

Research Into Use Programme

Annex 6 to Final Report (July 2006 – December 2012)

Final reports from Asia Innovation Challenge Fund

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Cluster 1 Participatory Crop Improvement in South Asia

1. Background

Project scope. The RIU Best Bets Project¹ was primarily designed to promote the new rice and legume varieties that had been identified in the RNRRS Plant Sciences Research Programme (PSP). The varieties were either bred using client-oriented breeding (COB) or had been identified using participatory varietal selection (PVS). There were also activities in promoting improved agronomy developed in the PSP.

The project activities took place in India, Nepal and Bangladesh and concentrated on raising farmer awareness of the new products and the provision of seed on a large scale (small samples to tens of thousands of farmers). In India and in Bangladesh this was facilitated by NGO networks – groups of NGOs who planned a coordinated approach to distributing seed of the new varieties. In Nepal farmer groups not only multiplied seed but also helped in the distribution of seed. The project used a business-oriented approach to help the groups become sustainable, profitable enterprises. In India and Nepal private-sector companies were established to promote the varieties (India) or both the varieties and the process of COB (Nepal).

Putting research into use. Investments in putting research into use are essential if the benefits from research are to be realised in a realistic time frame. The research products that were promoted had a far more rapid rate of adoption than 'control' varieties that had been promoted through conventional channels. For example, in Nepal new varieties from COB were adopted at a much higher rate (16%) of households in a resurvey of baseline data compared with 5% of households who had adopted a new variety of the same age as the from the Nepal Agricultural Research Council (NARC) (Fig. 1).

In India, the 'Ashoka' early maturing, drought-tolerant rice varieties promoted by the project were the only upland varieties with significant adoption. It showed that the conventional system of seed supply for upland varieties in eastern India is ineffective (and also indicates that conventional rice breeding had not produced competitive varieties). Any project that is funded on the premise that good upland varieties produced by research will reach farmers through the conventional system of seed supply and promotion is doomed to have minimal impact.

In Bangladesh, despite regulatory hurdles designed to give a monopoly to public-sector rice breeders there was considerable impact from COB rice varieties introduced from Nepal.

¹ This originally started as three separate projects under the Asia ICF component



Fig. 1. The adoption of COB varieties compared with three contemporaneous varieties from NARC in a resurvey of a sample of households from the baseline study in six districts of the 'rice – legume' project.

Role of the private sector. For real sustainability research outputs have to be applied by the private sector. Two private-sector companies were set up in Nepal (GATE and Anmolbiu) to promote the process of client-oriented breeding and supply seeds of the varieties identified by the RNRRS. The limited objective of supplying more seed of COB varieties has definitely been met. However, whether the process of COB will continue and, indeed, whether the companies will themselves continue is questionable. It is clear that the time frame for establishing the companies (two years) was too short, and the project should have continued to allow at least five years of mentoring.

In India, a seed producer company was established that also produced large quantities of seed of the COB varieties. However, the long-term survival of the company is not yet assured, again because of inadequate time for supporting its activities. The supply of upland rice varieties is not a particularly attractive commercial proposition and the longer maturity medium land COB varieties are the ones that the company will run with in the future (assuming its operations continue). There is a need for a policy change to subsidise upland varieties suitable for resource-poor farmers.

In Nepal, there was also a business-oriented approach to supporting farmer groups. Since this activity pre-dated the Best Bets project there was more time to support these groups and a good proportion of them should prove to be profitable in, at least, the medium term. However, the provision of newer varieties is still problematic as the supply of older, in-demand varieties is commercially less risky. Again, policy changes are needed to make the production of newer varieties.

2. Technological innovations and putting knowledge into use

2.1 Bangladesh

The project scaled up mainly two COB rice varieties: Barkhe 3004 and Judi 567. Barkhe 1027 and Barkhe 1036 were promoted to a lesser extent. All these varieties were bred in Nepal in DFID PSP projects. These performed well in Bangladesh following testing in participatory varietal selection (PVS) trials across the t. *aman* and *boro* season. The project covered 53 villages across 8 districts of Bangladesh covering over 8,000 households and distributing 41 t of rice seeds. A considerable quantity seeds of new varieties of chickpea, lentil and mungbean were also scaled up. The project worked through a network of 6 partners (see table below). In the distribution process, in addition to project partners, block-level officials of Department of Agriculture Extension, e.g. Sub Assistant Agricultural Officers (SAAOs) were involved, who also facilitated in market linkage for the seeds and grains.

COB rice varieties promoted in the project have a combination of desirable traits, e.g. unlike BRRI varieties, these can be grown in t. *aman* and *boro* season and Judi 567 is even suitable for t. *aus* season hence have less problem for seed availability. These are drought tolerant (*Khara Sahisnu*); can tolerate moisture stress for 10-12 days; Barkhe 3004 has seedling stage chilling tolerance. These also fetch higher market price (£4-5 more per 100 kg) than the existing varieties. The performance of Barkhe 3004 in Northern districts of Bangladesh was better than in the High Barind Tract (HBT).

The project also scaled up new varieties and associated technologies of chickpea, lentil and mungbean that were identified in DFID PSP funded projects. Crop varieties scaled up include BARI Chola 5 chickpea, BARI Masur 4 and BARI Masur 6 lentil, and BARI Mug 6 mungbean. In addition to new varieties of legumes, seed priming with Mo and *Rhizobium*, use of appropriate seed and grain storage techniques, use of IPM (placing bird perches and spraying insecticide) were also scaled up.

Farmers' capacity on rice and legume seed production and preservation increased through training. Farmer's field days, local print and electronic media were used for cresting awareness about the new technologies, build confidence on new varieties and technologies and help create seed demand.

2.2 India

The project scaled up five COB rice varieties. Three of these were bred in DFID PSP projects in India jointly by: Birsa Agricultural University (BAU), Ranchi, Jharkhand; the Gramin Vikas Trust (GVT), Ranchi; and Bangor University, UK. These were Ashoka 200F (Birsa Vikas Dhan 109), Ashoka 228 (Birsa Vikas Dhan 110) and PY84 (Birsa Vikas Dhan 111). Two of the varieties were bred in Nepal by COB : Sugandha 1 (Birsa Vikas Sugandha 1) and Barkhe 3010 (Birsa Vikas Dhan 203). PY84 was the product of marker-assisted selection in Bangor University under a DFID PSP project. Ashoka 200F and Ashoka 228 were notified by the Ministry of Agriculture, government of India in 2005, while PY84, Sugandha 1 and Barkhe 3010 were approved by the state release committee but are still undergoing bureaucratic delays.

Ashoka 200F, Ashoka 228 and PY84 are suitable for direct seeding in the rainfed uplands and transplanting in medium lands. They are tolerant to major pests and diseases, have superfine (long-slender) grains and excellent cooking quality. Sugandha 1 and Barkhe 3010 are suitable for transplanting in the drought prone medium and lowlands during the *kharif* season. Sugandha 1 has aromatic grains.

All these varieties performed well in the project area in India. The project distributed seed to over 100,000 farmers across 7 States of India. Over 60,000 households received seed through the NGO network in Jharkhand and over 48,000 households through GVT. Over 500 t of seed was distributed.

Farmers' capacity on rice and legume seed production and preservation increased through training. Farmer's field days, local print and electronic media were used for cresting awareness about new technologies, build confidence on new varieties and technologies and help create seed demand for the new varieties.

2.3 Nepal

Projects in Nepal focused on three themes: the scaling up of COB rice varieties and best bet varieties of legumes though IRD; the strengthening CBSPs through the business development services (BDS) approach; and agronomic intervention for improving productivity and sustainability of the production systems.

Crops and varieties used for scaling up in both the projects in Nepal were largely in common and comprised of COB rice varieties bred in Nepal, mungbean and lentils (Table 1). Of the various rice varieties validated and promoted in the project, three varieties, namely Barkhe 3004, Sunaulo Sugandha and Barkhe 2014 have already been released by National Seed Board while Barkhe 1027 has been registered. In addition to these, a number of other COB rice varieties were demonstrated to be useful for farmers and are awaiting to be entered into release/registration process.

The project promoted two mungbean varieties identified and released in DFID PSP projects namely, Kallyan and Pratiksha, as well as lentil, chickpea and kidney bean varieties

- In 2010/11 season, 38 CBSPs produced a total of 2,923 t of truthfully labelled (TL) rice seed; of which 486 t was of COB rice varieties, 22 t of kidney bean, 77 t of mungbean, 126 t of lentil, and 21 t chickpea.
- A total of >146,000 farming households were reached IRD kits of new varieties of rice, 13000 households for lentil, 6000 households for mungbean, nearly 4000 households for chickpea and 3000 households for kidney bean.
- A total of 5,033 farmers were exposed to the concept of quality seed production and marketing through their participation in new variety stakeholders meetings (NVSMs), trainings and exposure visits.
- Nearly 43,000 households were reached for RRC technologies through demonstration, field days and other approaches.

Farmers' capacity on variety selection, rice and legume seed production, preservation and marketing increased through training and other activities, such as farmer's field days, exposure visits. Local print and electronic media were used for creating awareness about the new technologies.

3. Systems strengthening and contribution to sustainability

3.1 Bangladesh

• Collaboration and linkages developed in project with various partners to scale out new crop varieties and technologies will be maintained.

• Establishment of a private seed company-Novel Agro Tech can be considered as one of the important outcomes of the project with the expectation that it gives continuity to production and marketing of all the crop varieties promoted in the project.

3.2 India

The Jagannath Crop Producer Company Limited (JCPCL) was established with 273 farmers drawn from 25 seed producer groups (SPGs) and started functioning at Baripada, District Mayurbhanj, Odisha, India. JCPCL members as well as other farmers (non-JCPCL members) have engaged in the seed production of COB rice varieties namely; Ashoka 200F, Ashoka 228, PY84, Sugnadha-1 and Barkhe 3010.

However, a seed producer company requires a minimum of 5 years of support to build the managerial capacity among the directors and adequate knowledge among the seed producers. The withdrawal of support after two years puts the medium-term sustainability of the company at risk.

3.3 Nepal

Both the projects in Nepal contributed considerably in terms of system strengthening. The major contribution was establishing/strengthening at least 38 community-based small seed enterprises. The project activities were based on a business development services (BDS) approach to train the management in such things as marketing, book keeping, capture of government grants, and utilisation of capital.

- Over 600 members of CBSPs were trained on business development and marketing skills.
- 38 CBSP groups have adopted business plan for seed production, use truthfully labelled tags, and all 38 groups have initiated developing 3-year visions.
- Working capital of 17 CBSP groups increased ranging from 10% to 820%
- As a matter of their sustainability, CBSP groups were able to tap resources from sources other than the project

Facilitating the establishment of two seed companies; Anamolbiu Private Limited and Global Agritech pvt. Limited (GATE). Both the companies were established as outputs from the projects. GATE is running independently under the Company Board of Directors but Anmolbiu is yet to establish a fully transparent system of management. Both companies have produced significant quantities of seed of COB varieties. The medium-term future of these companies is not assured. A longer period of mentoring was needed.

3. Contribution to policy

3.1 Bangladesh

Several meetings and consultations were organized with the officials of DAE and Bangladesh, Rice Research Institute and Bangladesh Agriculture Research Institute (BARI). These meetings were very helpful in smoothing out the field implementation of project activities but did not meet with any significant changes in seed policy or variety testing and release and registration policies of Bangladesh. This would have been overly ambitious given the project resources. However, the project did manage to distribute seed of non-released varieties without government interference which was a significant deviation from official policy.

3.2 India

The policy change was limited to trying to achieve changes at the State Agricultural University in Chhattisgarh. However, the traditional approaches of the breeders proved too entrenched to make any changes.

3.3. Nepal

Of the three countries, Nepal is the one where the project had significant influence on policy. It clearly contributed in influencing policy related to seed system development and marketing. The project promoted the BDS approach to strengthen CBSPs with an emphasis on busioness skill development. High-level government officials were invited in the project review and planning meetings, and joint monitoring visits. During these visits CBSP members highlighted the points related to strengthening CBSPs along business lines. This had considerable influence over Department of Agriculture (DoA) in re-orienting the District Seed Self Sufficiency Programme (DISSPRO). The recently developed Seed Vision 2025 also incorporated considerable learning from RiUP projects. A new seed project implemented in 26 districts of Nepal by NARC -Seed Safety Nets Project (SSNP) has also adopted the CBSP approach. Although it does not have a full understanding of the business perspectives needed, they have promoted truthfully labelled (TL) seed.

4. Value for money-impact created

4.1 Bangladesh

No formal impact assessment was done in Bangladesh but anecdotal evidences indicate that farmers are using and expanding new varieties of rice and legumes promoted in the project and also using seed and grain storage techniques promoted in the project and willing to purchase seed and other inputs for seed priming and pest control.

Networking and developing new partnerships helped in reaching to several new locations never reached by PROVA before. This also helped in terms of reaching to more beneficiaries.

4.2 India

The impact of the Ashoka varieties for resource poor farmers has been assessed in the RiUP under the MIL component. The benefits to resource-poor farmers were significant. The project has been able to reach an additional 100,000 households (comprising about 600,000 people) so the impact is not insignificant. This impact is greatly increased when the well-documented farmer-to-farmer seed spread is considered (it would be reasonable to assume that a further 200,000 households and over 1 million people have benefitted).

The project finished too soon for varieties with a far higher potential to impact on poverty (because their domains were far larger as they could be grown in medium and lowland) to be disseminated. If Barkhe 3010 could have been disseminated on the same scale as the Ashoka varieties the benefits would be about an order of magnitude higher (a much larger area and absolute increases in yield much higher).

4.3 Nepal

- The impacts of both the projects in Nepal were assessed in terms of adoption of the new varieties. The adoption of the COB rice varieties across all the project districts (for both the projects) and across production domains ranged from 10-16% of households. In ccontrast, the adoption level of NARC varieties released at the same time was 7% of households even though the NARC varieties in question had been in the system for a much longer period than the COB varieties.
- The acceptance and adoption of lentil and mungbean was evaluated through impact assessment. All the households who once tried the lentil and mungbean varieties continued to grow them.
- In term of adoption, 11 % of 469 households adopted improved varieties of mungbean while 21% of 1318 households adopted improved varieties of lentil.
- Assuming an average of 3 neighbouring farmers exchanging seeds of IRD varieties from 34,125 IRD receiver households, over 102,000 households would have been benefited from the new varieties of lentil and mungbean.

5. Learning and future pathways

5.1 Bangladesh

- Farmers are still looking for shorter duration rice varieties for *boro* season, i.e. nearly 10 days earlier with a similar yield to that of Barkhe 3004; an important breeding objective for *boro* rice in Bangladesh.
- Involvement of various DAE offices and Block level employees, a number of NGOs and private company contributed in implementing RiUP activities smoothly and help create more impact in a short period. The involvement of DAE in particular in the distribution of IRDs was helpful in the institutionalization of superior varieties. For similar initiatives in future quantity of seed per informal research and development (IRD) kit should be 2 kg instead of 5 or 10 kg to increase the coverage of the projects to more farmers, and putting a nominal charge on IRDs would create a feeling of ownership and ensures that those kits reach in the hands of needy farmers.
- Government seed policy and seed Acts are not favourable for the NGOs. At times project experienced difficulty in promoting unreleased COB rice varieties.

5.2 India

- Farmers in Odisha state have realized the importance of growing new rice varieties Ashoka, PY-84 and Barkhe 3010. There needs to be a reliable source for producing and delivering quality seeds of them to farmers and the JCPCL may be a route if it proves to be a sustainable enterprise.
- The production of upland rice varieties for farmers in north-eastern India is not straightforward. Seed production has to take place in more southerly locations in the off-season. However, in this situation farmers can more profitably produce seed of longer-duration, higher yielding medium and lowland varieties. For upland rice seed to be produced on a significant scale subsidies are required.
- Trust-building among company directors, shareholder farmers, employees and facilitating organization is vital for the successful establishment of any new seed producer company. This needs to be built up over a period of longer than two years.
- The creation of an NGO network was a highly cost-effective mechanism of disseminating COB rice varieties in Jharkhand. It is a model that could be used elsewhere to great effect.

5.3 Nepal

- The project demonstrated the value of a business-oriented approach to strengthening food crop seed systems. This needs to be internalized by the national system.
- Producing and marketing truthfully labelled seed is very vital for grassroots-level seed production and marketing. This approach is now being gradually internalized by other institutions in Nepal.
- PVS identified and promoted varieties very quickly. Now there is a growing demand for these varieties that are being scaled up through networks of farmers' groups, DADOs, Agrovets, Cooperatives, local *Hat bazaars* and by farmer-to-farmer seed flow.
- The IRD of the rice and legume varieties will produce a large spill-over effect to many farmers in the project area and beyond. IRD is also a very powerful tool for promoting faster dissemination. These results were shown in an end-of-project workshop to NARC scientists and Department of Agriculture officials and they have begun discussions on utilising this approach to make the official varietal promotion system more effective.

Country	Name of the project	Main implementing agency	Collaborators and partners	Major interventions	Coverage
Nepal	Promoting new rice and legume varieties from Client Oriented Breeding	Local Initiatives for Biodiversity, Research and Development (LI- BIRD)	 Centre for Advanced Research in International Agricultural Development (CARIAD), UK FORWARD SUPPORT Foundation Department of Agriculture (DoA) and Nepal Agriculture Research Council (NARC) were major infomediary partners 	Scaling up of rice varieties bred using client oriented breeding (CoB) and other sources. Evaluation and promotion of new Mungbean and lentil varieties Developing and strengthening small seed enterprises (SSEs) using business development services (BDS) approach Policy advocacy	Parts of 10 terai district, Nepal with extensive coverage all over the terai and several mid hill districts
	Reducing poverty through intensification into rice fallows (P9002C)	Forum for Rural Welfare and Agriculture Reform for Development (FORWARD)	 CARIAD, Bangor University, UK FORWARD SUPPORT Foundation Department of Agriculture (DoA) and Nepal Agriculture Research Council (NARC) were major infomediary partners 	Evaluation and promotion of new rice, mungbean and lentil varieties Developing and strengthening small seed enterprises (SSEs) using business development services (BDS) approach Policy advocacy	Parts of 8 terai district, Nepal with extensive coverage all over the terai and several mid hill districts

Table 1. Participatory Crop Improvement (PCI) in South Asia-Research in to Use Programme (RiUP) Best Bets project

Country	Name of the project	Main implementing agency	Collaborators and partners	Major interventions	Coverage
Bangladesh	Scaling up COB rice varieties and new legume varieties in High Barind Tract of (HBT) Bangladesh	Peoples Resource Oriented Voluntary Association (PROVA)	 Gram Bikash Sangsta (GBS) Jobs Iris Jako Nari Progati Sangsta Novel Agro-Tech (pvt.)Ltd CARIAD 	Evaluation and scaling up of rice varieties bred using CoB, new Mungbean and lentil varieties Capacity building of farmers on rainfed Rabi cropping (RRC) technologies, promoting new technologies using various approaches	Parts of 8 districts in north-west Bangladesh including the High Barind Tract (HBT)
India	Improving Livelihoods in South Asia through Sustained Access to New Technologies in Rainfed Agriculture	Gramin Vikas Trust	 Oxfam India NGO Network, Jharkhand (made up of 18 partners) CARIAD 	Scaling up of five rice varieties bred using COB.	Parts of 7 states in north western and north eastern India: Gujarat, Madhya Pradesh, Rajasthan, Chhattisgarh, Odisha, Jharkhand, West Bengal

RIU End of Project Report

Participatory Crop Improvement: BANGLADESH

List of Partners:

- 1. Peoples Resource Oriented Voluntary Association (PROVA)
- 2. Gram Bikash Sangsta (GBS)
- 3. Jobs Iris
- 4. Jako Nari Progati Sangsta
- 5. Novel Agro-Tech (pvt.)Ltd.
- 6. Centre for Advanced Research in International Agricultural Development (CARIAD), UK

Knowledge being put to use

Identify and describe all theknowledgeproducts/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to your country strategy documents answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

Rice Varieties

- COB rice varieties (Barkhe 3004 and Judi 567) do not lodge whereas BRRI dhan 28 lodges.
- Proper fertilizer management found to be important for COB rice variety Barkhe 3004. Growing Barkhe 3004 with the excessive use of urea prolonged its maturity duration which created problems for farmers.
- Boiled rice quality of COB rice variety is very much preferred by the farmers
- COB rice varieties fetched higher market price (£ 4-5 more per 100 kg) is more than existing variety

- COB varieties are known as drought tolerant (Khara Sahisnu); can tolerate moisture stress for 10-12 days
- Performance of Barkhe 3004 at Northern districts is better than HBT.
- Unlike BRRI varieties that can be grown just for one season, COB rice varieties can be grown in both t. *aman* and *boro* season and even during t.*aus* season hence have less problem for seed availability.
- Barkhe 3004 is very suitable for *boro* season and many farmers preferred it because its seedlings can tolerate more chilling temperatures than that of BRRI varieties.
- Barkhe 3004 has longer panicles, compact grain filling and has slightly finer grains relative to BRRI dhan 29 and it also tolerates standing water for up to 10-12 days
- Farmers are looking for even shorter duration rice varieties for *boro* season, i.e. nearly 10 days earlier with a similar yield to that of Barkhe 3004; an important breeding objective for *boro* rice in Bangladesh
- COB rice variety Barkhe 1027 is early maturing variety with long slender grains and it is very much suitable for both t.*aus* and *boro* seasons.
- COB rice variety Barkhe 1036 is also early maturing variety with long slender grains and performs better than pariza and BRRI dhan 28 during both of t. *aus* and *boro* season
- We have identified some t.*aus* COB lines which are performing better during this season.

Chickpea: We have been using BARI chola 5 the BARI released variety. This variety is high yielding and also shorter duration. In HBT, locations for producing chickpea seeds were identified. The area and proportion of BARI chola 5 planted is increasing. The practice of seed priming with Mo + *Rhizobium* is also increasing substantially, with farmers willing to purchase these inputs. The general practice of seed priming is also increasing. Use of TSP, spraying against BGM, use of IPM (placing bird perches and spraying insecticide), and farmers using recommended seed and grain storage techniques are also increasing. Thus there is a considerable evidence of adoption of appropriate techniques of chickpea seed production.

Lentil: In the project, we used BARI released lentil variety-BARI masur 4 for seed production and preservation. Previously, High Barind Tract (HBT) was not preferred for lentil production but now, lentil is being grown in the area. Lentil area in the HBT is increasing day by day. BARI masur 4 is shorter duration and high yielding variety. Another shorter duration and high yielding lentil BARI masur 6 has also been released and promoted at farmers' level.

Stem phylum blight is the major disease of lentil in HBT but the farmers are using IPM to control that disease.

Mungbean: For the first time, mungbean has been introduced in the HBT with the support from RiUP project. The participating farmers are growing mungbean at HBT for the first time in their life. New mungbean varieties developed at Asian Vegetable Research and Development Centre (AVRDC) through DFID funded projects have been promoted in the project one of which was released in Bangladesh in the name of BARI mug 6. Cultivation of Mungbean is becoming very popular in the area. New mungbean are resistant to Mungbean Yellow Mosaic Virus (MYVM), high yielding, bold seeded and require less picking compared to the existing varieties. These also fetch higher market price.

Trainings on RRC technologies

Farmers were trained through organizing demonstrations seed production and preservation technologies in the project districts. The capacity of farmers regarding seed production on legumes has been increased.

Farmers field days (FFDs)

Farmer's field days were organized by PROVA to build up the confidence about new varieties and technologies and help create seed demands for new varieties during maturity stage. Local print and electronic media present during the field days helped disseminate the knowledge and technology bout variety.

IRD distribution

Informal research and demonstration kits (IRDs) consisting of 5 kg seeds of COB varieties of rice and legumes with associated information sheets were distributed to a large number of farmers in 8 project districts to disseminate and popularize the COB and other varieties of crops. In the distribution process, project partners and Block level officers of Department of Agriculture Extension, e.g. Sub Assistant Agricultural Officers (SAAOs) were involved. They also helped farmers in establishing market linkage for the seeds and grain.

Non RNRRS generated knowledge used:

In case of rice, project did not use any of the non RNRRS knowledge while for the legumes most of it came from non RNRRS sources.

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred.

In the activities section briefly describe the nature of specific activities you have adopted in your project to achieve the outputs. Did you have to use any new activities or modify these activities and if so explain the reasons for the same.

Project Output	Activities undertaken	Status of	Deviations if any	Please provide a brief description of the management
litle	/changes in activities	achievement	and the reason for	decisions and strategic direction taken that affected the
			the deviation.	project outputs.
1. Scaling up of	The COB rice varieties	IRD kits of rice	IRDs in rice deviated	Firstly, we distributed IRD with 10 kg seed per farmer but as per
COB rice	have been scaled up in	34,000(includes	due to power	management decision later 5 kg seed per farmer was used to
varieties	various new locations	10,000 IRDs	shortage, severe	increase the number of farmers so that the variety can rapidly
	rather than HBT.	planned for June	cold, lack of seeds	spread up.
		2011)	and awareness	
			about new varieties.	
2. Seed	Farmers were trained to	192 t of legumes	Some deviations due	As per RiU management PROVA provided farmers training on
production of	produce and preserve	including 72 t	to moisture stress,	seed production and preservation so that farmers can easily
legumes	legumes seed.	chickpea, 60 t of	less knowledge	grow and preserve their seeds
(chickpea,		lentil and 60 t of	about new crop, lack	
lentil,		mungbean	of seeds.	
Mungbean)				
3.Farmers	Many farmers started	4,000 farmers	none	IRD distribution is not sufficient, they suggested to impart
training and	producing and preserving	trained		training with IRD kits
demonstration	their own seed.			

of RRC				
technologies				
4.	Company is running with	Novel Agro- Tech	Completed as per	RiU strategic direction was to establish a new company so that
Establishment	it's own effort with	(Pvt.) Ltd	plan	it can continue the technical business for wellbeing of farmers.
and operation	technology of COB	company with 11		
of companies		share holders has		
		been established		
		and is lead by its		
		Board of Directors		
		(BODs)		

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

ii). When working to strengthen and enhance relationships what do you think worked well?

i). From the very beginning PROVA was working alone but its area coverage was very much limited. Only HBT was its intervention area. But to increase the area coverage and to diversify the activities PROVA developed partnership with some potential implementing partners from various locations. Collaboration of partner organizations with PROVA is appreciable. None of the selected partners dropped out yet.

ii). When we are working to strengthen and enhance relationship with the implementing partners we are following that the project target technology is diversified to different locations. The number of beneficiaries has increased. It was only made possible to work more in short time through partnership.

District	Implementing partners	Coverage of the project in <i>boro</i> rice scaling up (number)				
		households	seed quantity (kg)	villages	rice varieties	
Kurigram	PROVA in association with Novel Agro-Tech (Pvt.) Ltd.	1500	7500	5	2	
Lalmonirhat	PROVA in association with Jobs Irris, Jako Nari and UDPS	2000	10000	10	1	
Joypurhat	PROVA in association with DAE	500	2500	5	1	
Rangapur	PROVA in association with Flood Hazard Research Centre (FHRC) & Novel Agro-Tech (Pvt.) Ltd.	200	1000	3	1	
Bogra	Grameen Bikas Sangstha	2000	10000	10	1	
Rajshahi	PROVA	1000	5000	10	2	
Naogaon	PROVA	500	2500	5	2	

Table 1. A view of scaling up activities COB rice varieties during Boro season in Bangladesh , 2011 through partnership

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Nawabganj	PROVA	500	2500	5	2	
Total	6	8200	41000	53	2	

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i). We had engaged some policy makers to contribute the project activities. We arranged some farmer's field days, motivational tours, group meeting partner's visit of different locations etc.

ii). The policy influencing groups are farmers, NGO partners, seed dealers, company people etc. Mechanisms that we used with policy makers like meeting, consultations, field visit etc.

iii). With respect to policy change, PROVA selected few partner NGOs and one seed company during project period. Some of them especially the seed company is working on our project activities through its own efforts. Undoubtedly, it is one of the symptoms of sustainability.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes? ii). Have there been any unintended changes / consequences?

i). PROVA has identified some implementing partners to implement its project activities collaboratively. Through collaboration of these partners it has been possible to diversify of new technologies.

ii). A private limited seed company NOVEL AGGRO TECH has been established and PROVA is providing technical backstopping to the company for seed production, procurement, processing and packing.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i). Lessons learnt

IRD distribution

- 1. At different locations the collaborative partners helped contributed in implementing RiU activities which helped create more impact on project works.
- 2. DAE Block level employees Sub Assistant Agriculture Officers (SAAOs) were very instrumental to select farmers and IRD seed distribution.
- 3. The involvement of DAE in the distribution of IRDs is helpful in the institutionalization of superior varieties.
- 4. Seed quantity per IRD should be 2 kg instead of 5 or 10 kg to increase the number of farmers.
- 5. Collection of a nominal charge for IRD from the seed receivers creates a feeling of responsibility among them and ensures that those kits reach in the hands of needy farmers.

ii). Have you shared these lessons with others and if so with whom and how?

We have shared the lessons that we have learnt from the project activities to our other stakeholders like implementing partners and company through formal discussion.

ii). Also, describe what has not worked and explain the reasons why not.

Since the COB varieties were not formally released in Bangladesh, it meant that at times it created a kind of legal issues as well.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

Work with non-registered varieties is the main challenge working with farmers.

Iv). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i). Technical

Maintenance of seed purity is most important issue for the farmers to create more impact for new varieties. ii). Organizational: We also came across the criticism that this type of activities is for the government organizations not for the NGOs.

iii). Marketing: PROVA lacked marketing expertise but once the private company has been created and started its activities, now our partner company will do that.

iv). Policy: Government seed policy seed Acts are not in favour of the NGOs.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Output No 1	Output No2	Output No 3	Output No 4
Number & Type of Indirect Beneficiaries (family members)	136,000 (approx)	5,600	20,000	200
Number & Type of Direct Beneficiaries (farmers)	34,000	1,400	5,000	50
Male Beneficiaries (indirect and direct)	70%	70%	70%	50%
FemaleBeneficiaries (indirect and direct)	30%	30%	30%	50%
Total	136,000	5,600	20,000	200
Please describe the	We distributed IRD	We distributed legume	We imparted	50 persons are directly
benefits to the	packets to 34,000	(chickpea, lentil,	training to 5,000	involved in newly
beneficiaries for	farmers with 5 kg seeds.	mungbean) seed to	farmers on seed	established company
example what was	Through this seeds a	1,400 farmers for seed	production and	and a total of 2,000
the impact/ result of	total of 136,000 family	production. By this	preservation. By this	family members are
delivering the output.	members were directly	seed a total number of	training a total	benefited.
Please try to quantify	and indirectly	5,600 family members	20000 family were	
your responses, so	benefited.	were benefited	benefited.	

use numbers, percentages etc. when describing the benefits.			
Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report.	An informal impact assessment has been conducted in different locations.		

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion to help shapeproject interventions?

i). During training we gave more emphasise to women especially for seed preservation training because this activities are basically done by women. We also included tribal people in seed production program.

ii) One of the implementing partners "Gram Bikas Sangsta" (GBS) gave more emphasise to the handicapped (disabled people) for IRD distribution of COB rice varieties

iii) During impact assessment of COB rice variety in the group discussion there were 30% female members.

Expected and Unexpected Outcomes

i). We would like to identify theories of change that underlie project activities. By theories of change we mean 'a process of planned transformation (economic, social or political) including an articulation of the assumptions that lie behind its design and its goals'. Although theories of change were not made explicit early on in project activities, please identify theories of change / the underlying assumptions that your project was based on.

ii). Were the assumptions in your theories of change correct? Did the project go as you predicted it to? If not, what did cause the changes to take place in your project?

iii). Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

i) We planned to introduce a COB variety Barkhe 1027 during t. aus season but finally we saw that its performance was equally good both for t.*aus* and *boro* seasons.

ii) Since we looked short duration variety so, yield is normally less than existing long duration variety.

iv) Yet we have not been able to release those COB varieties so in some cases it creates problem to work on unreleased varieties.

RiUP-End of Project Report: GVT, India.

Participatory Crop Improvement: INDIA

Project Title: Improving Livelihoods in South Asia through Sustained Access to New Technologies in Rainfed Agriculture.

Lead Project Organisation: CARIAD, Bangor University, Bangor, UK. List of Partners:

- a. GRAMIN VIKAS TRUST, INDIA
- b. OXFAM INDIA
- c. NGO Network, Jharkhand.

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

- a. Rice COB Varieties: Ashoka 200F (Birsa Vikas Dhan 109): Rice variety developed by Birsa Agricultural University (BAU), Ranchi, Jharkhand and Gramin Vikas Trust (GVT), Ranchi. Notified by the Ministry of Agriculture, Government of India (MoA) in 2005. Suitable for direct seeded rainfed uplands and transplanting in medium lands. Early vigour that makes it to smother weeds. Early maturity (86 days) that makes it tolerates terminal drought and suit contingency plans. Suitable as catch crop. High grain yield of 2.5 to 3.0 t ha⁻¹ under direct seeding (25% more than Kalinga III and 33% more than Birsa Gora 102). Tall plants (95 cm) that yield more fodder. Stiff straw, so resistant to lodging. Tolerance to major pests and diseases. Superfine (long-slender) grains. Straw-coloured husk with white kernels. Excellent cooking quality.
- b. Ashoka 228 (Birsa Vikas Dhan 110): This rice variety was also developed by Birsa Agricultural University (BAU), Ranchi, Jharkhand and Gramin Vikas Trust (GVT), Ranchi. Notified by the Ministry of Agriculture, Government of India in 2005. Suitable for direct seeded rainfed uplands and transplanting in medium lands.Early vigour that makes it to smother weeds. Early maturity (95 days) that makes it tolerate terminal drought and suit contingency plans. Suitability as catch crop. High grain yield of 2.5 to 3.0 t ha⁻¹ under direct seeding (19% more than Kalinga III and 26% more than Birsa Gora 102). Tall plants (100 cm) that yield more fodder.Stiff straw, so resistant to lodging.Tolerance to major pests and diseases. Superfine, long-slender grains. Straw-coloured husk with white kernels. Excellent cooking quality.

C.	PY 84 (Birsa Vikas Dhan-111): This rice variety has been developed by Birsa Agricultural University (BAU), Ranchi, Jharkhand and
	Gramin Vikas Trust (GVT), Ranchi. The revised recommendation of this variety has been submitted on 4.10.2012 to Department of
	Agriculture, Government for its onward recommendation to CVRC, MoA. Direct seeding in the rainfed uplands and transplanting in
	medium lands. Better root development. Tall plants (90-95 cm).Weed smothering ability. Long slender grain (length 9.30mm, breadth
	2.40mm, L: B ratio 3.87). Non-lodging, non-shattering. Highly drought tolerant. Responsive to fertilizer application. Moderately
	tolerant to brown spot and leaf blast. Moderately resistant to stem borer and dead heart insects under natural conditions. High yield
	of 2.3-2.5 t ha ⁻¹ .
d.	Sugandha 1 (Birsa Vikas Sugandha-1): Like PY 84, the recommendation of this variety has also been submitted on 4.10.2012 to
	Department of Agriculture, Government for its onward recommendation to CVRC, MoA. Suitable for transplanting in the drought
	prone medium and low lands during kharif season. Medium maturity (about 120 days). Tall plants (120-125 cm). Aromatic white grains.
	Long slender grain (kernel length 6.35 mm, breadth-2.10 mm, L/B ratio 3.71mm). Higher straw yield. Excellent drought tolerance.
	Moderately resistant to blast, bacterial leaf blight and Helminthosporium spots. Moderately resistant to Stem borer and Gandhi bug
	under field conditions. Non-lodging, non-shattering. Responsive to fertiliser application. Average yield 4.0-4.5 t ha ^{-1.}
e.	Barkhe 3010 (Birsa Vikas Dhan 203): Like previous two rice varieties, Barkhe 3010 the recommendation of this variety has also been
	submitted on 4.10.2012 to Department of Agriculture, Government for its onward recommendation to CVRC, MoA. Suitable for
	transplanting in the drought prone medium and lowlands. Semi- dwarf plant type. White husk with white kernel. Long slender grain
	(kernel length 6.0mm, Breadth- 1.9mm, L/B ratio 3.16). Moderately resistant to stem borer and Gandhi bug under field conditions.
	Moderately resistant to blast, bacterial leaf blight and Helminthosporium spots under field conditions. Responsive to fertiliser
	application. Non-shattering with erect, non-lodging plant type. Average yield under rainfed conditions 4.0-4.5 t ha ⁻¹ . Can replace IR 64.
Non RNRRS ge	enerated knowledge used:
	RiUP did not use any of the non-RNRRS generated knowledge

Project Outputs

Project Output	Activities undertaken /changes in activities	Status of	Deviations if	Please provide a brief
Title		achievement	any and the	description of the management
			reason for	decisions and strategic direction
			the	taken that affected the project
			deviation.	outputs.
1 Seed	• Identification of suitable domains for the rice seed production in	Target 500 t	Target	Involvement of local resources for
production	post rainy season.	361.4 t till June	exceeded,	effective community mobilization

		1		
	• Suitability of COB rice varieties in project area for seed production.	2009-10. 7 t in	total 512.4 t	was effective which enhanced
	 Motivation of farmers for COB rice varieties seed production 	summer and 45	seed was	the efficiency of the project work
		t in rainy season	produced	was very important. The local
		of 2010-11		There was no significant
		whereas27.9 in		deviation from the plan
		rainy season		
		and 9.1 t in		
		summer season		
		of 2011-12 was		
		produced.		
2 Seed	• To popularize and disseminate the advantages, seed of COB rice	Target 55000	Target	182.8t of rice seed was given to
distribution	varieties was distributed amongst the beneficiaries in the project	Achievement	achieved was	the NGO Network in Jharkhand in
	areas.	GVT=48426	more than	the project during 2009 through
	• The seed of the only COB varieties released by the government	NGO Network in	expected.	2011. Keeping in view lack of
	official system was made available by the project.	Jharkhand=	The seed	funds for NGOs the no cost
	• To meet the requirement of COB rice varieties seed, seed	60392	could be	extension in the extended project
	production programme was the foremost activity. The targeted	Total=108818	distributed to	period target was curtailed in the
	seed production of 500 t seed for the entire project period was		108818	later phase.
	undertaken. In the project, 512 t seed of various COB rice varieties		farmers by	
	was produced for distribution including for the NGO Network for		June 2012.	
	Jharkhand, NGO Network distributed seed to 60392 farmers in			
	Jharkhand state. A total of 48426 farmers were benefitted by			
	getting the seed of COB rice varieties in GVT project areas. Each			
	Farmer was provided with 2 kg seed of COB rice variety. Out of			
	these 48426, 5685 were women and 42,741 were men (Table 1 and			
	Table 2).			
3 Training (FURS .	West Bengal and Jharkhand were included in the first phase along	Target 60000	The capacity	Due to reduced funding in the no
Exposure visits.	with Chhattisgarh and Madhya Pradesh whereas Guiarat and	0	building of	cost extended period, total
FGDs, meetings)	Raiasthan were included in the extension phase in place of	Achievement=	additional	target of number of farmers
-,,	Jharkhand and West Bengal, Later, Jharkhand was covered by the	49715	11632	could not reach near to target.
	NGO Network for popularization of COB rice varieties	_	through	
	• In 2008 only 27 haseline study activities were under taken in 48		FURS and	
	- in 2000 only, 27 buschine study detivities were under taken in 40			

 12207 in MP, 12386 in Chhattisgarh, 1404 in West Bengal 4782 in Gujarat and 3440 in Rajasthan (Table 1). Awareness of advantages of COB rice varieties to 6518 was created through Focus Group Discussions (FGDs) and farmers meetings. In Odisha 35 FGDs in 48 villages for 1921 farmers, in Jharkhand 62 FGDs in 62 villages for 1905 farmers, in MP 26FGDs in 23 villages for 974 farmers and in Chhattisgarh 34FGDs in 34 villages for 1718 farmers were held in first three years of the project. Later on FGDs were discontinued. (Table 3) Capacity building of 22393 farmers was designed through exposure visits from 2008 to 2011 during the rice cropping season where the COB varieties were cultivated by the farmers. Total 270 farmers' exposure visits from 247 villages in six states excluding West Bengal were organised to familiarize and decide on cultivation of the COB rice varieties and needed a total of 22, 393(for details see Table 4). 236 Farmers Upland Rice Schools were organised during 2008-2012 for the 20804 farmers of 255 villages in six states. In Odisha (3426), Jharkhand (100), MP (5938), Chhattisgarh (3739), Gujarat (2372) and Rajasthan (4329) farmers were benefitted from the FURs (see 		which brought the total number of farmers to 49715.	
and Rajasthan (4329) farmers were benefitted from the FURs (see details in Table 5).			
 Sharing the concept of seed producer company with the pertinent stakeholders Formation of company Executive Board Capacity building of the company directors and members Registration of the company Distribution of the shares to the stakeholders 	Jagannath Crop Producer Company Limited (JCPCL) established at Baripada,	The JCPCL has been established and started functioning at village	Due to late start, the go down construction is to be completed by the company after end of the project.
	 12207 in MP, 12386 in Chhattisgarh, 1404 in West Bengal 4782 in Gujarat and 3440 in Rajasthan (Table 1). Awareness of advantages of COB rice varieties to 6518 was created through Focus Group Discussions (FGDs) and farmers meetings. In Odisha 35 FGDs in 48 villages for 1921 farmers, in Jharkhand 62 FGDs in 62 villages for 1905 farmers, in MP 26FGDs in 23 villages for 974 farmers and in Chhattisgarh 34FGDs in 34 villages for 1718 farmers were held in first three years of the project. Later on FGDs were discontinued. (Table 3) Capacity building of 22393 farmers was designed through exposure visits from 2008 to 2011 during the rice cropping season where the COB varieties were cultivated by the farmers. Total 270 farmers' exposure visits from 247 villages in six states excluding West Bengal were organised to familiarize and decide on cultivation of the COB rice varieties and needed a total of 22, 393(for details see Table 4). 236 Farmers Upland Rice Schools were organised during 2008-2012 for the 20804 farmers of 255 villages in six states. In Odisha (3426), Jharkhand (100), MP (5938), Chhattisgarh (3739), Gujarat (2372) and Rajasthan (4329) farmers were benefitted from the FURs (see details in Table 5). Sharing the concept of seed producer company with the pertinent stakeholders Formation of company Executive Board Capacity building of the company directors and members Registration of the company Distribution of the shares to the stakeholders 	 12207 in MP, 12386 in Chhattisgarh, 1404 in West Bengal 4782 in Gujarat and 3440 in Rajasthan (Table 1). Awareness of advantages of COB rice varieties to 6518 was created through Focus Group Discussions (FGDs) and farmers meetings. In Odisha 35 FGDs in 48 villages for 1921 farmers, in Jharkhand 62 FGDs in 62 villages for 1905 farmers, in MP 26FGDs in 23 villages for 974 farmers and in Chhattisgarh 34FGDs in 34 villages for 1718 farmers were held in first three years of the project. Later on FGDs were discontinued. (Table 3) Capacity building of 22393 farmers was designed through exposure visits from 2008 to 2011 during the rice cropping season where the COB varieties were cultivated by the farmers. Total 270 farmers' exposure visits from 247 villages in six states excluding West Bengal were organised to familiarize and decide on cultivation of the COB rice varieties and needed a total of 22, 393(for details see Table 4). 236 Farmers Upland Rice Schools were organised during 2008-2012 for the 20804 farmers of 255 villages in six states. In Odisha (3426), Jharkhand (100), MP (5938), Chhattisgarh (3739), Gujarat (2372) and Rajasthan (4329) farmers were benefitted from the FURs (see details in Table 5). Sharing the concept of seed producer company with the pertinent stakeholders Formation of company Executive Board Capacity building of the company directors and members Registration of the company District 	 Liz207 in MP, 12386 in Chhattisgarh, 1404 in West Bengal 4782 in Gujarat and 3440 in Rajasthan (Table 1). Awareness of advantages of COB rice varieties to 6518 was created through Focus Group Discussions (FGDs) and farmers meetings. In Odisha 35 FGDs in 48 villages for 1921 farmers, in Jharkhand 62 FGDs in 62 villages for 1905 farmers, in MP 26FGDs in 23 villages for 974 farmers and in Chhattisgarh 34FGDs in 34 villages for 1718 farmers were held in first three years of the project. Later on FGDs were discontinued. (Table 3) Capacity building of 22393 farmers was designed through exposure visits from 2008 to 2011 during the rice cropping season where the COB varieties were cultivated by the farmers. Total 270 farmers' exposure visits from 247 villages in six states excluding West Bengal were organised to familiarize and decide on cultivation of the COB rice varieties and needed a total of 22, 393(for details see Table 4). 236 Farmers Upland Rice Schools were organised during 2008-2012 for the 20804 farmers of 255 villages in six states. In Odisha (3426), Jharkhand (100), MP (5938), Chhattisgarh (3739), Gujarat (2372) and Rajasthan (4329) farmers were benefitted from the FURs (see details in Table 5). Sharing the concept of seed producer company with the pertinent stakeholders Formation of company Executive Board Capacity building of the company directors and members Registration of the company Distribution of the shares to the stakeholders District Kalajhini, in

• Every member of the SPG became the member of JCPCL 25 seed	Mayurbhanj,	Mayurbhanj,
producer groups (SPGs) established in 16 villages of three blocks of	Odisha, India	Odisha.
Baripada in Mayurbhanj districts of Odisha . A tota of 273 farmers		
are in the above 25 groups (table 6). All have paid a membership fee		
of Rs.100/- and each group has opened a bank account.		
 after paid up share capital of rs.500/ 		
• Seed production of COB rice varieties namely Ashoka 200F, Ashoka		
228, PY-84, Sugnadha-1, Ashoka 900F and Barkhe 3010 was		
undertaken		
• JCPCL members as well as non-JCPCL members involved in seed		
production of above COB rice varieties.		

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project?Kindly describe your experiences in this regard.

ii). When working to strengthen and enhance relationships what do you think worked well?

i). All partners have contributed as expected in the project.

ii). OXFAM was not included in the later stage as the key person who left this institution was then hired independently by GVT.

iii) The capacity building of the JCPCL directors and active members was undertaken by him including the visit to the Tussar Producer Company at Devghar in Jharkhand.

iv) Jharkhand Network was involved for seed distribution from 2009 onwards and significantly covered a good number of farmers.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons

derived from your project?

- i) Numbers of meetings were held with the Vice chancellor, Indira Gandhi Agricultural University, Raipur, Chhattisgarh to incite the importance of COB rice varieties and their recommendation for cultivation in the state.
- ii) The Director of Research of the Indira Gandhi Agricultural University along with the breeders working with him agreed to evaluate the COB rice varieties in that state.
- iii) The evaluation of the COB varieties were evaluated by IGAU along with the rice hybrids which was scientifically not valid. The situation led to the non inclusion of rice Asoka varieties for further the second year of testing could not be undertaken.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

i). The three varieties mentioned earlier in this report namely PY 84, Barkhe 3010 and Sugandha 1 were submitted to the CVRC for their release by Birsa Agricultural University, Jharkhand to CVRC.

ii). A meeting in this regard was held with the Vice Chancellor of the concerned university regarding the status of these varieties.

iii). The proposal has been resubmitted again after incorporating the suggestions made by the CVRC.

iv). After the formal release of these varieties, they will also be included in the seed production channel of the state.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i) The seed production during the main season (rainy season) was not advantageous as compared to off season summer production. This not only gives higher production but also avoids the storage period of the seed. This was further experienced by the beneficiaries during the project implementation.

ii) The hindrances in targeted quantity of seed production were faced due to aberrant weather conditions (high temperatures) in one of the

summer season.

- iii) The dissemination of COB rice varieties in Jharkhand by NGO Network in that state during the extended phase was complementary to the project activities.
- iv) The convincing to the farmers for becoming the paid up members of the company was a tiresome task which was later achieved once the process of membership was facilitated through groups. After realising the ownership to the company farmers became very enthusiastic and came forward voluntarily for strengthening the activities.
- v) Company directors worked for the company activities like supervising the go down construction, enrolling group membership and seed procurement and processing.
- vi) Trust building amongst the company directors, members, employees and facilitating organization was one of the important factor for the successful establishment of the seed producer company.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number & Type of	Number &	Male	Female	Total	Evidence Index*
	Indirect	Type of Direct	Beneficiaries	Beneficiaries		
	Beneficiaries	Beneficiaries	(indirect and	(indirect and		
			direct)	direct)		
Output No2-	145278 household	48426 rice	Direct	Direct	193704	See state wise details in
Seed distribution	members,	growers who	42741	5685		Tables 1 and 2 seed
(based on one grower with	concerned with	used COB	Indirect	Indirect		distribution at the end of
three house hold members)	paddy cultivation	seeds	54111	91167		report and Annexure I.
Output No3 –	149145 household	49715 rice	Direct 44246	Direct	198860	See state wise details in
Training/FURS/Exposure	members,	growers	Indirect	5469		Tables 3, 4 and 5 on
visits/FGDs/meetings	understood COB	trained/expos	55184	Indirect		training/capacity building at
	rice varieties	ed to rice		93961		the end of report and
	production	production				Annexure II.
	technologies	technologies				
Output No7-	All the rice farmers	273 members	256	17	273	See Table 6 at the end of the
Seed producer company	interested in	of the JCPCL				report
operating effectively	cultivating COB	including its				

	varieties. Share holders, contact	directors				
	farmers, local markets					
Impact	a. How seed production b. Farm c. Their financial procedu d. Role farmer owned or	ever no formal in of COB varieties I ters involved in se r capacity has bee tres. and responsibilit ganization.	npact study has l ike Ashoka, PY-8 eed production k en built in runnir ies of the memb	been done but the fa 4 and Barkhe 3010. 2 now the modus ope 1 g a seed producer co 1 ers, directors and er	armers have re randi of qualit ompany and it nployees unde	alised the importance quality y seed production. s official management and erstood the philosophy of a

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion to help shapeproject interventions?

- i) All out precautions were taken to include all spheres of farmers irrespective of caste, creed, religion and gender.
- ii) The 17 women became the members of the company by paying share capital.
- iii) There was one special seed producer group "Maa Shitala" in village Belisole of Suliapada block comprising only women members.
- iv) No data base was used in shaping the project interventions however, due priority was give to gender and social inclusion.

Expected and Unexpected Outcomes

i). We would like to identify theories of change that underlie project activities. By theories of change we mean 'a process of planned transformation (economic, social or political) including an articulation of the assumptions that lie behind its design and its goals'. Although theories of change were not made explicit early on in project activities, please identify theories of change / the underlying assumptions that your project was based on.

ii). Were the assumptions in your theories of change correct? Did the project go as you predicted it to? If not, what did cause the changes to take place in your project?

iii). Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new,

better or worse outcomes related to your project?
Unexpected:
i) a. One of the most important aspect of the activities was the enthusiasm amongst the stake holders to volunteer their services to the seed producer company i.e. JCPCL.
b. This indicates their ownership towards the activity along with their mindset.
ii) The group members were amenable to the changes in their traditional varietal cultivation.
iii) a. Assumptions made in the beginning of the project were almost correct due to the strong back-up supportand image of the implementing organisation in the community.
b. The formation of women group was a positive change in the assumptions which was not expected earlier.
iv) The availability of land on long lease without any cost by one of the company director was a positive outcome while implementing the company formation.
v) The change in the community mindset from farmer to entrepreneur.
vi) Participation of local resource persons while popularizing and dissemination the new technology has been more successful.
Expected:
i). Preference for the basket of choices for COB varieties especially Barkhe 3010 and PY-84.as anticipated while framing the project.
ii). Seed production with the involvement of the community was also and expected outcome.

Any Other Comments

Please include any other comments that you would like to include and which you feel don't fit in elsewhere. In particular what has happened to any RIU activities since RIU funding ceased? Have they continued or not? And for what reasons?

a. The submission of the COB rice varieties for their official release in Jharkhand state by Birsa Agricultural University due to no follow up after the project completion.

b. The testing of COB varieties was incomplete due to reduced funding in the extended phase of the project by Indira Gandhi Agricultural University in Chhattisgarh.

c. Due to reduced funding, seed producers are now interested in diversifying the seed production activities to other crops in addition to the rice.

State	2008	2009	2010	2011	2012	Oth. 2010	Oth.2011	Oth.2012	Total
Odisha	862	6701	1517	3216	432	574	169	99	13570
Jharkhand	637	0	0	0	0	0	0	0	637
МР	2135	5003	2490	71	2508	0	0	0	12207
Chhattisgarh	1006	4552	3753	3000	0	75	0	0	12386
West Bengal	0	1404	0	0	0	0	0	0	1404
Gujarat	0	0	2000	1019	224	1034	379	126	4782
Rajasthan	0	0	2490	135	815	0	0	0	3440
Total	4640	17660	12250	7441	3979	1683	548	225	48426

Table 1. No. of farmers to whom COB rice varieties seed distributed over years in Best Bet project.

Table 2. Direct gender wise beneficiaries of COB rice varieities seed distribution in Best Bet project.

State	2008		2008 2		009 20		2	2011		2012		Total	
Gender	F M		F	Μ	F	Μ	F	М	F	Μ	F	М	F+M
Odisha	9	853	573	6128	123	1394	187	3029	48	384	940	12630	13570

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

Jharkhand	78	559	0	0	0	0	0	0	0	0	78	559	637
MP	373	1762	1172	3831	306	2184	8	63	433	2075	2292	9915	12207
Chhattisgarh	188	818	930	3622	754	2999	215	2785		0	2087	10299	12386

Table 3. Base line in 2008 and Focus Group Discussions (FGD) arranged on COB rice varieties production in Best Bet project.

West Bengal	0	0	25	1379	0	0	0	0	0	0	25	1379	1404
Gujarat	0	0	0	0	86	1914	23	996	11	213	120	4662	4782
Rajasthan	0	0	0	0	40	2450	7	128	96	719	143	3297	3440
Total	648	3992	2700	14960	1309	10941	440	7001	588	3391	5685*	42741*	48426

*=Direct beneficiaries for seed ddistribution.

			20	08				2009			2010		Total		
State	Base line	No.of Villages covered	No. of farmers particip ated	FGD	No.of Villages covered	No. of farmers particip ated									
Odisha	7	18	75	28	28	862	7	20	984	0	0	0	42	66	1921
Jharkhand	7	9	75	62	62	1830	0	0	0	0	0	0	69	71	1905
МР	8	15	82	11	11	249	11	8	263	4	4	380	34	38	974
Chhattisgarh	5	6	25	14	14	700	20	20	993	0	0	0	39	40	1718
Total	27	48	257	115	115	3641	38	48	2240	4	4	380	184	215	6518

		2008			2009			2010			2011		Total			
State	No. of Exp. Visit	No. of Village	No. of farmer partici pated	No. of Exp. Visit	No. of Village	No. of farmer partici pated	No. of Exp. Visit	No. of Village	No. of farmer partici pated	No. of Exp. Visit	No. of Village	No. of farmer partici pated	No. of Exp. Visit	No. of Village	No. of farmer partici pated	
Odisha	12	20	1204	2	2	52	10	7	1116	5	5	1068	29	34	3440	
Jharkhand	10	14	166	0	0	0	0	0	0	0	0	0	10	14	166	
МР	12	12	318	26	23	2344	26	26	2628	6	6	1025	70	67	6315	
Chhattisgarh	11	11	550	45	33	2260	5	5	1000	7	7	1090	68	56	4900	
Gujarat	0	0	0	0	0	0	21	4	1019	5	5	1070	26	9	2089	
Rajasthan	0	0	0	0	0	0	62	62	4297	5	5	1186	67	67	5483	
Total	45	57	2238	73	58	4656	124	104	10060	28	28	5439	270	247	22393	

Table 4. Exposure visits on COB rice varieities arranged in Best Bet project.
	2	008	2	009	2	2010	2	2011	2	2012	Т	otal	Total no. of
State	FURS	No. of Villages covered	farmers participated in the state.										
Odisha	19	19	5	5	3	3	8	8	3	12	38	47	3426
Jharkhand	13	13	0	0	0	0	0	0	0	0	13	13	1000
MP	8	8	20	9	38	68	7	7	0	0	73	92	5938
Chhattisgarh	10	10	20	20	9	10	7	7	0	0	46	47	3739
Gujarat	0	0	0	0	9	5	8	8	3	5	20	18	2372
Rajasthan	0	0	0	0	39	31	7	7	0	0	46	38	4329
Total	50	50	45	34	98	117	37	37	6	17	236	255	20804

Table 5. Number of FURs organised on COB rice varieties production in Best Bet project.

Block	Village	Name of the group (SPG)	Total paid up members	Male	Female
Kuliana	Kalajhinni	Maa Duwarsuni	7	7	-
Kuliana	Kalajhinni	Maa bhagwati	12	12	-
Kuliana	Dubelbeda	Sarla sushanta	11	11	-
Suliapada	Jambhirapal	Baba jambhireswar	13	13	-
Suliapada	Dumurdiha	Maa santoshi	10	10	-
Suliapada	Dumurdiha	Jai Bajarangbali	17	17	-
Suliapada	Mundulia	Sri Gouranga	13	13	-
Suliapada	Rasunia	Maa Duarsuni	10	10	-
Suliapada	Sanputuka	Maa putuka	14	14	-
Suliapada	Bhaduasole	Marangburu	8	5	3
Suliapada	Belisole	Gandhi SPG	10	10	-
Suliapada	Belisole	Jai Hanuman	10	8	2
Suliapada	Belisole	Maa Sitala	10	-	10
Suliapada	Dhobanisole	Maa Dhabanipat	11	11	-
Suliapada	Anlakuda	Maa Basanti	12	10	2
Suliapada	Jamsola	Jaher Aayo	10	10	-
Suliapada	Badjugiband	Jai Kishan	14	14	-
Samakhunta	Baldiha	Maa Natkati	9	9	-
Samakhunta	Baldiha	Maa Sitala	10	10	-
Samakhunta	Baldiha	Jai Hanuman	6	6	-
Samakhunta	Baldiha	Baba balukeswar	10	10	-
Samakhunta	Baldiha	Maa Pilapati	7	7	-
Samakhunta	Baldiha	Maa Haldigundi	8	8	
Suliapada	Bad Baicha	Jai Shivsanker	12	11	1
Suliapada	Jhaliamara	Sagun sahar	10	10	-
Total			273	17	256

 Table 6. Jagannath Crop Producer Company Limited, Kalajhini, Mayurbhanj, Odisha.

SEED DISTRIBUTION OF ASHOKA RICE COB VARIETIES

	Overall Su	mmary 2008		
No. of farmers		F	Μ	Total
Odisha (formerly Orissa)		9	853	862
Jharkhand		78	559	637
MP		373	1762	2135
Chhattisgarh		188	818	1006
	Total	648	3992	4640
	Overall Su	mmary 2009		
No. of farmers		F	Μ	Total
Odisha		573	6128	6701
West Bengal		25	1379	1404
MP		1172	3831	5003
Chhattisgarh		930	3622	4552
	Total	2700	14960	17660
	Overall Su	mmary 2010		
No. of farmers		F	Μ	Total
Odisha		123	1394	1517
Gujarat		86	1914	2000
MP		306	2184	2490
Chhattisgarh		754	2999	3753
Rajasthan		40	2450	2490
Total		1309	10941	12250
	Overall Su	mmary 2011		
No. of farmers		F	Μ	Total
Odisha		187	3029	3216
Chhattisgarh		215	2785	3000
MP		8	63	71
Rajasthan		7	128	135

Gujarat	23	996	1019
Total	440	7001	7441
	Overall Summary 2012		
No. of farmers	F	Μ	Total
Odisha	48	384	432
Gujarat	11	213	224
MP	433	2075	2508
Rajasthan	96	719	815
Total	588	3391	3979

Other distribution (seed distribution in other programmes and activities).

Organization	Year 2010	Total farmers
Prikriti Foundation, Dahod, Gujarat.		377
I.G. A. U. Raipur, Chhattisgarh.		75
Seed Production GVT 2010 Summer		432
Seed Production GVT 2010 Rainy season		142
NAIP GVT, Gujarat		657
Total in 2010		1683
Organization	Year 2011	
Prikriti Foundation, Dahod, Gujarat.		280
Seed production GVT 2011 rainy season		53
Seed Production GVT 2011 Summer		116
NAIP GVT, Gujarat		99
Total in 2011		548
Organization	Year 2012	
Prikriti Foundation, Dahod, Gujarat.		56
Seed Production GVT 2012 Summer		99
NAIP GVT, Gujarat		70

Total in 2012	225
Grand Total (2008 -2012)	48426

				Annexure-II
(Capacity bui	Iding activities in	Best Bet on COB rice va	rieties in 2008
Activity	State	No. of activities	No. of villages covered	No. of farmers participated
FGD	Jharkhand	62	62	1830
	Orissa	28	28	862
	MP	11	11	249
	CG	14	14	700
	Total	115	115	3641
Exposure visits	Jharkhand	10	14	166
	Orissa	12	20	1204
	MP	12	12	318
	CG	11	11	550
	Total	45	57	2238
FURS	Jharkhand	13	13	1000
	Orissa	19	19	1500
	MP	8	8	412
	CG	10	10	538
	Total	50	50	3450
Baseline	Jharkhand	7	9	75
	Orissa	7	18	75
	MP	8	15	82
	CG	5	6	25
	Total	27	48	257
Total 2008		237	270	9586
	Capacity b	uilding activities ir	n Best Bet on COB rice varie	eties in 2009
Activity	State	No. of activities	No. of villages covered	No. of farmers participated
FGD	Orissa	7	20	984
	MP	11	8	263

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

	CG	20	20	993
	Total	38	48	2240
Exposure visits	Orissa	2	2	52
	MP	26	23	2344
	CG	45	33	2260
	Total	73	58	4656
FURS	Orissa	5	5	349
	MP	20	9	796
	CG	20	20	993
	Total	45	34	2138
Total 2009		156	140	9034

		No. of	No. of villages	
Activity	State	activities	covered	No. of farmers participated
FGD	MP	4	4	380
	Total	4	4	380
Exposure				
visits	Rajasthan	62	62	4297
	Orissa	10	7	1116
	MP	26	26	2628
	CG	5	5	1000
	Gujarat	21	4	1019
	Total	124	104	10060
FURS	Rajasthan	39	31	3225
	Orissa	3	3	191
	MP	38	68	3602

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

	CG	9	10	1014
	Gujarat	9	5	991
	Total	98	117	9023
Total 2010		226	225	19463
	Capacity build	ling activities in I	Best Bet on COB rice vari	eties in 2011
		No. of	No. of villages	
Activity Exposure	State	activities	covered	No. of farmers participated
visits	Odisha	5	5	1068
	Chhattisgarh	7	7	1090
	MP	6	6	1025
	Rajasthan	5	5	1186
	Gujarat	5	5	1070
	Total	28	28	5439
FURS	Odisha	8	8	1287
	Chhattisgarh	7	7	1194
	MP	7	7	1128
	Rajasthan	7	7	1104
	Gujarat	8	8	1282
	Total	37	37	5995
Total 2011		65	65	11434
	Capacity build	ling activities in I	Best Bet on COB rice vari	eties in 2012
		No. of	No. of villages	
Activity	State	activities	covered	No. of farmers participated
FURS	Odisha	3	12	99
	Gujarat	3	5	99
Total 2012		6	17	198
Grand Total (2008-12)		690	717	49715

End of Project Report

Participatory Crop Improvement: NEPAL

Lead Project Organisation: Forum for Rural Welfare and Agricultural Reform for Development (FORWARD Nepal)

List of Partners:

- 7. Local Initiatives for Biodiversity Research and Development (LI-BIRD),
- 8. Social Upliftment through Participatory Programmes, Research and Training (SUPPORT Foundation)
- 9. Centre for Advanced Research in International Agricultural Development (CARIAD)

Infomediaries

- 1. Department of Agriculture (DOA)
- 2. Nepal Agricultural Research Council (NARC)

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge :

Rice Varieties

- Sunaulo Sughandha: Aromatic, high yielding released variety.
- Barkhe 2014: High yielding and released in 2011 as a replacement to Kanchhi Masuli.
- Barkhe 3004: Released variety for lowlands.
- Barkhe 3019: Suitable for irrigated medium to lowlands, can be a good alternative to Masuli
- Barkhe 1027: Early maturing variety with long slender grains and is approved for registration. It is also suitable for making parboiled rice.

The following pipeline COB varieties were also tested and verified in various project districts:

• Sugandha 1: Aromatic variety for medium lands is liked by farmers and is in the process of registration

- PR101: Early maturing high yielding variety for rainfed upland area. Also suitable for making beaten rice. This variety will be proposed for release after collecting data from 2011 crop season
- MD0845: Medium duration variety liked by farmers in the medium lands, may be a substitute for Sabitri or Masuli
- MD0742 : Medium duration variety liked by farmers in the medium lands
- B1036 : Early maturing variety (115-120 days) suitable for rainfed uplands similar to Hardinath-1
- Judi 582: Early maturity (115-120 days) variety for irrigated and fertile lands

Mungbean Varieties

- Pratiksha: High yielding, mungbean yellow mosaic virus resistant, synchronous maturity.
- Kalyan: High yielding, mungbean yellow mosaic virus resistant, synchronous maturity
- VC 3960: High yielding pre-released variety liked by farmers

Chickpea Varieties

- Avarodhi :High yielding, botrytis gray mold and wilt disease tolerant
- Tara: High yielding, botrytis gray mold and wilt disease tolerant
- KPG59: Helicoverpa podborer tolerant pre-released variety. .

Some of the tools and methodologies applied in the project are as follows

CBSP Approach

For the production and marketing of seeds of COB and non COB varieties of crops, CBSP approach was put into use. For this, existing seed production groups registered in DADO Offices or Division Cooperative Offices were selected and capacitated through organizing a series of technical, managerial and marketing skills development training to the members. The project facilitated the registration of groups to the DADO offices or to cooperative division offices as per the need. Technical training was provided through project field staff and marketing skill development training was provided through hiring experts.

IRD distribution

Informal research and demonstration (IRD) kits consisting of 1 kg seeds of COB varieties of rice and legumes with associated information sheets were distributed to a large number of farmers in 12 project districts to disseminate and popularize the COB and other varieties of crops. Seeds of COB

varieties were procured from CBSPs while those of non-COB varieties were obtained from NARC centers. In mungbean and lentil IRDs, Rhizobium culture along with instruction sheet on seed inoculation was also included in the seed packets. Distribution of IRDs was done through CBSPs in collaboration with technicians of agriculture service centers (ASC) of DADO, wherever appropriate.

Farmers' field days (FFDs)

To popularize new varieties and technologies and help create seed demands of new varieties, farmer's field days were organized by CBSPs in the main cropping seasons. The visitors included seed entrepreneurs, mill owners, local and district level extension offices and farmers. Project technicians worked as facilitators. FFDs have facilitated the flow of information about new varieties to a large number of farmers.

Exposure visits /Neighbouring farmers' visit

A visit of neighbouring farmers to CBSP members were organized to acquaint them with the information on new varieties and technologies. This was also targeted to establish a business linkage between the seed group and farmers from the neighbouring areas to enhance market linkage.

Supporting CBSPs through matching fund concept

To make CBSPs more responsible for the creation of infrastructures for seed production, storage and processing, matching fund concept was introduced. The groups were motivated to raise funds of up to NRs 100,000.00 to take advantage of an equal contribution from the project for the construction of storage house, threshing floor, or purchase of any machines or the equipments needed for the group. Contribution of match fund has created a feeling of ownership of the assets and programs among the CBSP members.

Local resource persons

The concept of development of local resource persons (LRPs) and their deployment in farmer participatory research and development activities in the project area was initiated in previous projects. LRPs were capacitated and their services extensively used in farmer selection, IRD distribution, IRD feedback collection and organization of demonstrations, trials or other events as per need.

Trainings on Rainfed Rabi Cropping (RRC) technologies

The capacities and hands-on skills of farmers were enhanced through organizing on-farm demonstrations of RRC technologies and other associated activities nutrient loading demonstration on mungbean, zero tillage garlic production technology, demonstration of Jaita (*Sesbania Spp*) in agro

forestry system, value chain study on rice.

Non RNRRS generated knowledge used

Rice varieties:

- Hardinath 1: An early maturing (110 days) variety recommended for rainy/ spring season and rice vegetable pattern for the terai/inner terai and river basins.
- Mithila: Medium duration (145 days) fine grain variety promoted through the national system
- Ramdhan: An early maturing (133 days) fine grain variety recommended for the Siwalik dun/ inner terai areas.

Lentil varieties:

- Sagun: Medium bold seeded lentil variety recently released, moderately resistant to wilt and stephyllium blight diseases.
- Maheshwor Bharati: Newly released lentil variety with bold seeds and high yields coupled with lower disease incidences.

Wheat varieties:

- Vijaya: Ug99 rust resistant recently released variety.
- Gautam: The most popular variety for the terai and hills up to 500 meters.
- Aditya: Recently released variety for the terai area.

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project Output Title	Status of achievement	Deviations, if any	Reasons for the deviation
1. Seed production of rice legumes through CBSP groups	445.8 mt of rice including 108 mt COB varieties and 39.3 mt legumes (16.6 mt lentil, 17.1 mt mungbean, and 5.6 mt chickpea)	Target for rice has exceeded and those for legumes will be met after harvest of winter crops 2011	In response to increased seed demands from farmers, CBSPs produced more rice seeds than targeted. Mungbean production has suffered due to predominance of rainfed lands in the project area.

2. RNRSS and Non RNRSS technologies out scaled through IRDs	IRD kits of rice 21,550, lentils 2931 and mungbean 5666 distributed and the varieties made popular	IRDs in rice exceeded the targets	In response to increased demands for seeds of COB varieties, additional IRDs distributed.
3. Farmers training and demonstration of RRC technologies	7,923 farmers trained through demonstration of RRC technologies	1,823 additional farmers trained	Due to interests shown by farmers on RRC technologies, and farmer visitors at the Fourth National Organic Agriculture Fair held at Bharatpur Chitwan during 29-31 March 2011
4. CBSPs group members training	523 members from 17 CBSPs of eight districts trained on business development and marketing skills	46 members additionally trained	Membership of CBSPs increased due to initial success of CBSPs in seed business and marketing. One CBSP was dysfunctional due to internal conflicts among members
7 & 8. Establishment and operation of private seed companies	Global Agritech Pvt Ltd – a private seed company with 48 share holders established at Bankatua VDC of Banke district and handed over to Board of Directors (BODs) of the Company		Completed as per plan

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same?

Output 1

1. Seed production through CBSP approach

The project supported the 17 CBSP groups from eight districts to produce the seed of various crops in a number of ways. The key specific activities are briefly described below:

- Support CBSP groups to improve business plans: The project supported the groups to improve and develop a viable business plan.
- **Provide access to source seed:** FORWARD facilitated CBSPs in the procurement of source seeds of rice, mungbean, lentils and chickpea for implementing the seed increase program. Partner institutes NARC and DOA also facilitated the groups to procure the seed of other released varieties of those crops.
- Quality assurance: FORWARD facilitated monitoring visit of multidisciplinary team to seed production field of the CBSP groups in all the project districts. At least one such monitoring visit was conducted in cropping seasons of rice, mungbean, lentil and chickpea. This was to facilitate the assurance of quality of the seed produced by CBSP groups.
- Market networking: To improve the efficiency of marketing, CBSP groups were linked to DADOs, Agrovets, and different organizations working in the seed sector. Media was identified as one of the key components of marketing. All the CBSP groups broadcasted advertisements through local FMs and some of them also used local newspapers.

Output 2

Distribution of IRDs

Major activities associated with IRD distribution were as follows:

- Planning, preparation and distribution of IRDs: Based on the domain the COB varieties required, plans for distributing IRDs were made. New COB lines identified as promising were also included in IRDs. Packets of 1kg seed for both rice and legume were distributed with fact sheets on cultivation practices and the contact address of the seed producer. Seeds of COB varieties were procured from CBSPs while those of non-COB varieties were obtained from NARC centers. In mungbean and lentil IRDs, rhizobium culture along with instruction sheet on seed inoculation was also included in the seed packets CBSP groups and DADO staff were involved in distributing the IRDs.
- Collection of feedback on varieties tested through IRD: IRD feedback sheets for collecting the information on varieties distributed as IRD were administered in each project districts by local resource persons and project staff.

The IRD kits were distributed in all the 12 districts including the 4 additional extensive districts. Innovation in IRD distribution was that the CBSP groups distributed IRDs.

Output 3

3. Training of farmers through promotion of RRC technologies

Farmers were trained through organizing demonstration of RRC technologies in the project districts, on farm coaching, group discussions and interactions. The following activities were conducted for capacitating CBSP members/ farmers in the adoption of RRC technologies:

- Zero tillage garlic demonstrations: As a part of resource conservation technology, zero tillage garlic production demonstrations have been promoted in areas where the lands used to remain fallow after the main season rice harvest due to excess soil moisture regimes. Sowing garlic under zero tillage has offered good option for farmers to utilize the fallow lands profitably. The technology involved draining out excess water from fields after the harvest of main season rice and sowing garlic cloves in between the rice stubbles.
- Nutrient loading demonstration on mungbean :With a view to validate and demonstrate the benefits of nutrient loading through seed priming on crop establishment, growth and yield of mungbean, on-farm demonstrations on nutrient loading through seed priming.
- Demonstration of Jaita (*Sesbania Spp*) in agro forestry system: In rural households, the management of firewood is the responsibility of women. They have to devote considerable time and energy in the collection of firewood involving walking to long distances and carrying on their head loads, leading to poor health. To address this issue, Jaita (*Sesbania Spp*) a multi purpose fast growing leguminous species was promoted as a component of agro-forestry system in the sloppy and degraded lands, as a fence tree and around fish ponds. To popularize the technology, a technical bulletin Jaita Cultivation (In Nepali language) has been published and distributed to farmers, extension offices and other R&D organizations. To facilitate distribution of Jaita seedlings, private nurseries have been established.

Technical trainings:

- Technical training on various aspects of seed production of rice and legumes, seed storage, roughing off types, maintenance of proper isolation distances were provided to CBSP members. Field officers and subject matter specialist from DADOs were invited in the trainings conducted at cluster levels. These have been fruitful in building confidence among CBSP members on techniques of seed production. For sustainable increases in crop productivity, farmers were capacitated on pests and soil health management. For the management of soil health, promotion of legumes during the fallow period was emphasized. The use of animal dung as a fertilizer was emphasized through promotion of agro-forestry practices.
- Value chain study on rice: A value chain study on rice was conducted in Rupandehi district to understand comprehensive performance of rice sub sector through the value chain analysis.
- Talk program at IAAS and CTEVT: FORWARD organized a talk program on food security through seed security at the Institute of Agriculture

& Animal Sciences (IAAS) and Centre for Technical Education and Vocational Training (CTEVT) to help upscale and popularize RRC technologies and CBSP approach through teaching staff and students. Considering seeds as the cheapest input for increasing agricultural productivity, adequate and timely supply of quality seeds at affordable price is essential. The role of CBSP groups in production and marketing of quality seeds for ensuring seed security at the local level was highlighted in the talk program.

• Social campaign to manage stray animals: With a view to promote legumes in rice fallows, social campaigns were organized at Kapilvastu and other districts, and farmers were persuaded to manage the stray animals through stall feeding. A variety of methods including, posters, banners, miking and group interactions, were used to deliver the message. Local youth clubs, local extension offices, media personnel, CBSP members, agrovets and representative of local political parties participated in the campaign facilitated by the project officer. The benefits of growing legumes in rice fallows on maintenance of soil health, supply of dietary protein to households and income generation was highlighted throughout the events.

Output 4

4. Strengthening CBSPs

Training on business skills and marketing: Although CBSP members possessed a fair knowledge of seed production, through participation in a series of training, they lacked the business skills needed for running a seed business. This issue was addressed through providing training to CBSP members on business skills and marketing. Training on book keeping was organized to members of the financial committee. This was followed by on site coaching by experts hired from the district cooperatives or district agricultural development offices. CBSP members were also trained in good governance and leadership development, seed marketing, CBSP visioning and business plan preparation.

Farmers' field days': To popularize new varieties and technology and help create demand of seeds CBSPs, farmer's field days were organized by CBSPs in the main cropping season. The participants were seed entrepreneurs, mill owners, local and district level extension offices, farmers and media personnel. The visitors were taken around the seed increase and or mother trial plots, and they were allowed to observe and critically evaluate the varieties /technologies. Interaction/ discussion session held at the end of the events was useful to facilitate the flow of information about new varieties, technologies and approaches. This also helped in creation of seeds demands for the subsequent years and good will among the seed value chain actors in the districts.

Neighbouring farmers' visit: Visits of neighbouring farmers to CBSPs to get information about new varieties, technology and also book seeds of new and preferred varieties were organized to acquaint them with the information on new varieties and technologies.

Organization and participation in agro-fairs: Local agro fairs are important platforms for the advertisement of CBSP seeds. CBSP participation in such events has helped in the creation of seed demands and establishment of linkages with organizations working in seed sector. FORWARD provided technical backstopping and extension materials in the form of posters, pamphlets to CBSPs participating in local and district level agro-fairs, trade and tourism fairs.

FORWARD facilitated a CBSP member from Surkhet district to organize demonstration of *Helicoverpa* nucleo polyhedro virus (HNPV) production in the Fourth National Organic Agriculture Fair during 29-31 March 2011 at Chitwan. The demo-stall was able to attract more than 2000 visitors. It was successful in creating awareness among farmers on the use of locally produced bio product HNPV for the control of podborer in chickpea, pigeonpea, tomato etc.

Facilitation and mobilization of LRPs: The services of 32 LRPs were utilized in the current project period. Their major role was in farmer selection and distribution of IRDs, and providing technical inputs and services to the needy farmers and other CBSP members. Utilization of LRPs for dissemination of technical information was much cheaper than hiring outsiders. Some of the LRPs have also imitated service delivery through establishment of agrovets and nurseries and some have been upgraded to field technicians. The empowerment for LRPs has ensured the continuity and sustainability of project promoted technologies after the end of the project (EOP).

CBSP support on matching fund concept: To make CBSPs more responsible for the creation of infrastructures for seed production, match fund concept was introduced. The groups were motivated to raise matching funds to take advantage of a maximum of NRs100, 000 contributions from the project for the construction of storage house, threshing floor, and purchase of seed grader, seed treater, balances, seed bins, power tillers etc.

Output 7 & 8

Establishment of private seed company

Setting up a plant breeding seed company that contributes to the institutionalization of the RNRRS outcome and seed supply system of RNRRS outputs is an important activity of the project. In this context, FORWARD has facilitated the establishment of Global Agritech Pvt Ltd – a private seed company with 49 share holders at Bankatua Village Development Committee (VDC) of Banke district and handed over to Board of Directors (BODs). The company owns authorised capital of 70 mi NRs. FORWARD has contributed 47.5 percentages of the share money. The company has acquired seed marketing licence from National Seed Board and is functioning as per its business plan. Seed production and marketing of COB and other varieties has been initiated by the company.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

i). All the project partners and infomediaries listed in the project proposal have contributed to implement the project activities as per expectation. There was a conducive environment for cross learning while working together with all these partners. However, collaboration was extended with institutes like IRRI for access to submergence tolerance rice varieties based on the demands of farmers from project districts.

FORWARD had to drop Asia Network for Sustainable Agriculture and Bioresources (ANSAB) after writing draft report of the value chain study of rice and legumes for the project. The decision to this effect was taken as the project partners decided that this can be done in-house by mobilising the project staff with technical assistance from CARIAD.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i). FORWARD has participated with policy makers at various stages and levels in the conduct of project activities. It has participated and putforth its views on the effectiveness of CBSPs in producing and marketing seeds of COB and non-COB varieties. While doing so, FORWARD has presented working papers in national level workshops /seminars organized by DOA, NARC, and different professional societies eg Nepal horticultural society, Agronomy Society of Nepal and contributed in recommendation of technology policy improvements. FORWARD participated in variety approval release and registration sub committee (VARRC) meeting of NSB.

High ranking officials from DOA and NARC, and coordinators from national legume and rice research programs were invited in the project inception workshop and their views incorporated in the implementation of project activities. Similarly, DOA, NARC directors and NSB members were invited in joint monitoring visits to CBSPs, and seed increase and mother trial plots and their suggestions/comments were taken care of.

The FORWARD also organised a workshop inviting key people from the Ministry of Agriculture and Cooperatives to discuss the emerging policy issues in crop seed sector in the country. The meeting has been instrumental to sensitize the policy makers and various stakeholders in agriculture and seed sector about the participatory approaches to research and development and small seed enterprises in the villages.

ii). Department of Agriculture (DOA), Nepal Agricultural Research Council (NARC), Seed Quality Control Centre (SQCC) of Ministry of Agriculture and Cooperatives, District Agricultural Development Offices (DADOs), National Grain Legume Research Program (NGLRP) and National Rice Research Program (NRRP), village development Committees (VDCs), private seed companies, agrovets, mill-owners and grain traders are the major groups that are essential for up scaling the project interventions. Personal visits to the policy makers, involvement of policy makers in annual review and planning meetings, joint monitoring visits and presentation of project briefs were used to influence them.

iii). One COB rice variety Barkhe 2014 has been released through National Seed Board (NSB) using the data generated by FORWARD, LIBIRD and NARC. FORWARD contributed substantially to the process. Rice variety Barkhe 1027 is registered and Sughandha1 is in the process of registration using the information collected by RIU project and that of NARC. These events have been considered as important milestones in the institutionalization of products generated by participatory approach. The RIU project's role in field demonstration of the crop and data generation, as well as organization of joint monitoring visit for the members of variety release sub-committee members remained instrumental for the success in releasing varieties. This event has added one example for releasing variety in GO-NGO partnership, and so can be inspiration to other projects in the days to come.

Seed production through CBSP approach has been accepted as an important alternative measure for the supply of seeds at the local level. DOA, NARC and others institutes have planned to follow this approach in their programs. FORWARD contributed substantially to the process. During the RIU project, FORWARD organized monitoring visit for policy makers and members of national seed board. Also, the organization shared the CBSPs' performance indicators in terms of seed transaction, organizational management and business plan. Comparing the progress of CBSPs, government agencies have realized that business development training is needed, and in some districts they provided technical backstopping and match fund to CBSPs. We are advocating and many government officers working in the district level have realized that the arena of DISSPRO should be redefined with the role of district seed coordination committee, and CBSPs promoted at local level. But this idea is yet to be written in the government policy. This project has contributed a lot in this line. Due to the inclusion of marketing component, CBSPs are in a better position than the existing DISSPRO to produce and market seeds. In this context, the Seed Safety Nets Project (SSNP) being coordinated from NARC has adopted CBSP approach in seed production of maize in the hills of Nepal. SDC and USAID funded Hill Maize Research Project (HMRP) has adopted this approach in seed production of maize in the hills of Nepal. In this context, FORWARD is selected as one of the grantee of HMRP to carryout maize seed multiplication program through CBSP approach in Surkhet district in the midwestern region. The newly established seed company GATE Nepal Pvt Ltd is also a grantee of HMRP. Our project which integrated both research and development components in empowering CBSP in the unique one. In partnership with National Agricultural Research and Development Fund (NARDF), FORWARD promoted this concept in some terai and hill districts.

Promotion of truthful labelled (TL) seeds through CBSPs is accepted by the national seed board. With this provision, CBSPs are now authorized to produce and market seeds of COB and Non COB varieties of crops without any technical and legal obstacles. To become CBSP a profitable

organization, TL seed is the best option and this norm is available in the seed law. But government agency does not advocate on this but teach farmers about the conventional certification approach. In this approach, government staff should monitor the field and put certification tags on seed bags produced by farmers, but government office does not have sufficient staff to monitor the field and it makes the CBSPs problematic to follow this approach. FORWARD, through policy discussions, various trainings, visits and workshops advocated that TL is the most efficient approach and it should be promoted.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

i). Implementing this project has resulted into different working practices, regulations, functional changes in organisations, emergence of new partnerships. Some of these are mentioned below:

New working practices:

- Change in practice of IRD distribution: Usually, common practice was to include only name of the variety in IRD kits. To increase the effectiveness of IRD fact sheets provided information about the variety, its domain and cultivation practices. IRD distribution was linked with CBSP groups. This was very effective and there were many instances where a number of farmers receiving the IRD kits did contact these CBSP groups for seed. DADOs and many other NGOs especially those receiving small grant projects from Hill Maize Research Project of CIMMYT are adopting this practice.
- Working through local resource persons: Working through local resource persons has been found to be highly effective compared to project staff getting directly involved in all the activities.
- Match fund concept: To generate the feeling of ownership concept of match fund was implemented and it was highly successful. All the CBSP groups were happy to contribute to some extent in the project initiatives to improve their infrastructure and increase physical assets.
- **Diversification in seed production:** CBSP groups are diversifying the crops and seed production for better income and insurance against failure of any one crop.

Strengthening partnerships:

• FORWARD has been closely working with NARC and DOA since long and this partnership has been further strengthened through this project. The outcome of the improved relation is that NARC and DOA consider participation of FORWARD in any meetings and workshops related to seed. FORWARDs' experience in seed production through CBSP approach has been recognized by government institutes. FORWARD was invited in the NARC-organized national winter crops research workshop for sharing experiences on "Seed Production through CBSP Approach. The workshop has recommended CBSP approach as an effective and alternative measure for production and supply of seeds. FORWARD was invited in the Cereal Seed Sub-sector Analysis Workshop organized by World Bank funded project for agriculture commercialization and trade (PACT) on June 1, 2011.

• Although, not a part of RiUP project, FORWARD invited local IRRI project staff and shared the outcomes and lessons learnt from the RiU project. Based on this, collaboration with International Rice Research Institute (IRRI) has been initiated with the signing of MOU between IRRI South Asia Regional Office, New Delhi and FORWARD for upscaling of submergence tolerant rice varieties, as a part of RIU project. In the new partnership outside RIU, FORWARD has expressed its consent to work with IRRI in the proposed Green Super Rice (GSR) Project submitted by the Chinese Academy of Agricultural Sciences (CAAS) through IRRI. FORWARDs' role in the anticipated project will be seed increase of biotic and abiotic stress tolerant rice varieties through CBSPs and to scale out it through distribution of IRDs.

ii). Building on the experience of agro forestry activity being implemented in the RiUP, FORWARD has developed partnership with Fintrac Inc for implementation of agro-forestry project in flood affected area of eastern and western terai. FORWARDs' staffs were invited as subject matter specialist in agro forestry training program organized by Fintrac.Inc. This provided an opportunity to share experiences and replicate the lessons learnt.

- FORWARD is in the process of developing partnership with International Centre for Agricultural Research in the Dry areas (ICARDA) for seed multiplication of lentil varieties through CBSP approach.
- With the establishment of a private seed company GATE Nepal, the responsibility for maintenance of breeders and source seeds of COB varieties of rice and legumes has been shifted to the company. Previously, FORWARD had to depend solely on CBSPs for the maintenance and supply of source seeds of COB varieties. CBSPs would now concentrate on TL seed production and marketing.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so

how?

i). Lessons learnt

A. CBSP strengthening

Institutional, governance, representation

- Variety release jointly with government agency should be the key strategy in institutionalizing the technology associated with the crops/varieties. It helps scaling out/up of the innovations through different innovation platforms of the concerning stakeholders.
- The inclusion of line agency/government authorities in crop monitoring / CBSP visits opens windows for CBSPs to receive additional supports from the govt.
- For cross project learning, organization of review meetings and workshops jointly with other projects saves resources, and provides good platform for transferring technical and institutional learning.
- CBSPs' coordination and linkage with regional seed laboratories, district level organizations should be enhanced to tap services/resources by CBSPs.
- While organizing local fairs, farmers' field days (FFD) and interactions, local groups /CBSPS should take lead initiative with backstopping from the project. This approach will help all stakeholders including govt institutions to be more accountable to local institutions.
- CBSP member's exposure visits and cross learning is effective to motivate farmers adopting innovations and to facilitate the transfer of institutional learning from experienced groups to new ones.
- Disseminating technologies and knowledge through Agrovets freely while selling seed (produced by CBSPs) and other agro-chemicals to the community should be encouraged.

Technical

- To match farmer's needs from heterogeneous environments, the varietal portfolio of CBSPs should be increased according to the production domains.
- Field level training and field coaching was found effective for farmers.
- Refresher training on Account keeping system is very effective for quick understanding and adoption to the CBSP members by mobilizing the local resource persons in regular time interval.
- Training CBSP members on book keeping, marketing skills, and business plan development is more important than technical training.
- Diversified technological options are needed to address needs of small holder farmers.

- Cropping system perspective effective to popularize crop varieties.
- Reviewing of performance indicators of CBSPs at cluster-levels is effective to expose CBSP members to experiences or lessons from successful CBSPs.

Managerial

- Not all groups selected and strengthened by the project have equal strength on seed business. Different strategies and approaches are needed for social mobilization and building their technical capacity.
- Group homogeneity is important for the smooth running of CBSP activities and its sustainability.
- Groups led by young and dynamic energetic leaders seem to be more functional with greater impacts. So, groups should be encouraged to elect, nominate such leaders.
- Seed production should be conducted in larger plots involving medium to big farmers or grouping smaller farms in a block to facilitate inspection, roughing and also to avoid chances of mixing due to isolation problem.
- CBSPs should concentrate on a few important varieties for seed multiplication to avoid the chances of varietal mixing and also from business point of view.

Marketing and business linkages

- Marketing of seeds with TL does not have problem for sale.
- Competitiveness is must for the sustainability of any enterprises. So, appropriate business upgrading strategies should be developed based on the recommendations from value chain study of the commodity/sub sector.
- Networking of CBSP groups and local media (FM) are highly efficient for information dissemination on seeds and creation of seed demand/ marketing.
- Diversification in size of seed bags is important to address different customers and sizes should be crop specific. In case of rice, 5 to 10 kg seed bags were most preferred size by the farmers and retailers (Agrovets).
- Attractive packaging could play the most important role for the marketing of seeds and agricultural commodities.
- Linking CBSPs with government and private seed company is very much effective for the production and marketing of seed.
- Business development skill training should be provided to key members of CBSP enterprises to enhance sustainable seed production and marketing mechanisms in the target environments.
- Traders can have a significant role in adoption and popularization of farmer preferred crop varieties.
- Language should be an important consideration while communication with local communities. To address the heterogeneity of language use of

- LRPs and dissemination of information in local languages is important (training, FM radio etc.).
- CBSPs should strive for creation of working capital, rather than investment of scarce funds into fixed assets.
- All CBSPs should have business plans and should conduct seed production as per the plans.

Transparency & benefit sharing

- Financial transparency and good governess is important for running the seed business.
- Social audit should be the key strategy to minimize conflict in the group.
- Matching fund concept through public-private-partnership approach is very much effective to attract resources from multiple sources to develop infrastructure in CBSP enterprises.

B. Scaling out of the COB varieties:

- Distributing IRD kits through local resource persons (LRP) is the most effective way as they can easily communicate with the local people and disseminate technologies.
- The involvement of DADOs in the distribution of IRDs is helpful in the institutionalization of COB varieties.
- While distributing seed for CBSP or IRD, required information about the appropriate production environment, management as well as characteristics of the varieties is important.
- Collection of a nominal charge of NRs 5-10/ IRD from the seed receivers creates a feeling of responsibility among them and ensures that those kits reach in the hands of needy farmers.

ii). Have you shared these lessons with others and if so with whom and how?

Organization of planning and review meetings: The lessons learnt from the project were shared with other stakeholders Department of Agriculture (DOA), Nepal Agricultural Research Council (NARC) through planning and review meetings attended by district, regional and central level personnel from DOA and NARC. The findings from the project were presented, discussed and shared with those organizations. Participation in quarterly and annual progress review meetings of DOA and national workshops organized by NARC were also important platforms for sharing of important lessons of RiU. Presentation of working papers on "Winter crops seed production through CBSP approach: Experiences from Research into Use Project provided an opportunity for sharing of experiences and lessons among a cross section of Agriculture R&D workers and institutions. Presentation of working papers on seed security through food security in the institute of Agriculture and Animal sciences was organized twice. The participants were teaching staff of the institute and NARC scientists and extension officers. In many instances, project personals were invited as experts in training programs and lessons were shared among the participants. Project personnel's visits to local bodies and participation in joint monitoring tours and interaction were also the platform

for sharing the experiences and lessons. While working in collaborative projects with other institutions, the inputs and lessons from the RiU were used wherever appropriate.

iii). Also, describe what has not worked and explain the reasons why not.

Seed increase of unregistered varieties: Existing seed regulations of Nepal do not allow the sale of unregistered crop varieties and it was difficult for CBSPs to grow it in the absence of legal authority. Initially the problem was solved by purchase of the seeds through the project and distributing it in IRDs through CBSPs and DADOs as well. This created a favourable environment and farmers' demands of those varieties compelled DOA authorities to include those varieties in the seed production chain.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

- Difficult to change the mindset: Due to the overall low level of education among the farming community, the delivery of new knowledge is often difficult. Hence, without demonstrating benefits farmers do not accept the new knowledge easily. In some instances farmers insist on relying on old varieties like Radha 4 of rice released decades back.
- Social factors: Although the project tried to be more inclusive (caste, gender, well being etc) while delivering new technology but it was very difficult for the project to control the influence of the elite groups.
- Influence of NARC on seed regulatory issues: Due to the under representation of Pvt sectors in the varietal approval registration, release committee of NSB, the voices of the Pvt sectors are ignored resulting in non-release of varieties proposed from private sectors. This happens in spite of legal provision for the private sector to engage in plant breeding and seed trade.

(v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i). Identifying new and promising crop varieties: The identification of new and promising crop varieties in the diverse agro ecosystem is a challenge for CBSPs. For this to happen, CBSPs have to get an access to new varieties and evaluate them in existing production system and socioeconomic domains. Seeds of those selected varieties have to be multiplied, and sold in order to replace the old varieties developed through the national system. The resources available with CBSPs may not allow implementing those activities. For this to happen, the private seed companies established in the current project should take the lead in the generation of suitable varieties and agronomic evaluation through the existing CBSPs.

ii). Maintenance of varietal purity: Management of varietal purity is often a problem face by CBSPs. However the establishment of Private seed company Gate Nepal has now greatly relieved them of the burden of seed maintenance. For seed multiplication of COB varieties. CBSPs can now avail source seeds

from the private seed company established as an out put of the project. For source seeds of varieties developed through the national program, CBSPs have the option of getting it through DADOs or directly through NARC centres on the basis of their seed production plans submitted top DADOs and the seed balance sheet of national Seeds board (NSB).

iii). Lack of enough capital: CBSPs have inadequate working capital to run the seeds business. CBSPs are not often capable to procure all seeds produced by its members. In the absence of collaterals, financial institutes like banks hesitate to provide loans to CBSPs. Due to lower profit margins in seed business of CBSPs with low economy of scope, there is not enough business to have adequate profit to attract the share holders. Therefore CBSPs need to find out new ways of doing business e.g., district level networking, and CBSPs being affiliated to cooperatives.

iv). Poor understanding of marketing skills of CBSP members and a lack of marketing network/outlets: Although series of trainings on development skills and book keeping was provided to CBSP members, they are not fully skilled in this aspect. They need further training regularly so that they can run the seed production in a business model. Some of the CBSPs are running in a professional manner and have even appointed office bearers to run the business. Not all CBSPs are of the same category. Some CBSPs need conversions into private companies, while others need supports for them to develop into cooperatives.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number &	Number & Type	Male	Female	Total	Evidence
	Type of Indirect	of Direct	Beneficiari	Beneficiar		Index*
	Beneficiaries	Beneficiaries	es (indirect	ies		
			and direct)	(indirect		
				and		
				direct)		
Output No 1	27,550	523	19,370	8,703	28,073	Annex 4
Seed	Rice and	CBSP members				
production	legume farmers	rice and legume				
through CBSPs)	legume larmers	farmers of				
	Mill owners	different districts				
	Traders	Extension				

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		workers Others NGOs				
Output No 2 Distribution of IRDs	90,441 Farmers	30147 IRD Receivers	75,970	44,618	120,588	Table 2 and Annex 1
Output No 3	7,923 Farmers	7923	10,458	5,388	15,846	Annex 4
Training and dissemination of RRC Technologies						
Output No 4 Strengthening CBSPs	80 (VDC, ASCs, DADOs, Seed companies mill owners, agro-vets etc)	523 CBSP members	521	162	683	Annex 4
Output No 7 & 8 Establishment of Privet Seed Company	DADOs, CBSPs Mill owners Farmers, Donors DOA, NARC Others 50	Shareholders including FORWARD Agrovets Contract farmers	111		111	Annex 4
Total	126,044	39,177	106,430	58,871	165,301	

Note: Data sources

Annex 1: IRD direct beneficiaries: Actual number of farmers receiving IRDs during the project duration was taken from IRD distribution records maintained in the data file. Indirect beneficiaries were computed on the assumption of at least three additional (neighbouring) farmers deriving benefits (seeds and knowledge) from the demonstrative /spill over effect of each IRD.

Annex 2: Data from Zero Tillage Demonstrations conducted among 22 households in mid western terai were recorded by RiU field staff. The data were analysed and reported.

Annex 4: Direct beneficiaries were taken from the records maintained at CBSPs and CBSP records maintained in Data file of project office for output 1. For Output No. 2, 4 and 7 & 8, data file/records maintained at project office was the source of information. Information's were collected periodically, as part of reporting requirements and then compiled. Indirect beneficiaries for output 1 were computed on the basis of use of 864 mt CBSP seeds for crop production in 13775 ha by 27550 farmers assuming one farmer growing rice in 0.5 ha on an average.

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparasi in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report.

i). Achievements

OUTPUT 1

Seed production through CBSP approach

i) A total of 501 mt seeds of rice, lentil, chickpea, and mungbean were produced among 523 CBSP members of 17 CBSPs from the eight project districts in 2010 and 2011. The share of COB rice varieties in total volume of seed production was 24 percentages. To diversify their activities, 363 mt seeds of other crops were produced and marketed by CBSPs in the same period (Table 1).

Table 1. Summary of seed production of COB and non COB varieties of crops through CBSPs

Details Volume of production t							
Project intervened crops	2009	2009 2010 Total CO		COB varieties mt	Proportion of COB varieties (%)		
Rice	0.0 *	445.8	446	108	24		
Lentil	12.0	16.6	29	0	0		
Chickpea	4.1	5.6	10	10	100		
Mungbean	0.0	17.2	17	17	100		
Subtotal	16.1	485.2	501	135	27		
Other crops							

Kidney bean	11	1 1	2	0	0
Ridiley beam	1.1	1.1	2	0	0
Rapeseed	1.5	10.1	12	0	0
Wheat	68.6	173.2	242	0	0
Maize	17.5	13.5	31	0	0
Forage grass	0.5	0.0	0.5	0	0
Potato	24.5	51.8	76	0	0
Subtotal	113.7	249.7	363	0	0
Grand Total	130	734.8	864	135	19

OUTPUT 2

Distribution of IRDs

A total of 30,147 IRDs were distributed among 30147 farmers of 12 project districts who were directly benefited through access to seeds of rice and legumes (Table 2). Rice IRD feed backs from 1155 households showed 27% higher yield of Sugandha 1, 22% of Judi 572 and 17% of Ashoka 228 over the local checks.

Table 2. Details of IRD distributions in rice and legumes 2010 and 2011

	Number of IRDs						
Crops		2011	2011 Summer				
	2010	Spring		Total			
Rice	13935	-	7615	21550			
Lentil	2931	-	-	2931			
Mungbean	2254	3412	-	5666			
Total	19120	3412	7615	30147			

OUTPUT 3

Training and dissemination of RRC Technologies

- A total of 7,923 farmers were capacitated through demonstration of RRC technologies, participation in group training, on-farm coaching, and visits (Annex 5).
- As a component of agroforestry system, Jaita seedlings were distributed to 5,000 women farmers of the project districts, to help meet their needs of firewood and animal fodder.
- 50 on-farm demonstrations were organized for the promotion of garlic zero tillage technology, in areas where lands used to remain fallow in winter due to high moisture regimes. Using the technology, farmers were able to harvest 1.5 -2 time higher bulb yields over the conventional practice (Annex 2).
- 100 on-farm demonstrations on nutrient loading through seed priming in mungbean were conducted across the eight terai districts. Farmers were able to get 24 percent higher yield mungbean due to priming with rhizobium and sodium molybdate (Annex 3).
- Neighbouring farmers visit and framers' field days were also organized to capacitate farmers and upscale the technologies.
- 2773 farmers from 17 CBSP groups were trained through neighbouring farmer's visits and technical trainings (Annex 5).

OUTPUT 4

Strengthening CBSPs groups

For strengthening the CBSPs 44 technical trainings, 48 CBSP business plans preparations, 15 farmers' field days, 14 inter-district visits, one training each on book keeping, and good governance & marketing were conducted as of May 2011. Some of the activities are on-going as mungbean crop is still in the field and the data has yet to be collated (Annex 2).

OUTPUT 7 & 8

Establishment of Privet Seed Company

FORWARD facilitated the establishment of a private plant breeding seed company GATE Nepal Pvt Ltd. The Company It has been handed over to the Board of Directors of the company and is functioning as per its business plans.

ii). Baseline data has been collected at the beginning of the project to find out the existing situation of the project area on demographic, social, economic and agricultural resources. The primary data collected through HH surveys among 843 HHs from eight project districts Banke, Dang, Kailali,

Kanchanpur Kapilvastu, Morang, Saptari and Sirha were backed up with group discussion and secondary information. The findings have been compiled into a report.

iii). The formal impact study has not been conducted by FORWARD. However, DFID commissioned an impact evaluation by external consultants during January 2011. The findings from the study are yet to come. Based on the available data with the project the following impacts have been projected:

Data on IRD distribution has indicated significant and positive effect of IRDs in the crop productivity and income of IRD receivers, and neighbouring farmers. A total of 22,532 IRD receivers have derived direct benefits from the use of IRDs. They received monetary benefits of 9000 GBP in the form of IRDs (Table 3). Those seeds were sown by farmers of project districts in an area of about 564 ha. The projected production from 564 ha was about 1249 mt of seeds of rice and legumes. The additional income from yields of IRDs would have been 75000 GBP. Rice IRD feed backs from 1155 households showed 27% higher yield of Sugandha 1, 22% of Judi 572 and 17% of Ashoka 228 over the local checks. **IRD receivers have gained about 393000 GBP from sale of produce from IRDs**.

The demonstrative effects of IRDs were enormous, resulting in the spill-over effect of rice and legume varieties to a large number of farmers in the project area and beyond. If we conservatively estimate an average of 3 neighbouring farmers exchanging seeds of IRD varieties from 22,532 IRD receiver households, about 67596 farmers would have been benefited from it, resulting in accelerated rate of variety and seed replacement rate.

	-		-	-	-	-		-	-
								Increm	Total
							Gross	ental	bene
		Seed	Value	Area	Exp	Incremental	profit	profit	fit
	IRDs	Qty	000	sown	prod	prod	000	000	000
Crops	No	t	GBP	ha	t	t	GBP	GBP	GBP
Rice	13935*	13.9	3	279	970	162	176	29	179
Lentil	2931	2.9	2	59	56	9	10	6	12
Mungbean	5666	5.7	4	227	218	44	198	40	202
Total	22532	22.5	9	564	1244	215	384	75	393

Table 3. Direct and indirect monetary benefits to farmers from IRD distribution 2010-2011

* Does not include rice IRDs distributed in June 2011

During the project period 864.6 t seeds of various crops worth 199000 GBP were produced by 523 members of 17 CBSPs spread over eight districts. CBSP members have derived direct benefits through the sale of those seeds to farmers, agrovets, DADOs and NGOs. The use of those seeds by farmers in the project areas and other places in about 13775 ha has resulted in an estimated crop production of 39197 mt worth 8682 000 GBP involving a

large number of beneficiaries (Table 4). The gross monetary benefits from the CBSP seed production was about 8881000 GBP. It was estimated that the incremental benefit due to use of CBSP produced seeds was 1447,000 GBP during the Best Bets phase (Table 5). Compared with the total budget allocation of 200,000 GBP, the benefit cost ratio is about 7.25.

	0			0	11	•
	Seed		Area	Expected		Gross
Targeted	production	Value	sown	production*	Value	benefits
crops	t	000 GBP	На	t	000 GBP	000 GBP
Rice	446	81	8916	31028	5641	5722
Lentil	29	18	715	687	437	455
Chickpea	10	4	343	329	150	154
Mungbean	17	16	686	659	599	614
Subtotal	501	119	10660	32702	6827	6946
Other crops						
Kidney bean	2	1	22	40	25	27
Rapeseed	12	6	1456	1398	762	769
Wheat	242	55	29	67	15	70
Maize	31	7	1550	4092	930	937
Potato	76	10	57	899	12	133
Subtotal	363	80	3114	6495	1855	1935
Grand total	864	199	13775	39197	8682	8881

Table 4. Projected gross benefits from seed production through CBSP approach Best Bets (2010-2011)

*Expected production calculated with a conservative assumption of 20% higher productivity of CBSP seeds over national average productivity.

Table 5. Incremental benefits from seed production through CBSP approach Best Bets (2010-2011)

	Seed	=	-		-	Increment	-
	productio	Value		Avg	Expected	al	Incremental
Targeted	n	000	Area sown	yield	yield	productio	benefit
crops	t	GBP	ha	t/ha	t/ha	nt*	000 GBP**

Rice	446	81	8916	2.90	3.48	5171	940
Lentil	29	18	715	0.80	0.96	114	73
Chickpea	10	4	343	0.80	0.96	55	25
Mungbean	17	16	686	0.80	0.96	110	100
Subtotal	501	119	10660	-	-	5450	1138
Other crops							
Kidney bean	2	1	22	1.5	1.8	7	4
Rapeseed	12	6	1456	0.8	0.96	233	127
Wheat	242	55	29	1.9	2.28	11	3
Maize	31	7	1550	2.2	2.64	682	155
Potato	76	10	57	13.1	15.72	150	20
Subtotal	363	80	3114.4	19.5	23.4	1083	309
Grand total	864	199	13775	-	-	6533	1447

*Incremental benefit = incremental production due to use of CBSP seeds X prevailing price of grains. **Incremental production calculated with an assumption of 20% higher productivity of (CBSP seeds over national average productivity.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). In the project social inclusion and mainstreaming of gender was taken care of in all the activities particularly in IRDs distribution, testing of mother trials, technical trainings, management of CBSPs, selection /nomination of participants for monitoring visits and others activities.

ii). During the project cycle, due attention was paid on gender and social inclusion at all stages of project interventions. Women were empowered to be proactive and participate in all activities of the CBSPs. Overall the share of women in CBSP membership was 31 percentages. In some groups, the majority of the members were women. Ma Sundari CBSP group at Barmajhiya Saptari, has 67 percentage women members out of total members of 53. All CBSPs have women representatives except CBSP at Krishnapur of Kanchanpur and Barrohiya CBSP at Kapilvastu. Technology dissemination through distribution of a large number of IRDs of rice and legumes was done to provide access to seeds of COB varieties. Thirty-seven percent of IRD receivers were women (Fig 1). In training and visit programs the participation of women farmers was 34%. However, the gender disaggregated data for participation in different events also depended on the membership structure of CBSP groups



Fig1.Percentage representation of IRD receivers by gender (left) and ethnicity (right)

Due consideration was given for inclusion of the socially disadvantaged groups (Dalits), Adibasis, Janajatis, Teraiens, and others (Brahman/Kshetris) in all project interventions. Proportionate representation of women and socially disadvantaged groups was attempted as far as possible. Data disaggregated by ethnicity showed 33 % Adibashis as IRD receivers, 8 percent Dalits, 12 % Teraiens and 40 % others comprising Brahman, Kshetris or Thakuris. These data closely follow the socially disaggregated data recorded during baseline survey of project sites (Fig 1). The activity demonstration of Jaita (*Sesbania spp*) in agro forestry was primarily focussed for women members. The beneficiaries over 5000 of the activity were cent percent women, as the activity relieved them from the drudgery of fetching fuel wood and livestock fodders from far places. The time of women from adopter households is being utilized in income generating activities like kitchen gardening, vegetable farming etc.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

CBSPs win grant awards: One CBSP group was able to win a competitive grant from the world bank funded project for agriculture commercialization and trade (PACT). Groups became able to access financial resources from other sources of block grant from local bodies of the government.

Uptake of TL seeds: CBSP groups have initiated selling TL seeds and those seeds have been accepted by farmers. The uptake of TL seeds through farmer and extension networks is encouraging CBSPs

Seed increase of other crops: Although not targeted, CBSPs multiplied seeds of wheat, maize, rapeseed, potato, kidney bean and others crops for diversification of their business volumes and for achieving sustainability. The selection of crops and varieties were based on the local demands and in consultation with local extension office. To utilize the complimentary funds from DADOs, CBSPs had to resort to seed multiplication of crops prescribed by them. In addition to getting supports for seed related activities eg seed bins, seed grader, sewing machines etc, these activities have been fruitful for CBSPs to foster better rapport with DADOs.

Formation of seed production subgroups under CBSPs: In some instances, CBSP groups have formed subgroups in other villages for multiplication of seed of COB varieties. The absence of suitable lands /facilities with the CBSP members has necessitated them to resort to formation of such groups. Some CBSPs have even contracted out seed production to farmers groups of villages located 12 to 18 km away. Those experiences have demonstrated that size of land holdings should not be the sole criteria for sustainability of CBSPs.

Seed production in leased-in lands: The existing CBSPs/cooperatives have even resorted to seed multiplication in leased-in lands. In search for a contiguous piece of land for seed increase, the Bolbom CBSP at Kapilvastu and Ekta CBSP at Saptari have leased-in lands for seed increase of rice and legumes. Such an arrangement has facilitated them for, plant protection, quality control and maintaining of isolation distances between different varieties.

CBSPs affiliation to umbrella organization: In attempts to diversify their business activities, CBSPs have been associated with umbrella organizations. Such approaches are helpful to acquire loans from commercial banks and other organization, as CBSPs need collaterals to get bank loans. Bolbom CBSP at Kapilvastu is associated with agriculture and livestock development multipurpose cooperative, and Shiva Shakti CBSP at Bela of Dang district is associated with fresh vegetable production and seed multiplication cooperatives at the area. Those affiliations have opened avenues for the CBSPs to procure loans and other assistance from those institutions.

Any Other Comments

Please include any other comments that you would like to include and which you feel don't fit in elsewhere.

Variety Release/ Registration: Barkhe 2014 has been approved for release and Barkhe1027 for registration while Sugandha 1 is in the process of

registration by the Variety Approval Release & Registration Committee (VARRC) of NSB.

Scope of CBSP and Seed company: CBSPs promoted by the project and seed company GATE Nepal Pvt Ltd also an output of the project have competing nature of activities. Collection of seeds produced by CBSP members directly by the seed company will have negative effects on seed transaction and benefits of concerned CBSPs. To avoid duplication of efforts and sustain the activities of CBSPs, provisions should be made to include CBSPs as shareholders of seed company. Also authorizing CBSPs to act as the sale outlets of the seed company would be beneficial to both the CBSPs and the company

Indictors of sustainability of CBSPs

Increase in membership: The membership status of CBSPs has gradually increased from 392 in 2008 to 523 in 2010, indicating that the farmers have understood the importance of being affiliated to local level organization and derive benefit from the seed business (Annex 6). As an evidence of success in seed business some of the groups have been upgraded to cooperatives. With all the legal provisions of the cooperatives they are further diversification of activities for the financial sustainability.

Increase in working capital: The working capital of CBSPs has gradually increased from NRs 1.78 to 5.38 millions over the period of three years (Annex 7). There is a wide variation in accumulation of working capital among the CBSP groups. The sources of working capital are the membership fees, share money and profits earned through seed business, donations/support from projects and other institutes. Some groups were able to attract funds from other line agencies for implementation of seed business.

Enhanced capability of CBSPs to tap external resources: Some of the CBSPs were able to tap resources from other donors/ institutions. Sayapatri CBSP at Krishnapur of Kanchanpur district has own a project on seed production from world bank funded project for agricultural commercialization and trade (PACT). Jana Dibya CBSP at Gada Sirha has been able to install three borings for irrigation of seed production plots with 50% subsidy from the district irrigation office. Group investment in irrigation by CBSPs, is an indicator of sustainability.

Infrastructure development: CBSPs have been housed in their own offices, in govt buildings, community forestry premises, old cooperatives or some of them have initiated construction of buildings on their own initiatives. The groups are in the process of acquiring seed grader and seed treatment equipments through funds supported by the project, by DADOs, VDCs and others organization. To help construct the storage house, the RiUP has provided a maximum amount of NRs 100000 to CBSPs on the basis of matching funds. This approach has been very fruitful in attraction of funds from local institutions.

Increased profits: For any institution to be sustainable it should be profitable. For realizing profits business and marketing skills is a must. Some CBSP
groups have now been able to gain profits from seed business. Bolbom CBSP group at Kapilvastu has earned a profit of NRs 117,916 in FY 2009/10, has invested NRs 185,656 and was able to buy 4 kattha of land at NRs 400,000 collected through shares. Another CBSP which has been a model for success is Suryodaya of Bela, Dang district. With a working capital of NRs 1500,000 from the 123 members, it has earned an annual profit of NRs 350,000 in the last fiscal year.

Operationalization of business plans: FORWARD has facilitated the development three year visions, and business development plans of all the CBSPs. Moreover, CBSPs have initiated financial transaction through banks, are in the process of obtaining seed trading license from NSB, are following book keeping system and some have initiated selling TL seeds with their logo. Adoption of those points in their dealings indicates towards their sustainability. CBSP groups which have significantly increased their seed transaction, added fixed assets, and have increased working capital should do well in converting to seed cooperatives, as cooperatives would enjoy greater flexibility in getting loans and other privileges due to their legal status. Successful cooperatives could opt to convert themselves into private companies to derive full benefits from seed business.

	IRD No				Beneficiaries		
		2011	2011		Direct	Indirect**	Total
Crops	2010	Spring	Summer	Total			
Rice	13935	-	7615	21550	21550	64650	86200
Lentil	2931	-	-	2931	2931	8793	11724
Mungbean	2254	3412	-	5666	5666	16998	22664
Total	19120	3412	7615	30147	30147	90441	120558

Annex 1. Details of IRD distributions and beneficiaries in rice and legumes 2010 and 2011

* IRD direct beneficiaries: Actual number of farmers receiving IRDs during the project duration was taken from IRD distribution records maintained in the data file.

**Indirect beneficiaries were computed on the assumption of three additional (neighbouring) farmers deriving benefits (seeds and knowledge) from the demonstrative /spill over effect of each IRD.

Operations and Materials	Quantity required for 1 ha		Rate per unit	Tc N	otal cost NRs/ha
	Zero tillage	Conventional tillage	NRs	Zero tillage	Conventional tillage
Seed (kg)	300	430	75	22500	32250
Labor for land preparation (No)	30	60	150	4500	9000
Mulching materials (Tractor load)	30	30	500	15000	15000
Labor for mulching (No)	60	75	150	9000	11250
Labor for Intercultural (No)	75	105	150	11250	15750
Inorganic fertilizer (kg)	30	30	16	480	480
Organic manure (Cart loads)	30	30	200	6000	6000
Irrigation (NRs)	1500	1500	LS	1500	1500
Production (t) Income (NRs)	4.5	3.24	1000	450000	324000
Total cost (NRs)	-	-	-	70230	91230
Net benefit (NRs)	_	_	-	379770	232770
Benefit/Cost Ratio	-	_	-	5.41	2.55

Annex 2. Cost benefit analysis of zero tillage garlic production demonstrations in mid western terai

LS= Lump sum, Sale price of garlic NRs 1000 per mt

Note: Data from Zero Tillage Demonstrations conducted among 22 households in mid western terai were recorded by RiU field staff. The data were analysed and reported.

	0 0					0
Treatments	Yield	No of	No of	No of	Plant	Yield
	t/ha	plants	pods/pl	seeds/pod	ht cm	increase
		/m²				over
						control %
Priming with rhizobium	1.13 ^{ab}	10.8	26.5	11.2	57.3	16
Priming with sodium molybdate	1.16 ^{ab}	11.1	26.7	11.3	57.0	19
Priming with rhizobium and sodium molybdate	1.20 ^a	11.3	28.3	11.4	57.9	24
Priming with fresh water	1.02 ^{ab}	11.1	25.1	11.1	54.7	5
Non priming (control)	0.97 ^b	10.7	24.7	10.7	53.7	
Mean	1.09	10.9	26.3	11.1	56.1	
F test	*	Ns	Ns	Ns	ns	
CV %	14.92	12.06	20.18	9.22	7.41	
LSD (0.05)	0.203	1.652	6.615	1.281	5.18	

Annex 3. Effects of nutrient loading on growth and mean seed yield of mungbean spring 2010

• In a column means followed by the same lower case letters are not significantly different (P≤0.05).

Annex 4. Details of beneficiaries by project outputs

Outputs		Beneficiar	ies		Direct a indirect bene	nd ficiaries	
	Indirect		Direct		Male	Female	Total
Output 1	Farmers Mill owners		CBSP members				
Seed production through CBSPs	Traders DADOs	27550*		F 2 2	10270	8702	20072
		27550*		523	19370	8703	28073

Output 2					
Distribution of IRDs	90441	30147	75970	44618	120588
Output 3					
Training and dissemination of RRC					
Technologies	7923	7923	10458	5388	15846
	ASCs, DADOs, seed companies				
Output 4	mill owners, VDCs, farming				
Strengthening CBSPs	community agro-vets etc				
	80**	523	521	162	683
<u>Output 7 & 8</u>	DADOs, CBSPs, Mill owners	Shareholders,			
Establishment of a private Plant Breeding	Farmers, Donors, DOA, NARC	Contract growers			
Seed Company	&	Agrovets			
	others				
	50***	61			111
Total	126044	39177	106430	58870	165301

Note:

*Direct beneficiaries were taken from the records maintained at CBSPs and CBSP records maintained in Data file of project office for output 1. For Output No. 2, 4 and 7 & 8, data file/records maintained at project office was the source of information. Information's were collected periodically, as part of reporting requirements and then compiled.

Indirect beneficiaries for output 1 were computed on the basis of use of 864 mt CBSP seeds for crop production in 13775 ha by 27550 farmers assuming one farmer growing rice in 0.5 ha on an average. ..

**Institutional stakeholders/beneficiaries based on the records of CBSPs but will change over time.

** Institutional stakeholders/ beneficiaries at present based on the contacts/records of GATE Nepal Pvt Ltd but will change over time.

Annex 5. Cumulative Progress Report January 2010- to June 2011

Lead Institute: FORWARD Nepal

Project outputs	Project Target	Progress up to Dec 2010	Progress Jan-May 2011	Cumulative Progress June 2011	Remarks
Output 1. Community based seed production	mt				
Rice	270	0	445.8 (COB varieties 108 mt)	445.8	Achieved

Lentil	30	16.6		16.6	Total targets will be fulfilled by end of June 2011
Mungbean	60	17.1		17.1	Total targets will be fulfilled by end of June 2011
Chickpea		5.6		5.6	
Total	360	39.3	445.8	485.1	
Output 2. Promising RNRRS ns Non- RNRRS outcome out scaled through IRDs	No				
Rice	13900	13935	0	21550	Achieved
Lentil	3350	2931	0	2931	
Mungbean	5600	2254	3412	5666	Achieved
Total	22850	19120	3412	30147	Achieved
Output 3.Farmers training and Dissemination of RRC technologies (N0)	7100				
Jaita seedling distribution	4000	5000		5000	
Zero tillage garlic	35	50		50	
Nutrient loading in mungbean demo	160	100		100	
Trainings and visits of farmers	2905	2640	133	2773	
Total	7100	7790	133	7923	Achieved
Publication of technical bulletin on Sesbania spp (Jaita)	1 (2000 copies)	1 (2000 copies)		1 (2000 copies)	Achieved
Publication of technical bulletin on Zero Tillage garlic production	1 (2000 copies)	1 (2000 copies)		1 (2000 copies)	Achieved

Talk program at IAAS and CTEVT Centers (No)	3	3		3	Achieved
Output 4. Strengthening of CBSP Activities**					
Technical trainings (No)	48	40	4	44	Will be completed by end of June 2011
Business plan preparation (No)	48	32	16	48	
Farmers field days (No)	24	15		15	Will be completed by end of June 2011
Inter district visits(No)	14	11	3	14	Achieved
Book keeping training (No)	1	1 (48 trainees)		1(50 trainees)	Achieved
Good governance a and marketing training (No)	1	1 (48 trainees)		1 (36)	Achieved
	Facilitation for the	GATE Nepal Pvt		Gate Nepal Pvt Ltd	
Output 7 & 8. Establishment and	establishment of	Ltd established		established and	Gate Nepal Pvt Ltd working
Operanalization of Seed company	Global Agritech Pvt	and handed over		handed over to Board	as per its business plan
	Ltd	to BOD		of Directors	

** Support to CBSPs in seed increase through facilitation of source seeds, in creation of storage / infrastructure facilities, seed processing, and coordination/linkage with local and district level stakeholders continued.

				Mem	bership Status (N	umbers)		
District	VDC	CBSP Groups	2008	End of ICF	Best Bets 2010 June	Best Bets April 2011	Male	Female
Saptari	Barmajhiya	Maa Sundari Agrl. Cooperative	11	50	50	53	36	17
Saptari	Kadorbona	Ekta Seed Production Cooperatives	13	30	30	39	30	9
Siraha	Padariya	Salhesh Foolbari Seed Production Farmers Group	25	25	18	17	11	6
Siraha	Gadha	Janadivya Agrl. Cooperative	22	31	25	25	14	11
Siraha	Harinagara	Sagarmatha Krishak Samuha	25	25	25	25	21	4
Kapilvastu	Корwa	Bol Bam Krishi tatha Pashu Bikash Samuha	16	16	16	16	14	2
Kapilvastu	Buddi	Adarsha Seed Producer Agriculture Group	16	16	20	20	8	13
Kapilvastu	Pakadi	Barrohiya Seed Producer Farmers Group	12	12	15	15	15	0
Banke	Naubasta	Namuna Seed Production Group	32	32	30	31	24	7
Banke	Betahani	Krishak Upakar Multipurpose Cooperative	36	36	36	36	29	7
Dang	Ramapur	Shiv Shakti Seed Production Group	20	20	25	25	23	2
Dang	Bela	Suryodaya Seed Production group	74	74	84	103	79	26
Pyuthan	Pakadi	Swargadwari Milijuli Seed Production Group	N/A	N/A	13	13	3	10
Kailali	Masuriya	Sayapatri Seed Producer Group	20	20	20	20	12	8
Kailali	Chaumala	Kalika Seed Production Group	20	20	18	18	8	10
Kanchanpur	Krishnapur	Sayapatri Seed Production Group	33	33	33	33	33	0
Kanchanpur	Baisebechuwa	Laligurans Seed Production Group	17	31	33	34	3	31
Total			392	471	491	523	363	163

Annex 6. Details of CBSP membership profiles across project districts 2008-June 2011

			Group Savings (NRs)				
Districts	CBSP Groups	Baseline	End of ICF	Best Bets	Best Bets		
		(2008)	(Dec 2009)	June 2010	June 2011	2008	2011
Saptari	Maa Sundari Agrl. Cooperative	0	13000	106000	136930	0	1
Saptari	Ekta Seed Production Agrl. Cooperatives	20000	51000	103000	132950	0	1
Siraha	Salhesh Foolbari Seed Production Farmers Group	28000	28000	38000	53546	0	1.5
Siraha	Janadivya Agricultural Cooperative	2500	50000	60000	124300	0	1
Siraha	Sagarmatha Mahila Krishak Samuha	50000	50000	60000	70000	0	0
Kapilvastu	Bol Bam Krishi Tatha Pashu Bikash Samuha	250000	422000	361387	410000	0	4
Kapilvastu	Adarsha Seed Producer Agriculture Group	0	30000	60000	86375	0	0
Kapilvastu	Barrohiya Seed Producer Farmers Group	0	23000	24400	38750	0	0
Banke	Namuna Seed Production Group	0	21830	80000	252700	0	5
Banke	Krishak Upakar Multipurpose Cooperative	42000	53000	158000	285000	0	2
Dang	Shiv Shakti Seed Production Group	175149	442533	500000	580000	4	4
Dang	Suryodaya Seed Production Group	250000	191329	1009181	1500000	0	10.5
Pyuthan	Swargadwari Milijuli Seed Production Group	N/A	N/A	50000	110000	0	0
Kailali	Sayapatri Seed Producer Group	640	10000	100000	228000	0	1.5
Kailali	Kalika Seed Production Group	120000	85000	100000	246000	0	0.5
Kanchanpur	Sayapatri Seed Production Group	850000	910000	572000	1100000	0	1.5
Kanchanpur	Laligurans Seed Production Group	0	22250	35000	35000	0	1
Total		1788289	2402942	3416968	5389551	4	34.5

Annex 7. Details of CBSP working capital across Project Districts 2008-June 2011

1 Kattha= 333 M^2

End of Project Report

Participatory Crop Improvement: NEPAL

Participatory Crop Improvement in South Asia: Research into Use (Best Bets Project)- Promoting new rice and legume varieties from Client Oriented Breeding

Lead Project Organisation:

• Local Initiatives for Biodiversity Research and Development (LI-BIRD)

List of Partners:

- Forum for Rural Welfare and Agricultural Reform for Development (FORWARD)
- Social Upliftment through Participatory Programmes, Research and Training (SUPPORT) Foundation
- Centre for Advanced Research in International Agricultural Development (CARIAD)
- Department of Agriculture (DoA)
- Nepal Agriculture Research Council (NARC)

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

A wide range of knowledge products and processes were put into use in the project including the innovative methodologies, techniques and tools. The products of client oriented breeding (COB) for rice (R7122, R745, R8071) were scaled out using participatory variety selection (PVS) and Informal Research and Development (IRD). The following COB varieties were tested and disseminated widely on a large scale in 15 project districts (including the 5 extensive districts) in the Terai and mid hills:

- Sunaulo Sughandha: Aromatic, high yielding released variety.
- Barkhe 2014: A newly released rice variety
- Barkhe 3004: Released variety for lowlands.

- Barkhe 3019: Suitable for irrigated medium to lowlands, can be a good alternative to Mansuli
- Barkhe 1027: Early maturing variety with long slender grains and is approved for registration Also suitable for making parboiled rice.

The following pipeline COB varieties were also tested and verified in various project districts:

- Judi 582: Early maturity (115-120 days) variety for irrigated and fertile lands
- Barkhe 1036 : Early maturing variety (115-120 days) suitable for rainfed uplands similar to Hardinath-1
- Sugandha 1: Aromatic variety for medium lands is liked by farmers and is in the process of registration
- Barkhe 3017-7: Medium duration variety liked by farmers in the medium lands, may be a substitute for Sabitri or Mansuli
- Barkhe 3017-5: Medium duration variety liked by farmers in the medium lands, may be a substitute for Sabitri or Mansuli
- PR101: Early maturing high yielding variety for rainfed upland area. Also suitable for making beaten rice
- Madhyan Dhan 0845: Medium duration variety liked by farmers in the medium lands, may be a substitute for Sabitri or Mansuli
- Madhyan Dhan 0742 : Medium duration variety liked by farmers in the medium lands. It appears very promising

Among the legumesmung beanmung bean, mung bean varieties promoted by the project were RNRRS outputs.

- Pratiksha: High yielding, yellow mosaic virus resistant, synchronous maturity
- Kalyan: High yielding, yellow mosaic virus resistant, synchronous maturity

Some of the tools and methodologies applied in the project are as follows:

Community Based Seed Production (CBSP)

The project promoted the quality seed production at farmers' level through CBSP. The project supported the existing farmers' groups and also formed new groups where necessary. The project facilitated the registration of the CBSP groups in DADO offices or Division Cooperative Offices. A series of technical, managerial and business skill development trainings were provided to the members of the CBSP groups. A total of 22 CBSP groups were trained on business development services (BDS) approach and currently, only 20 groups are directly associated with the project excluding one of the CBSP groups supported by the project for producing seed of high-altitude rice varieties.

Informal Research and Development (IRD)

Free seed of rice and legume were distributed as IRD kits of 1 kg seeds of COB varieties of rice and 1 kg of legumes along with fact sheets comprising pertinent information on the varieties to a large number of farmers in 15 project districts. The major objectives of distributing IRDs were to scale out the new COB rice varieties and also to create seed demand for CBSPs

CBSP groups were mobilised in distributing the IRDs as an innovation way of distributing IRDs. The CBSP groups included their contact information along with the information of the variety. Farmers receiving the IRD came to the CBSP groups for more seed once they preferred the variety tested in IRD indicating that IRDs were instrumental in creating seed demand for farmer preferred varieties. This innovation was done to establish direct linkage between farmers and the group and to improve effectiveness and the efficiency in IRD distribution. DADO networks were also used to strengthen partnership with the Department of Agriculture and also to bring efficiency in IRD distribution.

New variety stakeholders meeting (NVSM)

It was one of the novel methods used in the project to share complete information of new varieties to all the pertinent stakeholders. This method has been one of the successful initiatives taken by the project to scale out the new varieties developed using COB.

Farmers field days

One of the process innovations done by the project to strengthen the CBSP groups is to support the groups to organize farmers' field days during crop maturity period. The participants of the farmers' field days included seed entrepreneurs, millers, relevant agriculture organization/institution representatives and farmers. The groups benefited by a number of means by organizing these farmers field days like:

- Popularization of the new variety grown by the groups
- Demand creation of seed of new crop varieties

Exposure visits

Exposure visits of the neighbouring farmers to the nearby CBSP groups were organized during the crop seasons. Farmers were found to be benefited by a number of ways through these visits, for instance:

- The farmers were acquainted with importance of quality seed and techniques of quality seed production
- The farmers acquired information on new varieties of different crops (rice and legumes)
- Some of the farmers were keen on getting involved in seed production

Working capital and matched fund concept

The CBSP groups were trained on systematic book keeping and accounting. They are increasing the group saving by raising some amount from individual group member on a monthly basis and also outsourcing the capital resource from local government, respective DADOs and other organizations. On the other hand to improve the physical infrastructure (store house, threshing floor, seed grader, seed dressing drums, balances, seed bins etc) of the CBSP groups the project provided certain fund to the groups. To make sure that the groups develop a feeling of ownership on the infrastructure, a concept of matching fund was also created.

Developing local resource persons (LRPs)

Local resource persons were identified in each of the project locations and they were trained in various aspects of the project activities along with the techniques of social mobilization. They were useful in managing group meetings, distribution of IRDs, data collection, IRD feedback collection and several other project-related activities.

Non RNRRS generated knowledge used:

Project scaled out two high altitude rice varieties:

- Lumle 2: A pipeline high-altitude rice variety
- Machhapuchhre 3: A released high-altitude rice variety

In 2010 main season DADO of Mugu district demanded and distributed 270 kg seed of Lumle 2.

Lentil varieties:

- Shital : Small seeded variety suitable for drought conditions
- Simal: Small seeded variety suitable for drought conditions

Kidney bean:

• Hetaude

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project outputs	Status of achievement	Deviations if any	Reasons for the deviation
1. Seed production	• 20 CBSPs produced 1015 t of truthfully labelled	Initially worked with 22	CBSP groups in Sunsari
	rice seed of which 148 t was of COB rice	CBSP groups but 2 were	was not effective and
	varieties.	dropped due to their poor	CBSP in Morang was
	CBSP groups produced	performance	not interested at all in
	18.5 t of kidney bean seed	 Rice, lentil and mung 	

Table 1. Status of achievements made by the project

	 11.5 t of mung bean seed 31 t of lentil seed in 2009/10 and 2010/11 season 	bean seed produced greatly exceeded the target	COB varieties
2. Seed distribution through IRD	 A total of 46,918 farmers have been reached with IRD consisting of 38 t rice seed farmers/households 3 t mung bean seed (2980 farmers/households) 3 t kidney bean seed (3061 farmers households) 3 t lentil seed (2906 farmers) 	 Distribution of IRD of rice and lentil exceeded Target was to distribute IRD of 4.5 t kidney bean 	 Target for kidney bean not met due to cost savings based on plan for a no-cost extension.
3. CBSP trained	 A total of 5,033 farmers exposed through participation in NVSMs, trainings on quality seed production and through exposure visits 20 CBSP groups have adopted business plan for seed production, use truthfully labelled tags 18 groups have just initiated developing 3 years' visions. All 11 NVSM planned have been completed Working capital of 17 CBSP groups increased from 9% to 600% 	 The target was 5,769 (some of which is to be achieved within June 2011) 	
7 & 8. Establishment and operation of companies.	 Anamolbiu Private Limited, a seed company established and is working independently under the Company Board of Directors 		

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

Output 1

Seed production

The project supported the CBSP groups to produce the seed of various crops in a number of ways. The key specific activities are briefly described below:

- **Support CBSP groups to improve business plans:** The project supported the groups to improve and develop a viable business plan.
- **Provide access to source seed:** For COB rice varieties LI-BIRD is the only centre for source seed and the CBSP groups were provided with seed. LI-BIRD and its partners also facilitated the groups to procure the seed of other released rice varieties.
- Quality assurance: The project facilitated monitoring visit of multidisciplinary team to seed production field of the CBSP groups in all the project districts. At least one such monitoring visit was conducted in cropping seasons of rice, kidney bean, lentil and mung bean. This was to facilitate the assurance of quality of the seed produced by CBSP groups.
- Market networking: To improve the efficiency of marketing, CBSP groups were linked to DADOs, Agrovets, and different organizations working in the seed sector. Media was identified as one of the key components of marketing. All the CBSP groups broadcasted advertisements through local FMs and some of them also used local newspapers.

Output 2

Seed distribution through IRD

The encouraging result of the RiU MIL study on the on the adoption of varieties from COB proved the value of IRD distribution and led to further improvement on the process of IRD distribution. Major activities associated with IRD distribution were as follows:

- Planning, preparation and distribution of IRDs: Based on the domain the COB varieties required, plans for distributing IRDs were made. New COB lines identified as promising were also included in IRDs. Packets of 1kg seed for both rice and legume were distributed with fact sheets on cultivation practices and the contact address of the seed producer. CBSP groups and DADO staff were involved in distributing the IRDs.
- **Collection of feedback on varieties tested through IRD:** IRD feedback sheets for collecting the information on varieties distributed as IRD were administered in each project districts by local resource persons and project staff.

The IRD kits were distributed in all the 15 districts including the 5 additional extensive project districts. Innovation in IRD distribution was that the CBSP groups distributed IRDs.

OUTPUT 4

CBSP trained

A number of approaches were used to enhance and strengthen the capacity of building CBSPs to develop those as profitable and sustainable enterprises:

- Support in developing business plans and market networking: The trainings covered various aspects of seed business including group mobilization, good governance, CBSP visioning and business plan preparation. They were also briefed thoroughly on various other aspects of seed business like how to create demand of the seed produce (advertisements through local media), how to form a market network (developing a close relation with pertinent stakeholders like DADOs, Agrovets etc), and how to manage the profit (benefit sharing). In addition trainings on rice and legume seed production were provided. Emphasis was given on improving their knowledge on truthfully labelled seed.
- Account and book keeping training: Training was conducted to improve the capacities of CBSP members in account, finance and good governance. Participants were selected such that the groups are benefited in the long run by the training. Post training, evaluation of the accounting system of the groups was done and relevant feedbacks were provided to the groups.
- **Capacity building through exposures visits**: Two types of exposure visits were promoted during the project period as a part of capacity building, learning and sharing:
- 1. Farmers' field days. Farmers' field days were organized by the CBSP groups with support from the project.
- 2. Neighbouring farmers' visits. Exposure visits of the neighbouring farmers to the nearby CBSP groups were organized during the crop seasons.
- New Variety Stakeholder Meeting (NVSMs): The project tried to place a major emphasis on increasing demand of new COB rice varieties by conducting New Variety Stakeholders Meetings (NVSM). The key objectives of the meetings were to link all the major actors in the innovation system, i.e. CBSP enterprises (producers of seed) with farmers (the potential purchasers of seed of a new variety) with millers and grain traders (the potential purchasers of grain of the new variety) and speed up the innovation process.
- Matched fund concept: A concept of matched fund was also created. Each CBSP group was provided with up to GBP 1000 as a part of the matched fund.
- **Outsourcing fund by CBSP groups:** The project facilitated the CBSP groups to improve access of CBSP groups to different service providers. CBSP groups were linked with DADOs, Agrovets and other service providers.
- **Promotion of new varieties through FM:** LI-BIRD KO CHAUTARI, a radio programme produced by LI-BIRD is broadcasted from 12 different FM stations all over Nepal at a time.

Output 7

Establishment and operation of companies

Anamolbiu Private Limited, a new seed company with plant breeding component has been established. The major objective of promoting this seed company is to institutionalize the RNRRS outcomes. In order to capitalize this advantage over other existing seed companies and to continue the COB programme upholding Anamolbiu Private Limited is very vital and challenging. Some of the key activities done for establishing Anamolbiu Private Limited are:

- **Registration of the company:** Key shareholders were identified; memorandum of the company and articles of association were prepared; business plan of the company was also developed; and finally company was registered in Company Registrars Office in Kathmandu.
- **Post –registration activities:** Board of the company has been formed. A total of 8 staff members have been recruited. Seed production programme is ongoing.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

i). Each of the project partners contributed as expected in the project. There was a conducive environment for cross learning while working together with all these partners.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i). LI-BIRD participated in various policy level meetings and workshops related to seed organized by National Seed Board at national and regional level and LI-BIRD also presented a number of papers in these meetings and workshops. LI-BIRD being an organization working in seed sector it was always invited to such meetings. High-level government officials were invited in project review and planning meetings, joint monitoring etc. LI-BIRD led the development of variety release and registration proposals of 2 COB rice varieties and there were at least 4 meetings with the technical committee of and Variety Release Registration and Coordination Committee (VRRCC) of the NSB.

ii). The relationship with NARC especially with National Rice Research Programme (NRRP) and National Grain Legume Research Programme (NGLRP) was emphasized during the project period. Close relationship was maintained with Seed Quality Control Centre (SQCC) under Ministry of Agriculture and Cooperatives to ensure that the project interventions especially CBSP activities move on smoothly. In addition, agro-vets, millers and grain traders are the other major groups whose contribution to scale out the project intervention cannot be denied.

iii). It was in 2006, when LI-BIRD and the then CAZS-NR influence the policy makers such that proposal for release and registration of crop varieties from NGOs were accepted. In addition, participatory data (participatory trial data and orgnoleptic data) were also accepted for release and registration purpose. With the initiative taken by this project, Barkhe 2014 has been released and Barkhe 1027 registered. The project promoted the CBSP approach which was business oriented. However, the DoA-promoted District Seed Self Sufficiency Programme (DISSPRO) lacked this component but after exposure to the Best Bets activities the DADOs are now also promoting entrepreneurship as one of the key components of DISSPRO. A new NARC project, Seed Safety Nets Project (SSNP) has also adopted CBSP approach and this is being implemented in 26 districts of Nepal. The project always promoted truthfully labelled (TL) seed.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

i). Implementing this project has resulted into different working practices, regulations, functional changes in organisations, emergence of new partnerships. Some of these are mentioned below:

New working practices:

- Change in practice of IRD distribution: Usually, common practice was to include only name of the variety in IRD kits. To increase the effectiveness of IRD fact sheets provided information about the variety, its domain and cultivation practices. IRD distribution was linked with CBSP groups. This was very effective and there were many instances where a number of farmers receiving the IRD kits did contact these CBSP groups for seed. DADOs and many other NGOs especially those receiving small grant projects from Hill Maize Research Project of CIMMYT are adopting this practice.
- Working through local resource persons: Working through local resource persons has been found to be highly effective compared to project staff getting directly involved in all the activities.

- **Matched fund concept:** To generate the feeling of ownership concept of matched fund was implemented and it was highly successful. All the CBSP groups were happy to contribute to some extend in the project initiatives to improve their infrastructure and increase physical assets.
- **Diversification in seed production:** CBSP groups are diversifying the crops and seed production for better income and to avoid any failure from any crop failure.

Partnerships:

• Strengthening partnerships: LI-BIRD has been closely working with NARC since long and this partnership has been further strengthened through this project. The outcome of the improved relation is that NARC and DoA consider participation of LI-BIRD in any meetings and workshops related to seed. LI-BIRD was invited in the Cereal Seed Sub-sector Analysis Workshop being organized by world bank funded project for agriculture commercialization and trade (PACT) to share knowledge on participatory crop improvement and seed production on 1 June 2011.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i). The lessons learnt while implementing the project are:

Community-based seed production:

Entrepreneurship skill in community based seed producer groups is the key to the success of the CBSP approach:

The failure of the farmers' groups despite the enhanced skills on technical aspects of quality seed production and substantial material support was due to the fact that the seed producer groups lacked the business skill. Through this CBSP approach the seed producer groups have been provided business skill development trainings in addition to the technical aspects of the seed production and material support. The CBSP land holding size and availability of agricultural inputs play a large role in the profitability of the seed business. CBSP groups in high production potential areas with more than 50-60 hectares and with irrigation (around 75% irrigated) are succeeding. CBSPs with less land holding should increase the members so that area for seed production increases which directly increases the volume of seed business. Key to the successful CBSP approach can be summarized as:

- .Development of entrepreneurship skill of the farmers/CBSP groups: Farmers' groups need to be trained in developing seed business plan, seed business vision plan, value addition, networking and marketing. Value addition through proper processing, labelling and attractive packaging have been found to be important.
- Seed money/working capital: Seed money is a must for modest improving infrastructures needed for quality seed production and marketing programme:
- Media for promoting seed business: One of the lessons learnt is that media like newspapers (local and national), FM radios have been found to be instrumental in promoting seed business. Advertisements in the local newspapers and FMs have boosted the seed marketing.
- Accessing resources from various sources The project looked into empowering the CBSP groups to outsource the resource. The groups were able to tap resources from the local government as well as from the District Agriculture Development Offices. Two CBSPs; Buadhimai Cooperative, Bara and Shree Ram seed producer group, Chitwan were able to win the grants from PACT a world bank funded project for improving their seed business.
- **Ownership development:** The CBSP group members should take the ownership of all the things associated with the group. To promote this establishment of a group fund, sharing the resources while adding up new infrastructure etc gave more impetus.
- Improvement in management: Trainings on improving group management (development of local resource person) as well as financial management (book keeping/accounting) also led to proper functioning of the CBSP group.
- Increase access to service providers and marketing outlets: It is very essential that all the CBSP farmers are linked with the service providers like DADOs, Agrovets, seed companies etc

Scaling out of the COB varieties:

• Free seed kit (informal research and development-IRD kits): It should be distributed with proper information on type of variety, recommended domain, inputs needed by the variety etc. New innovation in free seed kit distribution is that CBSP groups have initiated distributing the seed of new crop varieties.

Capacity building of CBSP group members and other farmers:

• Farmers' exposure visits: Neighbouring visits and cross exposure visits motivated the farmers for cross learning and sharing. Adoption of the new innovations is promoted through such visits.

ii). Have you shared these lessons with others and if so with whom and how?

The experiences and lessons learnt have been shared mainly with DoA and NARC. Every year, LI-BIRD has been participating in all the four monthly review meetings and yearly review meetings organized by Regional Agriculture Directorates in each 5 regions and DoA respectively. These meetings were excellent platform to share the lessons from the project. As the project is working closely with the DADOs in each project districts there is both on and off field sharing about lessons learnt. Sharing of knowledge through print and electronic media was practised during project implementation.

NARC has been participating in the project review planning meetings and joint monitoring which have been the platforms where learnings were shared. LI-BIRD has provided trainings on community based seed production to a number of NGOs. Staff of the Dhan Foundation, an NGO based in Tamil Nadu, India, and 5 faculty members and two PhD students from Tamil Nadu Agricultural University were provided training on COB and CBSP approaches.

iii). Also, describe what has not worked and explain the reasons why not.

Some of the things that have not worked are as follows:

• One of the Co-operatives (CBSP) in Morang districts Krishi Upaj Bajar Bebasthapan Sahakari Sanstha never wanted to take up any of the COB rice varieties in its seed production programme despite several follow-ups and persuasions. The main reason behind this could be the size of support from RiU project to the group. During this project period the group received a large volume of support (financial as well as material support) from Commercial Agriculture Development Project of Department (CADP).

iv). What kinds of challenges did you face while up-scaling/promoting new knowledge under this project and were you able to address these and if so how?

The challenges faced by the project while promoting the knowledge:

- **Difficult to change the mindset:** It is always difficult to deliver new knowledge to any farming community in Nepal since the education level is low. Hence, without demonstrating benefits farmers do not accept the new knowledge easily. There were several such instances where the project was trying to promote COB varieties but they insisted (perhaps for good reasons) for age-old varieties like CH 45.
- Social factors: The project tried to be more inclusive (caste, gender, well being etc) while delivering new technology but it was very difficult for the project to control the influence of the elite groups.
- Limitations of the project: The project would include more and more participants in the trainings on seed production, entrepreneurship development and account and book keeping. However due to limited resources, the inclusion of only few key farmers in the trainings was possible. Other CBSP members who wanted to take part were dissatisfied.
- Influence of NARC on seed regulatory issues: NARC influences decision making process in the national seed board as they try to create a kind of hindrances on the way of releasing and registering crop varieties developed by the private sector. This happens in spite of legal provision for the private sector to engage in plant breeding and seed trade.

Iv). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

The challenges that remain to be resolved yet:

Technical:

- New CBSP groups need more strengthening: Despite the series of trainings on entrepreneurship development skills, accounting and book keeping, the newly formed CBSP groups need further nurture so that they are independent in seed business.
- Less varietal options of released and registered COB varieties: The project had to work with only two released COB rice varieties namely, Sunaulo Sugandha and Barkhe 3004. Barkhe 1027 have been approved for registration very recently. Seed regulations controlled promotion of unregistered rice varieties through seed production and marketing. Thus, it is essential that more COB rice and legume varieties are released or registered very soon.

Organizational

- **CBSP group members**: CBSP groups are trying to become more inclusive in terms of gender and other social issues. However, in a community it is not as easy as anybody can imagine. Hence, a lot remains to improve in this regard.
- **Problem with understanding:** In most of the project sites the farmers recognized LI-BIRD/other partners as the organization that provides seed. At times it was difficult to control the farmers asking for seed of a number of crops including and for seeds of obsolete rice varieties which the project would never promote.

Marketing

• Allocation of time: Most of the CBSP groups have divided different tasks among the members. Among all the other tasks members looking after the marketing need to give more time to sell all the seed available within a certain period of time. But all the member s being mostly the farmers, it was observed that farmers facing some challenges in marketing their seed. This is mostly applicable to newly formed CBSP groups.

Policy

• More advocacies needed: There is a lack of understanding about the need for truthfully labelled seed among the key stakeholders. This stream of seed production is more flexible and puts all the responsibility onto the producers-CBSPs making it a system that runs based on the trust of the market. Hence, more advocacies is needed to make the system better known among all the stakeholders in the seed system.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Table 2. Beneficiaries of the project

Project Output	Number & Type of	Number & Type	Male	Female	Total	Evidence Index*
	Indirect	of Direct	Beneficiari	Beneficiari		
	Beneficiaries	Beneficiaries	es (indirect	es (indirect		
			and direct)	and direct)		
1. Seed production		4,932 CBSP group	3,343	1,589	4,932	Annex 3
		members				
2. Seed distribution		37,971 COB rice			37,971	Annex 1, Annex 2
through IRD		IRD receiver				
		farmers (Note:				
		Record of IRD				
		2011 is not				
		included here)	27,169	10,802		
		2906 Lentil IRD				Annex 4
		receiver farmer	2105	801	2906	
		3061 Kidney bean				Annex 4
		IRD receiver				
		farmer	2245	816	3061	
		2980 Mung bean				Annex 4
		IRD receiver				
		farmer	2456	524	2980	
3. CBSP trained		5033 farmers			5033	Annex 5
		reached through				Annex 6
		NVSM, Cross				
		exposure visits,				
		neighbouring				
		farmers' visits	3384	1649		

	and trainings		
7& 8. Establishment	1 Seed company	/	Annex 19Annex 20Annex 21Annex 22
and operation of	established		
companies.			

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

i).Achievements:

Output 1

Seed production through CBSP approach

- Rice seed production: 20 CBSPs produced 1014.9 t of truthfully labelled rice seed which comprised of 148.9 t seed of COB rice varieties in 2010 Main season (Annex 17). CBSP were provided with around 2.7 tons of source seed of COB for seed production sufficient for about 50 hectares. The COB rice varieties included were Barkhe 3004, Sunaulo Sugandha, Judi 582, Barkhe 1027, Sugandha 1, Barkhe 3019, MD 0742. In case of high altitude rice 1000 kg of Lumle 2 and 500 kg of Machhapuchhre 3 seed was produced through project support.
- Legume seed production: CBSP groups produced 4.5 t of kidney bean seed, 11.48 t of mung bean seed and 13.16 t of lentil seed in 2009/10 season. In 2010/11 season the CBSP groups produced 13.9 t of kidney bean and 17.9 t of Lentil seed (Annex 16)
- Monetary value of seed produced by CBSP groups: The monetary value has been calculated for seed produced in in 2010/11 crop season based on average selling price adopted by CBSP groups in Chitwan (Annex 18). They produced seed of rice, lentil, kidney bean and mung bean which valued approximately GBP 368,000 in 2010/11 season.
- Other achievements: All the 20 CBSP groups are registered either in respective DADOs or in Co-operative Division. These 20 CBSP groups have knowledge on TL seeds (Annex 8). 15 CBSP groups have developed 3 years vision plan (Annex 8). 20 CBSP groups have adopted **b**usiness plan,

joint bank account (Annex 8). Some of the CBSP groups are in the process of changing into co-operatives. The CBSP groups have adopted a structure with defined responsibilities of different members (for group management, seed quality assurance, seed marketing, networking with service providers like DADOs, Regional Seed Testing Lab, Agro-vets etc). CBSP have taken initiative to diversify the crops for seed production.

Output 2

Distribution of IRDs

A total of 46918 farmers have been reached with IRD consisting of:

- 37971 t rice seed (37971 farmers/households)
- 3.0 t mung bean seed (2980 farmers/households)
- 3.1 t kidney bean seed (3061 farmers households)
- 2.9 t lentil seed (2906 farmers)

Feedback on COB rice varieties distributed as IRD were collected about three months after harvesting rice. The result showed:

- Except Sunaulo Sugandha, Barkhe 2024, Judi 572, Barkhe 1036 and Agaute 0905 all other COB varieties tested through IRD have lesser disease problems compared to the varieties grown by the farmers (Annex 9).
- COB varieties have more tillering capacity compared to farmers' variety except Barkhe 1036, MD 0845 and Judi 572 (Annex 10).
- COB varieties except Barkhe 2024, Sugandha 1, PR 101, Barkhe 1036 and Judi 372 have higher milling recovery (Annex 11)
- Most of the varieties have either easier or similar threshing (Annex 12)
- Most of the COB varieties are lodging tolerant compared to farmers' varieties (Annex 15).
- Most of the farmers responded that Quality of Sunaulo Sugandha is better to their variety (Annex 13)
- Sunaulo Sugandha and Agaute 0904 have better market price than farmers' variety and others have similar or lesser market price than farmers' variety (Annex 14).

OUTPUT 4

CBSP trained (Enhancing capacity of CBSP groups)

A total of 5033 farmers have been trained or exposed to different visits.

• 2340 farmers were exposed through neighbouring farmers' visits, 638 farmers were exposed through cross CBSP visits, and 1180 farmers received different trainings (Annex 5). Farmers' field days and exposure visits of the neighbouring farmers to the nearby CBSP groups were

organized during the crop seasons and this was basically coordinated by the project in order to expose the farmers to the new technologies/crop varieties. CBSP members and project staffs acquired knowledge both theoretically and practically on account keeping/financial management. Weaknesses of the CBSP accounts identified and suggestions provided for improvement in their account keeping. Training manual developed based on a training needs assessment and discussion with project stakeholders.

- Altogether NVSMs were organized by the project in 11 project districts where 875 individuals representing different organizations actively
 participated (Table Annex 5). The key part of NVSMs are displaying COB varieties (both milled and unmilled grains), information on varieties
 (brochures, posters etc), sharing all the pertinent information on all rice varieties, sharing views of all the participants, information on seed
 availability, organoleptic tests, collecting feedback from the participants etc. Before conducting NVSM in Tanahun district, Bahuuddeshiya
 Samabeshi Krishak Samuha of Manapang, Tanahun were finding difficult to sell the seed of Sunaulo Sugandha which is in fact a popoular
 variety. But the available 1500 kg of seed was sold within a week after the NVSM. This is one of the examples how powerful NVSM can be for
 popularizing any crop varieties.
- Out of 22 CBSP groups selected initially only 20 have been supported and promoted. 20 CBSP groups have adopted business plan for seed production, use truthfully labelled tags and 18 groups have just initiated developing 3 years vision plan (Annex 8) (This excludes the CBSP group in Kaski producing the seed of high altitude rice varieties).
- Matched fund concept was also successfully implemented in the project where each group contributed at least 25% to 50% of the total cost and this has been a lesson learnt as a part of sustainability. Sayapatri CBSP group of Morang district bought a seed store house at GBP 4000. Project supported only GBP 1000. CBSP members contributed GBP 1000 and they outsourced GBP 2000 from Department of Agriculture. Dakanimai CBSP Group of Sunsari is built a seed store with a capacity of 50 tons rice seed where project supported only GBP 500, CBSP members contributed GBP 1000 and they outsourced GBP 2000 from Department of Agriculture. Baudhimai CBSP has purchased a grader machine for seed processing where project supported GBP 200, CBSP contributed GBP 100 and received GBP 100 from Department of Agriculture. Working capital of 17 CBSP groups in increasing trend ranging from 9% to 600% (Annex 7). The CBSP groups were also able to outsource financial resources. They have been able to outsource certain amount of fund from DADOs and projects of Department of Agriculture. Bahuddhesiya CBSP group received a grant of GBP 600 from DADO, Tanahun (Department of Agriculture, Nepal). Similarly, 50% share (GBP 400) of the storehouse built by Sayapatri CBSP Group came from DADO Morang. Baudhimai CBSP group was able to secure PACT project fund (GBP 19370) which is one of the most notable achievements of the project. Similarly, Dakanimai CBSP group also secured GBP 2500 from DADO (Department of Agriculture). Project had the provision to support each CBSP groups with a fund of about NRs 100,000 and all the CBSP groups have contributed at least 25% to build some infrastructure or buy some physical assets for CBSP groups.
- To improve the physical assets of CBSP groups different material supports were provided to the CBSP groups (Annex 6)

Output 7

Seed company has been established and it is functioning independently. Company was registered in August 2010 in Company Registrars' Office under Ministry of Industry in Kathmandu. The head office of the company is in Bharatpur Municipality-12, Gondrang, Chitwan. Some of the progress made by the company are listed below:

- Company board with 7 members formed
- Office set up completed
- Company staff with Chief Executive Officer, Plant Breeders (2), Field Technicians (4), Admin Officer (1), Office Assistant (1), Runner (1) recruited
- Company marketed 9420 kg seed of COB rice varieties (Annex 19) and earned a net benefit of 190327 (GBP 1655)
- Source seed production of COB rice varieties has been planned for 2011 main season (Annex 20)
- Company initiated wheat seed production programme(Annex 21)
- Company has initiated vegetable seed production programme (Annex 22)

Other programmes/activities

- Client Oriented Breeding in rice
- Company is investing in Akabare Khursani (Local Chilli) breeding
- Company secured small grant project from Hill Maize Research Project of CIMMYT

ii). A baseline survey was conducted in ten project districts with the major objective to collect and establish benchmark information related to socioeconomic, agro-ecological and varietal parameters of the sites for planning project interventions and evaluating changes due to project activities at the end of project. Household level interview among 962 farmers of the research sites was conducted. Multistage simple random sampling technique was used for the collection of data and the obtained information was analyzed using descriptive statistical tools. The findings have been compiled into a report.

iii). The formal impact study has not been conducted by LI-BIRD

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). Gender and social inclusion was given priority though not exclusively. Disadvantaged groups were preferred in IRD, trainings and exposure visits. Among the members of all the CBSP groups 32% are female. Among the beneficiaries 29% rice IRD receivers, 24% legume IRD receivers, 33% of the

famers receiving trainings and exposures were female (Annex 5). Inclusion of Janajatis, Muslims and Dalits was also given emphasis. However, due to the nature of the project it was a tough task to put higher emphasis on inclusion issues.

ii). No. The data base was not used in shaping the project interventions.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

CBSP groups opt for diversification

The project basically focussed rice and legumes (kidney bean, lentil and mung beanmung bean in particular) for seed production. In rice, COB varieties were promoted by the project. But the CBSP groups did not remain limited to only these crops and varieties. They are trying their best to diversify crops and varieties in seed production. They are growing seeds of wheat, chickpea and many other crops.

Change in the cropping pattern

In some of the project sites change in the cropping pattern has been observed. For example in Rampur Khadauna site of Nawalparasi district the cropping pattern from rice-wheat-fallow has changed into rice-wheat-mung bean.

Any Other Comments

Please include any other comments that you would like to include and which you feel don't fit in elsewhere.

COB varieties released and registered

COB variety Barkhe 2014 has been approved for release and Barkhe1027 has been approved for registration by the VARRCC of NSB. Sugandha 1 and Barkhe 2001 have been rejected for release or registration although Sugandha 1 has been considered for next proposal with all the required information.

Barkhe 2014

A new variety named 'Barkhe 2014 developed using client –oriented breeding (COB) has been approved for release by National Seed Board of Nepal for its commercial use. This variety was developed jointly by LI-BIRD and CAZS-NR in collaboration with NRRP, FORWARD, Jaskelo Youth Club of

Chitwan district, Jagriti Krishak Samuha of Saptari district and the farming communities of different districts across Terai and foot hills of Nepal. The variety was developed from the cross Kalinga III/IR64 made at International Rice Research Institute (IRRI) in 1996. Modified bulk method was used to develop this variety. The variety was developed by screening a total of 290 F3 lines of this cross in the farmers' fields in Chitwan district in 1998 under farmers' customary management and input levels for exposing them to varying biotic and abiotic conditions. Barkhe 2014 is another addition in the list of rice varieties released in Nepal developed from participatory joint efforts of farmers and technicians.

Barkhe 2014 has been proposed as an option for Kanchhi Masuli (Annex 23). Although this variety shares a number of traits similar to Kanchhi Masuli it is superior in terms of yield, disease resistance and many other traits. Average yield of Barkhe 2014 is 3.8 tons per hectare which is 9% higher than that of Kanchhi Masuli. The panicles are 22 cm on an average which are longer than that of Kanchhi Masuli. It has wider adaptation from low to medium fertility and upland to medium soil moisture regimes with better adaptation in marginal soil. Barkhe 2014 has been recommended for rainfed to partially irrigated medium lands across Terai, Inner Terai and foot hills of Nepal up to 1000 m altitude. Barkhe 2014 is a medium tall rice variety with an average height of 129 cm and it is a variety with medium maturity with maturity days ranging from 135-140 days. The variety is responsive to fertilizers and other inputs.

Barkhe 2014 is preferred by the farmers for its earliness compared to Kanchhi Masuli. It has attractive golden coloured grains. It is preferred and selected by farmers for its good post harvest qualities like high head recovery, good cooking and eating qualities.

Barkhe 2014 is resistant to blast, moderately resistant to bacterial leaf blight and resistant to sheath blight. It is also moderately resistant to brown plant hopper and stem borers.

Barkhe 1027

Barkhe 1027 is one of the COB varieties approved for registration by National Seed Board of Nepal (Annex 24). It is suitable for rainfed environments. Some of its key characteristics are:

- 1. Early maturing and suitable for low to medium fertility conditions of uplands and medium lands.
- 2. Higher grain and straw yields than a number of rice varieties grown in rainfed uplands particularly in the low yielding environments.
- 3. Cooked rice is soft with good eating quality.
- 4. It fetches premium price in the market over Radha 4.
- 5. Highly resistant to blast and BLB

Recent impact assessment done by Department for International Development (DFID) indicated that in spite of very low promotional support, this variety was adopted by 2.8% of 344 households from across the six randomly surveyed terai districts and 5% of 287 households from the upland areas of another set of four randomly surveyed terai districts.

Annex 1. Rice IRD distribution, 2010 Main

District	COB rice varieties, 1 set of IRD= 1 kg													Total Amount (Kg)	Total HH	Female	Male
	B 1027	B 2014	Ashoka 228	Judi 582	B2024	B3004	Judi 572	MD 0742	B1036	SS	B3019	Sugandha 1	MD 0845				
Dhanusha	400	350	0	0	0	450	0	0	0	100	1850	0	0	3150	3150	925	2225
Mahottari	0	282	166	0	0	537	0	0	0	1200	1500	19	0	3704	3704	1135	2569
Makwanpur	50	0	0	0	0	0	0	0	0	1400	1200	0	0	2650	2650	289	2361
Rupandhai	1000	0	0	0	0	0	0	0	0	1260	1400	0	0	3660	3660	1413	2247
Rautahat	0	0	0	0	0	200	0	0	0	500	0	0	0	700	700	257	443
Rautahat	0	0	0	0	0	234	0	0	0	2800	0	0	0	3034	3034	378	2656
Rautahat	0	0	0	0	0	0	0	0	0	700	0	0	0	700	700	93	607
Rautahat	0	0	0	0	0	170	0	0	0	916	0	0	0	1086	1086	189	897
Sarlahi	0	0	0	0	0	490	0	0	0	1000	0	0	0	1490	1490	180	1310
Sarlahi	0	0	0	0	0	810	0	0	0	400	0	0	0	1210	1210	457	753
Sarlahi	0	0	0	0	0	500	0	0	0	200	0	0	0	700	700	174	526
Sarlahi	0	0	0	0	0	700	0	0	0	200	0	0	0	900	900	365	535
Parsa	0	0	0	0	0	175	0	0	0	240	0	0	0	415	415	97	318
Parsa	0	0	0	0	0	210	0	0	0	1500	0	0	0	1710	1570	150	1420
Parsa	0	0	0	0	0	245	0	0	0	185	0	0	0	430	430	111	319
Parsa	0	0	0	0	0	270	0	0	0	365	0	0	0	635	645	190	455
Sunsari	0	400	0	574	0	0	0	35	0	0	0	0	127	1136	1136	350	786
Sunsari	400	0	0	0	0	0	135	0	700	0	0	360	0	1595	1460	600	860
Sunsari	0	0	0	0	0	20	0	0	0	0	1200	0	0	1220	1227	15	1212
Sunsari	0	0	0	0	0	400	0	0	0	0	800	0	0	1200	978	250	728
Jhapa	246	10	0	51	0	0	0	0	54	0	0	100	0	461	461	150	311

Jhapa	550	335	0	143	300	0	0	37	0	0	0	200	50	1615	1615	222	1393
Jhapa	0	190	0	94	19	1600	0	10	0	0	1250	0	27	3190	2460	1558	902
Ibana	0	0	0	0	0	1800	0	0	0	0	900	0	0	2700	2500	1254	1226
Total	2646	1567	166	862	319	8811	135	82	754	12966	10100	679	204	39291	37971	10802	27169

Annex 2. Rice IRD plan, 2011 Main

						MD	MD		Sunaulo	Grand
District	B 1027	B 2014	B 3004	B 3019	Judi 582	0742	0845	PR 101	Sugandha	Total
Banke	100	275			100	155	105	50	250	1035
Bara			140	85		155	105		350	835
Bardiya			140	85		155	105		300	785
Dang	100				100	155	105		500	960
Dhanusha	100	275	100	150		155	105			885
Jhapa		275	140	85	100	180	105	50		935
Kailali	100	275			100	155	105	50		785
Kanchanpur	100	275			100	155	105	50		785
Kapilvastu	100	275			100	155	105		300	1035
Mahottari	100	275	140	85		155	105			860
Morang	100	275	140	85	100	170	105			975
Nawalparasi			140	85		155	105		400	885
Parsa			140	85						225
Pyuthan					100					100
Rautahat			140	85		155	105		350	835
Rupendehi			140	85		155	105		250	735
Saptari	100	275				155	105	50		685
Sarlahi	100					155	105			360
Siraha	100	275				155	105	50		685
Sunsari		275			100	170	105			650
Surkhet					100	155	105	50	150	560

Tanahun	100		140	85	100			50	150	625
Grand Total	1200	3025	1500	1000	1100	3000	1995	400	3000	16220

Annex 3. Summary of CBSP groups and members

District	Name of CBSP	Address (VDC, Ward No.)	Total Member	Female	Dalit	Janajati	Muslim	Others	Estd. Date	Registered Number	Revolving Fund (Nrs.)
Sunsari	Dakani mai sahakari sanstha	Itahari-6	46	10	0	44	0	2	2062	048-62-63	51000
Sunsari	Namuna krishi sudhar samuha	Itahari-3	32	15	0	7	0	35	062-9-25	6412	50000
Jhapa	Alpa devi biu bijan utpadak sahakari sanstha	Budhabare-4	28	9	0	0	0	28	2/1/2062	39/061/062	150000
Jhapa	Mechi multiperpose	Mechinagarpalika-12	3980	1265	597	1393	179	1821	2056/2057	3/1/7/(166)056/057	5449820
Morang	Sayapatri biu utpadak krishak samuha	Babiyabirta-9	23	5	0	6	0	17	7/21/2063	662	77,629
Morang	Krishi upaj bajar byabsaya sahakari sanstha	Tankisinuwari	213	58	4	69	0	82	12/23/2062	332(31)	193,947

Nawalparasi	Naya Belahani fruit and seed production group	NayaBelahani-5	23	3	0	10	0	13	2065	DADO-702	305663
	Shivashakti seed production group	Rampur Khadauna-4	20	0	0	20	0	0	2061	DADO-281	40000
Bara	Baudhimai Agricultural Cooperative Ltd.	Maheshpur-4	50	29	10	31	9	0	2064	DCO, Parsa	505000
	Ankur seed production cooperative Ltd.	Sapahi-4	27	7	0	3	0	24	2065	DCO,Parsa	325000
Tanhun	Bauuddeshiya Samabeshi seed production group	Manpang-8	20	14	4	2	0	14	2065	256	24973
	Barbhanjyang Laganshil seed productio group	Barbhanjyang-5	25	13	1	2	0	22	2065	257	12600
Rautahat	Shree K P M K S S Ltd	Dumariya - 2 NAJARPUR	56	56	0	0	0	56	0/0/2063	598	4034872
Rautahat	Shrijanshil krishak Samuh	Dumariya - 2 DUMARIYA	10	1	1	8	0	0	2052	101	20000
Sarlahi	Janjyoti Krishak Samuh	Jamuniya-5 MADANPUR	30	6	8	4	0	18	2065	190	11000

Sarlahi	Kisan Uththan Krishak Samuh	Haripur-5 CHITAIN	30	20	0	30	0	0	7/7/2065	567	57000
Dhanusa	Jayma Laxmi	Phoolgama	51	2	5	9	0	37	2/15/2066	462	13000
Dhanusa	Jankalyan	Digamberpur-8	22	7	2	2	0	18	10/15/2066	463	15000
Dhanusa	Mithila Krisi Utpadak Krisak Samuha	Umaprempur-4, Haripur	26	6	6	0	2	12	12/17/2065	387	20,000
Mahottari	Nab Krishi CBSP	Mahadaiya-7	25	3	1	1	2	21	11/1/2066	In Process	13000
Mahottari	Gairi CBSP	Maisthan-4, Cheru	41	14	0	1	0	40	1/30/2066	330	46,000
Rupandehi	Adarsa	Semlar-6	74	23	2	10	0	62	6/13/2055	311	5,00,000
Rupandehi	Ramapur	Dudhrakshya-5	80	23	2	2	0	76	8/10/2054	28	16,75,152
Total:			4932	1589	643	1654	192	2398			11415504

Annex 4. Legume IRD distribution, 2010/11

			Dalit	Janjati	Muslims	Others	Total Participants
Activities	Male	Female					
Lentil IRD	2105	801	133	867	102	1804	2906
Rajma IRD	2245	816	114	833	92	2022	3061
Mung beanMung bean IRD	2456	524	86	840	42	2012	2980
Total Beneficiaries	6806	2141	333	2540	236	5838	8947

			Dalit	Janjati	Muslims	Others	Total Participants
Activities	Male	Female					
Neighboring visit	1540	800	68	672	34	1566	2340
Cross CBSP	470	168	16	246	8	368	638
NVSM	644	231	36	281	5	553	875
Seed Prod Training	730	450	65	382	18	715	1180
Total Beneficiaries	3384	1649	185	1581	65	3202	5033

Annex 5. Beneficiaries through trainings and exposure visits, 2010/11

Annex 6. Material support to CBSP groups 2007 to 2011

Items	Count (2007-2009)	Count (2010/11)
Grading machine	1	3
Plastic sealing machine	1	
Printing block of seed sacks	6	
Rice Winnowing Hand Fan	1	
Seed Bin	10	12
Seed drill Machine	1	

Sewing Machine	7	4
Sprayer	10	2
Weighing balance	3	3
Seed treating machine		1
Grand Total	44	25

Annex 7. Status of the working capital of CBSP Groups

CBSP groups	2007	2008	% increased	2009	% increased	2010	% increased
Adarsha, Rupandehi	400	400	0	450	5.9	500	11.1
Alpa Devi, Jhapa	422	603.5	17.7	1300	36.6	1500	15.4
Ankur, Bara	10	60	71.4	150	42.9	415	176.7
Bahuuddeshyiya, Tanahun	0	1.2	100	22	33.3	158	618.2
Laganshil, Bar Bhanjyang, Tanahun	0	1.23	100	2.5	33.3	16.3	552
Baudhimai, Bara		45	100	461.7	82.2	505	9.4
Dakanimai, Sunsari	21.6	26	9.2	70	45.8	51	-27.1
Gairi, Mahottari	0	0	0	14.8	100	46	210.8
Janjyoti Krishak, Sarlahi	0	0	0	11	100	11	0
Jayama Laxmi, Dhanusa	0	0	0	7	100	13	85.7
Kisan Uththan, Sarlahi	0	45	100	57	11.8	57	0
Mechi Multipurpose, Jhapa	4668	5150.8	4.9	6100	8.4	5449.82	-10.7
Namuma, Sunsari	10	20	33.3	50	42.9	50	0
Naya Belahani, NPC	79.2	178.2	38.5	305.66	26.3	629.802	106
Ramapur, Rupandehi	1500	1800	9.1	1000	-28.6	1675.152	67.5
Shivashakti, NPC	10	20	33.3	40	33.3	180	350

Shrijanshil krishak, Rautahat	20	45	38.5	75	25	20	-73.3
Sri Krishna Pranami, Rautahat	4034	8431	35.3	9200	4.4	4034.872	-56.1
Sayapatri biu utpadak krishak samuha, Morang					77629	77.629	
Krishi upaj bajar byabsaya sahakari sanstha, Morang					193947	193.947	

Annex 8. Indicators of sustainability of CBSP groups

Indicators	Means of verification	2007	2008	2009	2010
Business plan	Rate of adoption by CBSPs	1 (5%)	3 (15%)	19 (95%)	20 (100%)
TL seeds Marketing	Quality testing, bagging, Tagging, Marketing records	2 (10%)	8 (40%)	17 (85%)	20 (100%)
Understanding level on TL Seed	Degree				
	Low	17	6	1	0
	Medium	1	11	4	3
	High	2	3	15	17
Institutionalization	Registered in-DADO, Co-operative division			20	20
Governance	AGM, Audit		14	20	20
Joint Bank Account	Bank name and Account number			20	20
3 Years Vision	Prepared vision	0	0	0	15 (75 %)

Annex 9. Farmers' perception on disease susceptible trait of COB rice varieties tested in IRD, 2010

	Farmers			
COB varieties	More	Same	Less	Total
Barshe 3004	119	157	226	502
Sunaulo sugandha	265	78	106	449
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Barshe 1027	44	161	154	359
Barshe 3019	92	111	226	429
Barshe 2024	50	16	23	89
Judhi 582	26	13	72	111
Sugandha-1	1	3	7	11
Barshe 2014	16	44	83	143
Barshe 1024	0	1	2	3
Madham 845	5	5	11	21
Madhyam 0742	1	6	23	30
Judhi 572	24	1	8	33
Barse 1036	15	8	12	35
Barkhe 0905 (agaute)	13	9	1	23
0744	0	0	2	2
PR 101	0	8	0	8
Asoka-228	0	2	0	2
Agaute 904	3	5	17	25
Total	674	628	973	2275

Annex 10. Farmers' perception on tillering capacity of COB rice varieties tested in IRD, 2010

	Farmers Perception (Number of farmers)			
COB variety	More	Same	Less	Total
Barshe 3004	312	148	39	499
Sunaulo sugandha	220	153	76	449
Barshe 1027	150	126	77	353
Barshe 3019	236	118	73	427
Barshe 2024	30	32	27	89

Judhi 582	54	35	22	111
Sugandha-1	0	3	8	11
Barshe 2014	51	58	33	142
Barshe 1024	3	0	0	3
Madham 845	8	1	10	19
Madhyam 0742	17	9	4	30
Judhi 572	5	14	13	32
Barse 1036	4	17	13	34
Barkhe 0905 (agaute)	16	7	0	23
0744	1	1	0	2
PR 101	0	3	5	8
Asoka-228	0	2	0	2
Agaute 904	19	5	1	25
Total	1126	732	401	2259

Annex 11. Farmers' perception on milling recovery of COB rice varieties tested in IRD, 2010

	Farmers I			
COB variety	More	Same	Less	Total
Barshe 3004	185	219	71	475
Sunaulo sugandha	141	206	82	429
Barshe 1027	119	133	79	331
Barshe 3019	116	165	112	393
Barshe 2024	16	41	28	85
Judhi 582	32	43	28	103
Sugandha-1	0	8	3	11
Barshe 2014	33	77	30	140
Barshe 1024	1	2	0	3

Madham 845	6	4	8	18
Madhyam 0742	11	10	6	27
Judhi 572	2	4	23	29
Barse 1036	5	14	15	34
Barkhe 0905 (agaute)	15	7	0	22
0744	2	0	0	2
PR 101	1	4	2	7
Asoka-228	0	2	0	2
Agaute 904	17	5	0	22
Total	702	944	487	2133

Annex 12. Farmers' perception on threshing of COB rice varieties tested in IRD, 2010

	Farme	Farmers Perception (Number of farmers)			
COB variety	Easy	Same	Hard	Total	
Barshe 3004	243	206	44	493	
Sunaulo sugandha	224	188	34	446	
Barshe 1027	191	139	14	344	
Barshe 3019	241	125	64	430	
Barshe 2024	53	31	5	89	
Judhi 582	54	26	28	108	
Sugandha-1	0	9	2	11	
Barshe 2014	79	60	3	142	
Barshe 1024	0	3	0	3	
Madham 845	4	8	7	19	
Madhyam 0742	9	13	8	30	
Judhi 572	2	3	27	32	
Barse 1036	11	8	13	32	
Barkhe 0905 (agaute)	11	10	2	23	

0744	2	0	0	2
PR 101	2	6	0	8
Asoka-228	0	2	0	2
Agaute 904	11	8	6	25
Total	1137	845	257	2239

Annex 13. Farmers' perception on quality of COB rice varieties tested in IRD, 2010

	Farmers P			
COB variety	Good	Same	Bad	Total
Barshe 3004	254	183	44	481
Sunaulo sugandha	325	98	13	436
Barshe 1027	193	74	73	340
Barshe 3019	238	124	48	410
Barshe 2024	40	27	19	86
Judhi 582	66	31	7	104
Sugandha-1	5	2	4	11
Barshe 2014	53	75	14	142
Barshe 1024	0	3	0	3
Madham 845	9	1	10	20
Madhyam 0742	17	4	6	27
Judhi 572	8	0	22	30
Barse 1036	14	11	9	34
Barkhe 0905 (agaute)	16	4	1	21
0744	2	0	0	2
PR 101	1	5	2	8
Asoka-228	1	1	0	2
Agaute 904	12	10	0	22

Total	1254	653	272	2179
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Annex 14. Farmers' perception on market price of COB rice varieties tested in IRD, 2010

	Farmers I			
COB variety	More	Same	Less	Total
Barshe 3004	123	188	156	467
Sunaulo sugandha	248	89	53	390
Barshe 1027	88	125	105	318
Barshe 3019	84	91	211	386
Barshe 2024	20	15	37	72
Judhi 582	17	26	47	90
Sugandha-1	2	2	0	4
Barshe 2014	23	62	52	137
Barshe 1024	0	3	0	3
Madham 845	3	3	13	19
Madhyam 0742	11	9	9	29
Judhi 572	0	3	24	27
Barse 1036	2	5	21	28
Barkhe 0905 (agaute)	1	8	2	11
0744	0	0	2	2
PR 101	0	6	2	8
Asoka-228	0	2	0	2
Agaute 904	7	2	0	9
Total	629	639	734	2002

Farmers' perception (Number of farmers)			
COB variety	Yes	No	Total
Barshe 3004	18	478	496
Sunaulo sugandha	60	383	443
Barshe 1027	21	327	348
Barshe 3019	9	407	416
Barshe 2024	1	84	85
Judhi 582	7	101	108
Sugandha-1	2	9	11
Barshe 2014	19	118	137
Barshe 1024	0	3	3
Madham 845	0	18	18
Madhyam 0742	5	24	29
Judhi 572	0	33	33
Barse 1036	1	34	35
Barkhe 0905 (agaute)	0	23	23
0744	2	0	2
PR 101	0	8	8
Asoka-228	0	2	2
Agaute 904	0	25	25
Total	145	2077	2222

Annex 15. Farmers' perception on lodging of COB rice varieties tested in IRD, 2010

Annex 16. Legume seed produced in 2010/11 season

District	CBSP groups	Kidney bean (kg)	Lentil (kg)
Jhapa	Mechi Co-operative	7000	
Jhapa	Alpadevi	5000	
Sunsari	Dakani mai	400	200

Sunsari	Namuna		
Morang	Sayapatri	130	750
Morang			
Mahottari	Nav Jagarn Co,		300
Mahottari	Gairi		135
Dhanusa	Jay Laxmi		760
Dhanusa	Jankaliyan		150
Dhanusa	Mithila	125	185
Sarlahi			
Sarlahi			
Rautahat			
Rautahat			
Bara	Ankur	400	1050
Bara	Bauddimai	250	1200
Nawalparasi	Nayabelhani	300	10000
Nawalparasi	shivas		600
Tanahun	Bahuuddhesiya	100	450
Tanahun	Laganshil	80	100
Rupandehi	Adarsha	25	1100
Rupandehi	Ramapur	150	970
	Total	13960	17950

Annex 17. Summary of rice seed production and sale by CBSP groups from 2008 to 2011

Achievements of CBSP groups in rice Seed Production	2007-2008 (t)	2008-2009 (t)	2009-2010 (t)	2010-2011 (t)
Total Production of all varieties (t)	209	257	335	1,018.9
Total Sale of all varieties (t)	174	237	307	To be supplied
COB Production (t)	4.5	26	67	149.9
COB Sale (t)	4	24	64	To be supplied

Non COB Production (t)	204.5	231	268	867.9
Non COB Sales (t)	170	213	243	To be supplied

Note: It excludes high altitude rice seed

Annex 18. Average monitory value of the seed produced by CBSP groups in 2010/11 season

SN	Сгор	Production in 2010/11 season (kg)	Price per kg*	Value in NRs	Value in GBP
1	Rice	1014000	35	35490000	308608.7
2	Lentil	31110	110	3422100	29757.4
3	Kidney bean	18460	110	2030600	17657.4
4	Mung bean	11480	120	1377600	11979.1

*Note: This is the average price of rice and legumes as adopted by CBSP groups in Chitwan. Per kg price of rice ranged from NRs 32 for course grain varieties to NRs 40 for aromatic varieties like Sunaulo Sugandha

Annex 19. COB rice seed sale by Anamolbiu Private Limited, 2011

			Source Seed			TL seed								
			Amount (K	g.)				Amount (K	<u>g.)</u>				Total	
				Total Amount	Rate	Income			Total Amount	Rate	Income	Grand Total	Rs. (Source	Income
S.N.	Variety	Jhapa	Chitwan	(Kg.)	(Rs./Kg)	(Rs.)	Jhapa	Chitwan	(Kg.)	(Rs./Kg)	(Rs.)	(Amount;Kg)	+ TL)	in GBP
										Jhapa:				
										Rs				
										45/Kg,				
										Chitwan:				
										Rs.				
1	Sunaulo Sugandha	0	155	155	60	9,300	200	1810	2010	50/Kg	99500	2350	108,800	946.1
2	Sugandha-1	0	0	0	0	0	60	0	60	45	2700	60	2700	23.5

					60 Kg. only sold @									
					Rs									
3	Barkhe 2014	85	0	85	45/Kg	2700	809	0	809	40	32360	894	35060	304.9
4	MD 0742	10	0	10	45	450	1615	985	2600	45	117000	2610	117450	1021.3
5	Barkhe 3019	0	0	0	0	0	747	0	747	40	29880	747	29880	259.8
6	Barkhe 3004	20	0	20	45	900	500	0	500	40	20000	520	20900	181.7
7	Judi 582	40	0	40	45	1800	768.5	0	768.5	40	30740	808.5	32540	283.0
8	MD 0845	0	0	0	0	0	315	385	700	45	31500	700	31500	273.9
9	Barkhe 1027	15	0	15	45	675	176	0	176	40	7040	191	7715	67.1
10	Barkhe 2001	0	0	0	0	0	60	0	60	40	2400	60	2400	20.9
11	Barkhe 1036	0	0	0	0	0	161	0	161	40	6440	161	6440	56.0
12	Agaute 0904	0	0	0	0	0	100	0	100	40	4000	100	4000	34.8
13	Agaute 0905	0	0	0	0	0	64	0	64	40	2560	64	2560	22.3
14	MD 0907	0	0	0	0	0	42	0	42	40	1680	42	1680	14.6
15	MD 0904	0	0	0	0	0	49	0	49	40	1960	49	1960	17.0
16	MD 0744	0	0	0	0	0	48	0	48	40	1920	48	1920	16.7
17	Barkhe 3017-5	0	0	0	0	0	15	0	15	40	600	15	600	5.2
														0.0
Total												9419.5	408,105	3548.7

Annex 20. Planning of Anamolbiu for COB rice source seed production, 2011

Crop	Variety	Pedigree	Location	Total seed (kg)	Area (m2)	Seed Type
Rice	Sunaulo Sugandha	IPB	Nawalparasi	3	1000	Breeder/Source
			Jhapa	2	666	Breeder/Source
Rice	B 3004	Kalinga III/IR64	Nawalparasi	1	333	Breeder/Source
			Jhapa	1	333	Breeder/Source
Rice	B 2014	Kalinga III/IR64	Nawalparasi	1	333	Breeder/Source

			Jhapa		1		333	Breeder/Source
			Jhapa	12 hills		10m2/hill		Breeder
Rice	Sugandha 1	IPB	Jhapa		1		333	Breeder/Source
			Jhapa	20 hills		10m2/hill		Breeder
Rice	MD 0742	Masuli/MT4	Jhapa	20 hills		10m2/hill		Breeder
Rice	B 1027	K III/IR 64	Nawalparasi		1		333	Breeder/Source
			Jhapa		1		333	Breeder/Source

Annex 21. Wheat seed production programme 2010/11

S.N.	Name of crop and varieties	Quantity of Seed used (kg)	Seed standard	Total area under cultivation (ha)	Tentative production (kg)
1	Wheat : Gautam	20	Breeder	0.2	400
2	Wheat : NL 297	30	Breeder	0.3	700
3	Wheat : Bijaya	30	Breeder	0.3a	700
4	Wheat : Gautam	120	Foundation	1.0	2000
5	Wheat : NL 297	120	Foundation	1.0	20000

Annex 22. Vegetable seed production programme 2011

Crops	Varieties	Source seed amount (Kg)	Seed standard	Total area (ha)	Target (Kg)
Raddish	Mino Early, 40 days	50	C1	0.1	3000

Rayo	Marpha, Khumal	2.5	C1	0.05	1500
Simi	Ghiu Simi, Four Season	58	C1	0.05	1300
Реа	Sikkim Local	40	C1	0.05	800
Cowpea	I.T. Bodi	25	C1	0.01	200
Cucumber	Bhaktapure	1	C1	0.01	200
Tomato	Lapsi, B.L.,C.L.	0.9	C1	0.02	150
Coriander	Kalami	5	C1	0.005	200
Lettush	Local	1	C1	0.001	30
Onion	Red Creole	10	C1	0.03	500

Annex 23. Agro-morphological traits of Barkhe 2014 compared with Kanchhi Masuli

Characteristics	Barkhe 2014	Kanchhi Masuli (check)
Plant height (cm)	129	126
Days to maturity from seeding	135-140	140-145
Yield (t/ha)	3.8 (up to 5.8)	3.2 (up to 5.0)
No. of effective panicles per hill	9.1	8.5

Panicle Length (cm)	22	19
No. of tillers per hill	9.3	8.7
No. of filled grains per panicle	142	120
1000 seed weight (g)	22	20
Grain Color	Light golden	Dark brown
Harvest Index	0.39	0.33
Head rice recovery (%)	69	65
Awn	Awn less	Short awn

Annex 24. Agromorphological traits of Barkhe 1027

Characteristics	Barkhe 1027
Plant height (cm) (n=5)	89
Maturity (DAS)	115-120
Yield (t/ha)	3.3 (up to 4)
Effective panicles / hill (n=5)	9.1
Panicle Length (cm) (n=5)	23-25
Tillers /hill (n=5)	8-10
Grain Size	Long Slender
1000 seed weight (g)	25.19
Grain Color	Golden
Awn	Awn less

CLUSTER 2 Value Chain Innovation

Project Title: Linking Farmers with Markets for Rural Prosperity

Lead Organization: IDE Locations: Cambodia, Nepal, Vietnam Start / End Date: 2008 - 2011 Summary Page

The Research into Use (RIU) program in Cambodia focused on ways for the rural poor to increase income from vegetables, in coordination with partners, the Cambodian Center for Study and Development in Agriculture and the Partnership for Development in Kampuchea. The project consisted of increasing capacity for quality based production, improved supply of quality farm inputs, increased use of micro-irrigation technologies, and specific market opportunities identified via market chain assessment and marketing groups. Each of these components was organized around the market assessment, farmer's interactions were improved, and linkages became more organized to take advantage of the identified market opportunities. Training programs were held to facilitate entry into these new markets, resulting in an increase in the average vegetable plot size, from 367m to 500m. These famers were then able to report a net income improvement from \$53 to \$137/year. In all, this program benefited 75 farmer groups and 40 farm business advisors – groups that included nearly 1,400 women. Through this project, IDE learned that often the best method for instituting new systems is to allow their growth organically and entrepreneurially. It was clear that many farmers remain conservative and need higher levels of certainty before changing their habits. This understanding helped us to change the program early on, making it more successful.

In Nepal, IDE worked with local partners CEAPRED and AEC to pilot the participatory market chain approach (PMCA). This approach called for creating thematic groups of market chain actors, but in Nepal it was most beneficial to create a mixed group of value chain actors such as input service providers, market and planning committee members, vegetable producers, wholesalers, retailers, and restaurant owners. This approach has been successfully used across five districts, and is scheduled for adoption by the government. By bringing together these varied actors, IDE had the opportunity to build trust between value-chain stakeholders, leading to valuable information more widely accessible to farmers, increased production, sales, and incomes of smallholders. Market information was disseminated through local radio broadcasts, enabling farmers to be better equipped with knowledge of daily crop prices. We learned in Nepal that the project intervention should also include a focus on adoption of improved production technologies. This leads to production volume increases, leading to increase in income. With this focus, the project directly benefited over 5,000 vegetable producers - 3,000 of those were women.

In Vietnam, working with the women's union in three different districts, the PMCA approach was applied to pig farmers and used to organize the outreach and coordination among market stakeholders. IDE was able to strengthen farmer access to alternative rural/urban markets and better meet market demands. Beginning with a market chain sketch and market appraisal, a business plan was created and used by the group. The intention is to change and improve the approached taken by these farmers in accessing high value markets. In one area, over 700 women pig raisers were able to achieve a net annual income gain. This was accomplished through improvements in quality-based production and marketing, communication with pig buyers, and quality of the product. New market opportunities were identified through the project, linking sellers to new buyers, and value chains were improved through market chain assessments, increasing business opportunities for all participants. The end result of this project was a 30% increase in annual household income. IDE learned that the 3-way arrangement model among feed supplier, pig producers, and pig buyers is highly appreciated by most market actors, as well as the local authorities. This model is considered one of the solutions to the problem of capital shortage and unstable market outlets, and we continue to work in this area.

Project Title: Linking Farmers with Markets for Rural Prosperity

Lead Project Organisation: IDE Cambodia

List of Partners: Official – Cambodian Center for Study and Development in Agriculture (CEDAC), Partnership for Development in Kampuchea (PADEK) Unofficial – Provincial Department of Agriculture (Prey Veng and Svay Rieng), International Volunteers of Yamagata (IVY – Svay Rieng)

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

Non RNRRS generated knowledge used:

1. Market Assessments

A market assessment was completed at 5 points along the major highway traversing the whole of the project area. This started at the Vietnamese border and continued 120 km to the west. Value chain actors from farmers through to consumers were interviewed at each point.

The assessment both echoed the findings of past studies, and highlighted newer opportunities :

- The dominance (65%) of Vietnamese imports throughout the area, which is similar to the national import rate
- The preference of all actors to buy Cambodian produce with the perception that it is cleaner (lower agrochemical use) and better tasting
- Prices can be as high at the local 'farm-gate', distant from the main supply routes
- The amount of vegetables being grown in the project area is small and increasing slowly. Low availability of water, low quality inputs and a lack of extension support, are the main constraints to greater production
- Vertical and horizontal integration of value chain actors is virtually absent. This leads to high transaction costs/lower quality produce being sold.
- Absence of market information means producers have no knowledge to support their decisions on where to sell and at what price
- One alternative to the local market is the Border Casino Restaurant vegetable supply contract administered by the NGO IVY. The prices are contract arranged (constant most of year), but this market requires a higher quality product, with higher attention to presentation

• Despite the wide range of vegetable varieties available, farmers still only grow on average 4 vegetables (cucumber, eggplant, bitter gourd, long bean), as they have good previous success with these and the price received is acceptable, subject to oversupply issues.

2. Improved Water Management (Drip irrigation and Low-cost pumps)

Drip irrigation is still a good solution for extracting more value from the limited water availability facing many people in the project area. Demonstrations show the benefits in water savings (50%), labour savings (70%), and increased profit. The majority of drip irrigation sales are still to NGOs who pass them onto their beneficiaries at varying degrees of subsidy. Despite data showing that the most profit is created by farmers who invest in their own system, sales to this segment have been at a minimum.

Low-cost pumps have also been trialled. Manually-operated, bicycle pumps were introduced through an agreement with a major international pump company. However, the people deemed the pumping rate to be too low for the work input.

Low-cost fuel pumps are still the desirable, and increasingly affordable, option for farmers.

3. Improved access to good quality inputs and competent technical advice through Farm Business Advisors (Private Extension Agents)

This resource has been the star of the project.

The target of assisting 2500 small farmer households in the 40 project communes was surpassed in April 2010 and eventually reached 4200 at end of project. The average income improvement over this time has been \$260/household.

The Farm Business Advisors (FBAs) have been the main vehicle to pass on market messages to the households.

In many villages, vegetable growing does not have a strong place in the general income stream of most families. The FBA makes their business through showing the farmers that with some technical support and good inputs, superior income is quite achievable.

4. Fertiliser Deep Placement (FDP)

FDP remains a technique which continually demonstrates excellent benefits, but is under-utilised. FDP usage consistently produces a 20-30% yield and profit improvement. In addition to the improved result, the fertiliser is applied just once in the growing cycle, thus reducing the amount of monitoring required and repeat application of standard fertilisers.

FDP has been promoted through the RIU project and has resulted in ever increasing sales. This has occurred mainly through promotion of demonstration results and field days, and not commercial marketing.

We are hopeful that a subsequent funding proposal will provide the opportunity to promote FDP more widely.

5. All of the above technologies are Climate Change Adaptations

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Pro	oject Output Title	Status of achievement	Deviations if any	Reasons for the deviation
1.	Farmer marketing	A range of farmer marketing groups		
	groups formed	formed :		
		 approx. 75 groups formed by partner NGOs 		
		• Each FBA worked informally with a		
		range of non-partner NGO groups		
		• FBA clients also supplied vegetables		
		into the Vegetable Supply Association		
		 operated by the NGO IVY 		
2.	Increased capacity of	Surveys found that 80% of farmers were		
	farmers for quality-	satisfied with their increased capacity to		
	based production and	both produce and market their		
	marketing	vegetables.		
3.	Improved supply of	During the project some \$30K of quality		
	quality farm inputs and	assured inputs were sold by the FBAs to		
	services promoting	their farmer-clients, with good quality		
	enhanced farm	extension advice.		

	productivity			
4.	Increased use of micro- irrigation technologies (MIT) by target farmers (for Nepal and Cambodia)	Farmers are using MIT, if they have been supplied with kits by other organisations	No appreciable increase in MIT adoption has been seen in the project area	 Farmers have low willingness to invest in diversification Traditionally, the project area relies heavily on rice production and off-farm income, with low levels of vegetable production The area has significant environmental constraints. Flooded in Wet season and drought in Dry, poor soils. The farmers technical skill is quite low
5.	Specific market opportunities identified via market chain assessment (PMCA)	Three main markets identified : Local (farm gate) market District market Bavet Border Restaurants (Vegetable Supply Association - VSA)		
6.	Market chain actors' interactions are improved and linkages become more organized to take advantage of market opportunities (PMCA)	Farm Business Advisors, traditional traders and VSA collectors are all playing increased parts in the value chain.		
7.	New collaborative marketing initiatives supported with business services (PMCA)	The FBA input sales and extension directly complement the VSA collection system. Increased availability of higher quality vegetables, is improving trader interest in the area – prior to program		

		there were few traders working.	
8.	Project lessons and case	Lessons and case studies that became	
	studies documented and	apparent during the project have been	
	shared	highlighted and incorporated	

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

The Market Assessment was the main activity around which the project was organised. Having found the major market options, training programs were then organised to enable farmers to achieve the additional market requirements.

Almost independent to the Market Assessment, the supply of quality inputs and advice by the FBAs was on-going.

The low rates of vegetable production, combined with the large rate of vegetable importation, means that, at present, marketing is not a major constraint.

While few new activities were required, there was opportunity for employing locally developed tools, such as the Farmer Marketing School (FMS). The FMS is very complementary to the PMCA process, and helps teach post-harvest treatment and promote better relationships with other actors such as traders.

An example of a new activity was introducing the Cambodian Agricultural Marketing Information System into the project area. This system used SMS to disseminate market prices and enable contact between actors.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

The partner NGOs were quite traditional. In the Cambodian context, this means they were founded on a food security platform. Their programs are based around showing household how to improve food security without requiring cash investment ie. supplying all inputs from the land, seed-saving, composting, natural pesticides etc. The most relevant difference is that they advocated low market involvement, assuming this needs high investment and is not a poor-friendly activity. In fact, both NGOs saw this project as an opportunity to trial market involvement. Also, both NGOs support organic

vegetable production practices.

This lead to two limitations. Firstly, each organisation was asked to provide FBA candidates. The candidates proffered were more 'lead farmers', than the entrepreneurs required to make a success of the new FBA business opportunity. Also, the income of these FBAs was constrained by the organic limitations and the lower profits/ available cash of these farmers.

While no actual replacement of the partners was performed, we did shift focus to other NGOs who were more aligned with the commercial goals of the project.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i). Engagement has been limited to working with the local authorities to ensure our work is consistent with policies. Our work matched the government's policies very well eg climate change, diversification, and reduced reliance on groundwater.

ii). The Provincial Department of Agriculture is the main implementer for both ministerial (central) and local policies. The main engagement mechanisms were :

- Regular meetings
- Seconding staff
- Sharing demonstrations

iii). We have been successful in getting several NGOs to buy inputs from the FBAs, as they see this as a step towards sustainability.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

i). IDE has now changed the salary arrangements of internal field staff who are involved with the FBA program to be performance based. This is a big change for an NGO to make, but one that was critical to having all parts of the program focussed on farmer and FBA success.

ii). No unintended changes that we are aware of.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i).

• One of the biggest lessons has been to understand when to let the new systems go and develop organically, entrepreneurially. But also to know what areas need close attention eg quality control

- Initial selection of FBAs is critical must be entrepreneurs, otherwise their ability to attract business is limited.
- Training should be as interactive as possible
- Different logic is often at play. A deep understanding of the motivations behind certain decisions and actions will help plan interventions. For example, simple presentation/demonstration of superior gross margins of a particular agricultural intervention, may not improve adoption when having a family member working off-farm brings more status.
- When extension messages are focussed on Return on Investment, Costs become a minor issue

ii). Lessons have been incorporated as quickly as possible in the program. This occurs usually through the FBA training program. The FBAs give an upscaling ratio of approximately 100:1

iii). There has been little evidence of better planting/harvesting scheduling to avoid local gluts. It will take more work to demonstrate the benefits of lengthening the harvesting season, and diversifying the crops. Traditionally, the people in the project area have little expectation of deriving income from vegetables. The current/past practice is to plant small amounts with no investment and if any surplus eventuates then this is a bonus. Our

challenge is to turn this view to one of expecting success.

iv). NGO dependency can be a major constraint when attempting to form commercial entities with a view to sustainability. Our way to address this has been two-fold. Firstly, to communicate our sustainability vision to these organisations and connect them with their local FBAs, who can offer future input sales. Secondly, to instruct the FBAs to find the farmers working with these programs and turn them into clients after they see the services being offered.

v). The farming population remains very conservative. Not only do they need higher levels of certainty before changing their habits, but many do not see farming as a good livelihood and recommend that their children seek off-farm jobs. We are hopeful our work will help to change the view that farming is a 'default livelihood', to one that sees profits higher than the off-farm incomes that take family members out of the house and community, while elevating the status of successful farmers to 'local technical specialists'.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Pro	oject Output	Number & Type of	Number & Type	Male Beneficiaries	Female Beneficiaries	Total	Evidence Index*
		Beneficiaries	Beneficiaries	(indirect and direct)			
1.	Farmer marketing groups formed,		73 groups formed	689	486	1175	CEDAC Final Report PADEK Final Report
2.	Increased capacity of farmers for quality-based production and marketing		4200 farmers have been exposed to the program. 80% have expressed satisfaction	2806	1394	4200	FBA Survey
3.	Improved supply of quality farm		40 Farm Business Advisors sold	FBA : 45 FBA Clients : 2806	FBA : 5 FBA Clients : 1394	4200	FBA Database query

	inputs and	\$30K of inputs to			
	services	4200 farmer			
	promoting	clients			
	enhanced farm				
	productivity				
4.	Increased use of	35 kits sold to			FBA Database query
	micro-irrigation	farmers			
	technologies				
	(MIT) by target				
	farmers (for Nepal				
	and Cambodia)				
5.	Specific market	Approximately			Estimate only.
	opportunities	200 farmers			Recording exact
	identified via	introduced to			number interacting
	market chain	Bavet Casino			with this market has
	assessment	vegetable market			been difficult as
	(PMCA)				mainly administered
					by other
					organisation, and
					collection variable
					from week to week
6.	Market chain	30 traders and	5	25	Training list
	actors'	FBAs trained to			
	interactions are	use Market			
	improved and	Information			
	linkages become	system			
	more organized to				
1	take advantage of				
	market				
	opportunities				
	(PMCA)				
7.	New collaborative	Business services			

marketing	taught to all FBAs,		
initiatives	who, in turn,		
supported with	passed on to their		
business services	clients.		
(PMCA)			
8. Project lessons	Lessons		Case study of Puth
and case studies	incorporated in		Saroeun included
documented and	FBA business		
shared	training modules		

*Please provide evidence for the figures included here as a separate attachment, use this column in the table to indicate where this evidence can be found.

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

i). Three forms of baseline data were collected, 2 specific to the partners (CEDAC/PADEK), and one overarching (IDE)
 CEDAC – prior to the project only a 'very small number' of families were producing a surplus. At the project end 31% (193) were selling a surplus. The average vegetable plot size at increased from 367 m² to 500 m². These families averaged sales of "~ \$50 / month" (CEDAC Final Report)
 PADEK – The PADEK farmers report a net income improvement from \$53 to \$137/year (PADEK Final Report)
 IDE- The IDE survey indicates an income improvement of \$260/year

ii).The baseline data has been mostly used to track income improvement, and where the extra income has been used. Interestingly, increased income has been utilised on a range of items from extra schooling, to on-farm investment (eg pumps), to more 'social capital' items eg wedding gifts, TVs, jewellery. The data has also been used to track the farmer client satisfaction with the FBA services, which have consistently rated high. Seven baseline surveys have been conducted and 4 follow-ups. One report has been produced.

iii). The impact studies have been included, with Case Studies , in each of the partner final reports. The main impacts have been a keener knowledge of the benefits of market involvement, and lower risk aversion. The lower risk aversion has been achieved through superior results from higher quality inputs, and higher technical confidence, both with the farmer, and their knowledge that they have ready access to the FBA.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). Approximately one-third of the farmer clients are female. In most households, both women and men are involved in and benefit from agricultural production. Surveys of FBA clients—including the households of both male and female clients—indicate that about 35% of vegetable crop management and 79% of crop marketing is done by women. Thus, women's involvement in horticultural activities is significant and, in most cases, income from the marketing of vegetables goes into the woman's pocket first.

Also, our surveys show that 30% of FBA clients come from the poorest half of the population.

ii). The program already has a good reach into the lower poverty levels. We were concerned about the lower number of female FBAs than our target. However, as described above, our subsequent survey revealed a greater involvement of women in the activities than first thought. Also, the FBAs are expected to spend extended time away from the house tending their clients. For many women this is not possible as their responsibilities are around the house.

Therefore, no special program was developed to target women, or the poorer people.

The large network developed by the FBAs is ideal for testing and marketing new products. Recently, a mechanical weeder for rice was introduced into the system. This implement has great potential for use by women.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

The development of the Cambodia/Vietnam Border Casino restaurant vegetable market at the same time as the project was an added benefit. It gave

farmers a choice of very different markets with different quality requirements and prices, along with a good example of 'change'. A new market for Hibiscus Tea was tested, and resulted in a successful Master's Thesis. The results showed good economic return is possible, but the organisation of a critical mass to export will take more time to organise.

A large donor programme in the final year of RIU, gave away free seeds/fertilisers throughout the project area. While the short term effect of this was lower sales for the FBAs, the longer term effect seems to have been neutral to positive. The disbursement was a single event and this left the farmers with both a desire to repeat the good outcomes, but not having a repeat source of inputs. The FBAs who reacted well were able to turn these farmers into clients.

Project Title: Linking Farmers with Markets for Rural Prosperity

Lead Project Organisation: International Development Enterprises NEPAL

List of Partners: CEAPRED, AEC Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used: The project has introduced, piloted and demonstrated the Participatory Market Chain Approach (PMCA). Initially, RIU Nepal tried to abide by the PMCA guidelines prepared by the research project funded by the DFID Crop Post-Harvest Research Programme (CPHP), "Promotion and Development of the Participatory Market Chain Approach (PMCA) in Uganda" (R8418). Later on, it was experienced that the guidelines could not be exactly followed considering the context of Nepal. The thematic groups, defined in the guidelines as a group of market chain actors who are primarily involved in marketing part, were conceived in Nepal as a mixed group of value chain actors such as input service providers, Market and Planning Committee Executive Committee members, vegetable producers, wholesalers, retailers, consumers and restaurant owners. This approach of forming the thematic groups has been used widely in Nepal RIU. RIU created 18 thematic groups across five districts.

One of the events organized in the RIU PMCA Final Phase was the dramatic presentation of real-ground problems and solutions. This techniques was widely used in RIU, and was replicated by other projects of IDE.

Non RNRRS generated knowledge used:

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
1. Farmer marketing groups formed	RIU Nepal worked with 20 farmer	None	
	marketing groups named as "Market		
	and Planning Committee (MPC)"		
	formed by the Rural Prosperity		
	Initiative (RPI) Project and		
	Smallholder Irrigation and Market		
	Initiative (SIMI) Project.		

Г	1	1
2. Increased capacity of farmers for quality-based production	RIU has focused on facilitation to the	
and marketing	MPCs and market actors; and	
	channelled marketing for stronger	
	linkage with better markets and	
	greater benefits to market actors. In	
	Nepal, RPI and SIMI have delivered	
	varieties of trainings to build	
	farmers' capacity on production	
	technology and facilitated	
	coordination with service providers	
	and development line agencies. RIU	
	specifically facilitated training and	
	capacity building on marketing	
	aspects. RIU focused on the trainings	
	and strengthening of the Executive	
	members of the MPCs, thematic	
	groups and raising awareness of the	
	importance of markets among the	
	producers and market actors. The	
	progress data show that the	
	participation of MPC executive	
	members in different trainings and	
	workshops is 2.995 in total. This is	
	the cumulative figure of 202	
	Executive Committee members. This	
	so shows that each of the members	
	have participated in 14 different	
	project events	
	In respect of input service delivery	
	services and facilitation on vegetable	
	production Bural Prosperity	
	Initiative (RPI) has provided services	
	and facilitation about input and	
	and facilitation about input and	

		production part.	
3.	Improved supply of quality farm inputs and services	RPI and SIMI Projects have	
	promoting enhanced farm productivity (existing project)	established a number of micro	
		irrigation technology dealers, agro-	
		inputs (seed and fertilizer) suppliers,	
		local resource persons, nursery	
		growers and leader farmers within	
		and around the locality of the farmer	
		beneficiaries. RIU has further	
		facilitated the above service	
		providers, ensuring better services	
		to the farmers and greater	
		coordination among the market	
		actors. As a result of these	
		interventions, the farmers vegetable	
		production and productivity have	
		been enhanced; and the volume of	
		vegetable collection has increased at	
		the Collection Centers.	
4.	Increased use of micro-irrigation technologies (MIT) by	100% of the RIU beneficiaries from	
	target farmers (for Nepal and Cambodia) (existing project)	RPI Project have adopted micro-	
		irrigation technologies, whereas 87%	
		of the beneficiaries from SIMI	
		Project have adopted micro	
		irrigation technologies.	
5.	Specific market opportunities identified via market chain	The important findings of RIU PMCA	
	assessment (RIU PMCA)	Rapid Market Assessment result was	
		as follows:	
		Monthly average demand and	
		consumption of tomato in Pokhara	
		Market was found to be 47,312 kg	
		and the average price trend for	
		twelve months was Rs. 27.91 per kg.	
		Ninety percent of the total demand	
		was being fulfilled by the supply of	

tomato from outside the district	
while merely a 10% of the demand	
was being met by the in-district	
production. Thus the production	
situation is the opportunity to	
produce more tomatos to meet the	
large demand of Pokhara Market.	
The percentage of loss during	
harvesting and transportation is	
ranging from 8% to 15%, which can	
be reduced by providing trainings on	
improved post harvest technology.	
The price trend in different months	
also seems to be differed which	
specifically shows that the price goes	
up in the months of September,	
October and November. This would	
be the opportunity to produce more	
tomato in these months.	
With this finding, the RIU Project has	
created different Thematic Groups	
around the Pokhara Markets,	
specifically focused on production	
and better channelled marketing of	
tomatos.	
There are similar cases with other	
vegetables as well, such as beans	
and pumpkins (95% from outside	
and 5% from in-district), cauliflower,	
cabbage and cucumber (50% from	
outside district and 50% from in-	
district). The story of other	
vegetables such as radish, bottle	

-	
gourd, and bitter gourd also does	
not vary that much in cases of supply	
from outside district and supply from	
within district.	
The cases of markets in Syangja	
District are as follows:	
Monthly demand and consumption	
of tomato in Syangja Markets are	
9,070 kg and the price trend of	
vegetable across the year is Rs.	
20.79 per kg. Inflow of tomato from	
outside districts into Syangja District	
Markets fluctuates in different	
months each year. The high time for	
inflow starts in January and runs	
through mid-May. In percentage, it is	
from 50% to 85%. This in fact is the	
time of off-season tomato, which	
offers a high price. The case of	
cauliflower in Syangja is different	
from in the Kaski District. The	
average demand of cauliflower is	
2,712.50 kg per month. The amount	
of demand has to be fulfilled by the	
inflow from outside the district in	
April to late July. Apart from these	
months, Syangja Market still has to	
fulfil the demand from outside	
districts by 33% to 66%. Similar is the	
case of other vegetables in Syangja	
Markets. With this finding, RIU has	
created different Thematic Groups	
to produce market-demanded	
vegetables and supply produce	

through improved marketing.	
5 1 5	
In Palpa District:	
The opportunity for RIU in Palpa was	
to strengthen and facilitate the	
Market and Planning Committees to	
motivate their beneficiary	
households to produce fresh	
vegetables to be supplied to Butwal	
Markets, which further can be	
supplied to Indian border markets.	
In Rupandehi and Kapilbastu:	
There was an opportunity for	
vegetable marketing in Kapilbastu,	
as it has big market outlets in	
Kapilbastu, Taulihawa market,	
Butwal and Bhairahawa markets of	
Rupandehi District. Similarly,	
Rupandehi District's vegetable	
market potential is also high, as	
there are different local end-user	
markets as well as district and	
regional markets. Apart from these	
in-country possibilities and	
opportunities, the opportunity for	
RIU in Rupandehi and Kapibastu	
districts was to export fresh	
vegetables to Indian markets, which	
have a very big supply potential for	
vegetables as the Indian markets are	
expanding. Agro Enterprise Center	
(AEC) has carried out a survey to	
determine the potentiality of	
vegetable markets in India and	

		conducted different levels of	
		dialogues in the process of	
		strengthening market linkages.	
6.	Market chain actors' interactions are improved and linkages	The RIU MPCs are holding Executive	
	become more organized to take advantage of market	Committees monthly meetings on a	
	opportunities (RIU PMCA)	regular basis, which include their	
		executive members and related	
		thematic groups' executive	
		members. They discuss their current	
		issues, problems, and constraints.	
		Besides these regular meetings, the	
		MPC chairperson calls for emergency	
		meetings in case of any necessary	
		important agenda or decisions.	
7.	New collaborative marketing initiatives supported with	The practice of facilitation from	
	business services (RIU PMCA)	existing projects was to look after	
		the value chain components, which	
		could not take care of the marketing	
		portion as needed. RIU created 18	
		thematic groups across five districts,	
		which have included MPC members,	
		traders, retailers, wholesalers,	
		consumers, and input service	
		providers. This venture was to build	
		trust among all actors in the value	
		chain, so that the marketing of the	
		produce is facilitated through the	
		improved collection center, or	
		through profitable market outlets.	
8.	Effective monitoring, learning & case studies documented	RIU Nepal has opted to facilitate and	
		strengthen MPC and Thematic	
		Group executive members to	
		monitor their activities and	
		performance by using an M&E tool,	
		Participatory Planning, Monitoring	

and Evaluation (PPME). According to this tool, the MPCs themselves have to monitor their activities and performances using a well-defined spider-web format. The format was especially designed for monitoring on gender and community participation in social activities and decision making.	
RIU Nepal has derived useful learning from the application of PMCA in the context of Nepalese agriculture production and marketing: These are listed in section 7.	
10 case studies from across the project districts have been documented.	

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

Organization 1 - IDE

- 1. Start-up: Staff orientation & PMCA training: *IDE Nepal conducted 1 event for PMCA orientation or training each year. The orientation or training focused on the PMCA approach, program implementation at the community, way of working with society and stakeholders, coordination and linkage with different development agencies and stakeholders, and social mobilization at the community level.*
- 2. Start-up: PMCA guidelines in Nepali & general training materials: The whole PMCA guideline was summarized into a small document in local language and disseminated among the project stakeholders and line agencies.
- 3. Inception workshop at district level: To begin with the RIU Project, IDE Nepal conducted inception workshops in each district. The seniorities of IDE have participated in the workshop. They also interacted with and orientated the stakeholders, MPC executive members, and government staff about the application of PMCA and its importance in the context of Nepal.

- 4. MPC practice baseline & final M&E survey incl travel/per diem: *RIU Nepal has carried out a survey of all 20 MPCs which RIU Nepal has worked with, and 8 MPCs in Banke and Surkhet District which are not the RIU District. The purpose of the survey was to compare the impacts between the MPCs the RIU Project has worked with, and the MPCs which the RIU Project has not worked with.*
- 5. Annual planning and review workshop incl travel/per diem: For the initiation of implementation of activities in the community, RIU Nepal has planned all the activities as where and when to be executed and what would be the estimated budget for them.
- 6. Phase 1 PMCA Market Assessment (in-country): *IDE Nepal has carried out a quick market assessment in each district to find out the major constraints and problems existing in those districts. The program and M&E section developed different questionnaires for different stakeholders. The survey was executed on wholesalers, retailers, vendors, restaurant holders and consumers. With these different stakeholders, IDE's project staff carried out the surveys by themselves. The data was analyzed by the staff, and the program implementation modalities have been developed taking the findings into consideration.*
- 7. Phase 3 Marketing ventures BDS support & follow-up: RIU Nepal facilitated the MPCs in training their beneficiary households on post harvest technology and improved marketing activities. The RIU Project has also supported the Vegetable Collection Centers (CC) by supporting the purchase of new balance scales, weights, crop calendars and packaging materials. RIU in the initial phase/year has followed up on the activities carried out by the Project itself and the activities of MPCs, CCs and Thematic Groups. Later on, RIU became a facilitator and the MPC and Thematic Groups turned into the program developer and implementer. In the final year of RIU, the MPCs can plan their activities, implement them in the field, monitor their performance, and evaluate the impact.
- 8. MPCs organizational development & leadership training: *RIU Nepal has conducted different training events to strengthen the MPC's organizational enhancement and benefit MPC executive members as well as the Thematic Group members. The RIU Project has also included the executive members of these organizations in various interaction activities with different service providers and stakeholders. With the participation in those activities, the members have been able to approach different service providers and coordinate with different stakeholders.*
- 9. MPCs production & marketing planning sessions (once a year): MPCs are now able to plan their own program and implement the activities to the capacity of their financial availability. They prepare their Annual plan in close coordination with general members, taking into consideration the suggestions from related stakeholders.
- 10. MPCs Training in accessing diversified markets: The executive members of the MPCs have been trained on preparation of marketing strategies, preparation of a simple plan, implementation of the activities, and planning for production, taking into consideration the market demands.
- 11. Demonstration materials for post harvest handling: *RIU Nepal has supported some of the Vegetable Collection Centers with packaging materials as a demonstration. Understating the importance of systemic packaging and handling after harvest, the Collection Centers themselves have purchased new packaging materials i.e. plastic crates.*
- 12. Case study: RIU Nepal carried out the case study surveys simultaneously with the MPC impact survey. As per the prior planning, RIU has carried out 10 case studies across five RIU districts two in each district. For the proper conduction of the survey and proper reporting, a representative of M&E from the country office provided the field staff with a brief refresher training on conducting a case study.

Organisation 2 - CEAPRED

1. Phase 1 - public meetings [5]: Public meetings in RIU Project at the initial phase were grand events with different stakeholders participating. The participants expressed their views, ideas, problems, constraints and opportunities. To be specific, the government officials also expressed commitment to work collaboratively with RIU and proceed for adoption of PMCA as a model for smallholders' vegetable marketing in rural areas of Nepal. Some of the government authorities committed to collaborate with RIU in financing as well as working together for the service delivery for the small farmers. The IDE staff, with participation from the farmers and MPC members, demonstrated a drama skit presenting the facts that occur along the channel from production to market outlets. The event was the

most interesting part of the meeting. The participants appreciated by heart the event and expressed their concern, as the event can be an artistic tool to motivate the different stakeholders along the market channel.

- 2. Phase 2 Thematic groups formed & meetings held [9 sessions]: To begin with the PMCA implementation, RIU Nepal has formed 18 Thematic Groups across five project districts. Prior to the formation of Thematic Groups, the farmers who were associated with the RIU Farmer Groups, MPCs associated to RIU, potential traders, wholesalers, retailers, consumers and restaurant owners were oriented about the PMCA and its working modalities. Followed by the orientation, one or two successive meetings were conducted to reach the formation of Thematic Groups. Finally before the first phase final event, all of the 18 Thematic Groups were formed and called upon for the participation in the final event itself. At the initiation, the groups were formed including producers, traders, wholesalers, consumers etc. whereas the groups were reformed later with inclusion of input service providers such as agro-vets etc.
- 3. Phase 2 Thematic group exposure visit district & regional: *RIU Nepal has conducted 5 exposure visit programs. The visit programs were jointly organized in some cases so as to cost-effectively benefit the partakers. The exposure visit team visited different vegetable market centers, such as national level vegetable market, district level, and regional level markets. Other visiting places were the model vegetable production plots, use of micro irrigation technology, collection centers, MPCs etc.*
- 4. Phase 2 responsive analysis studies: The responsive analysis study was the fact-finding study that was carried out as a Focus Group Discussion (FGD). A total of 45 events were carried out for the FGD 15 FGDs at the end of each PMCA phase. The events provided feedbacks on RIU's modalities, services, approaches and reach. An example for this is the suggestion for increment of production volume. This also encompasses the suggestion about the inclusion input service providers in Thematic Groups.
- 5. Phase 2 public meetings [5]: Public meetings at this stage of RIU implementation were for review and follow-up on work from the first phase, sharing of learning, and further encouragement towards application of PMCA and its expansion among other development agencies and stakeholders. Top-level seniorities from government agencies, non-government organizations, private sectors, and IDE participated in the meeting. IDE and its implementing partners shared their learning, experiences, constraints, opportunities and measures for solutions. The government officials appreciated the PMCA approach and expressed their fulfilled commitments and made more commitments for the coming year. The Thematic Group Members also shared their learning, experiences, and views on working with RIU PMCA.
- 6. Phase 3 design marketing ventures: This activity is an initiation to move the MPC management and Thematic Group members towards making them selfsustainable. RIU supported the MPC and Thematic Groups in preparing their own programs and activities and also helped them plan their annual works. The major activities were regular operation of Collection Centers, strengthening, and proper management of MPCs and CCs. The subsequent activities were strengthening and expanding coordination with different stakeholders, searching and accessing more beneficial markets, and training MPC and Thematic Group members for better post-harvest technology etc.
- 7. Phase 3 public meetings [5]: The final, or 3rd Phase, event was the handover of the overall organizational management responsibility to the MPCs, CCs and Thematic Groups. Similar to the previous phase final events, there was also participation by the seniorities of different government and non-government organizations. The MPC members and Thematic Group members expressed their commitment for further enhancement of their Collection Centers and a promise for better service to their smallholder farmers and better cooperation and coordination in the future.

Organisation 3 - AEC

1. PMCA Market Assessment (export market to India): One of the RIU project implementation partners, Agro Enterprise Center (AEC), was assigned to look after the marketing portion of the project intervention. They carried out a detailed study on finding the potentiality of vegetable export to and along the way to Gorakhpur, a very large vegetable market place in Uttar Pradesh of India. Two successive round-table meeting events with vegetable wholesalers of Gorakhpur India were
carried out to discuss on the possibility of vegetable export from Nepal.

2. Market Information, radio broadcast, web-based: AEC has worked on dissemination of price information among RIU beneficiaries. RIU has made contracts and agreements with 6 local FM stations for broadcasting of daily vegetable prices of major markets in town, such as Butwal Market, information in Kapilbastu and Rupandehi, Tansen wholesale market price in Palpa District, Putali bazaar market price in Syangja District, and Pokhara wholesale market price in Pokhara city and the surrounding locations. AEC has also put the price information in its website. However, this is not as beneficial to the farmers due to a lack of knowledge on computer technology and the computer itself.

Other Activities:

- 1. Fourteen MPCs among 20 are now registered as cooperatives. With the status of registered entity, the MPCs are a legal organization and will be eligible for any cooperation or support from the government.
- 2. RIU has also initiated establishment of a District level Apex Organization of MPCs. The process is underway and is expected to proceed further through implementation of other projects by IDE Nepal.
- 3. RIU has formed project advisory committees at district and central levels. The committee comprises members from different government and non-government organizations. The role of the committee is to provide advice and suggestion for proper operation of project programs and activities. With the representation from different organizations, it has been felt that the working environment has been as conducive as expected.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

Initially IDE ventured this project to be implemented through IDE itself, Center for Environmental and Agricultural Policy Research Extension and Development (CEAPRED), Agro Enterprise Center (AEC) and Winrock International. Each organization has to play its role as proposed in the project document. Later on, Winrock International decided not to join RIU, and the remaining three partners continued the implementation of the project. Throughout the project period, each of the organizations worked to the best of their capability and contributed to the project implementation.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

RIU Nepal has worked with government organizations for the whole period of the project. In consequence of the project implementation in close coordination with government and non-government organizations, RIU Nepal has successfully influenced the government of Nepal to assess the approach. Final report with strong recommendations on success of PMCA application has come up. A recent meeting of the Project Advisory Committee has endorsed the PMCA approach, the Directorate of Agricultural Marketing of the Department of Agriculture has been advised to work out necessary papers to adopt this approach by the government.

- Apart from the government cabinet the final policy maker, the Department of Agriculture is the high level agriculture policy influencing organization. A high-level Government Coordination Specialist who is also an ex-government employee, has been assigned for coordination with government and furthering the process of PMCA adoption from government.
- The PMCA is expected to be adopted by government in the recent future. One of the tools i.e. Participatory Planning Monitoring and Evaluation that has been adopted by RIU has been adopted by other Projects of IDE Nepal. With this approach, the MPCs have been able to monitor their programs and performances by themselves. The presentation of drama skit for motivation of market actors and make them internalize the problems and solutions, has been adopted by other projects of IDE Nepal.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

As the low volume of vegetable collection at Collection Centers seems to be the prevailing problem for efficient operation of Collection Center, we have learned that the project should focus on the production aspect along with the marketing facilitation. All of the Collection Centers have good record keeping system which leads towards systemic operation and transparent management.

Any unintended changes/consequences haven't been observed.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc. continue to remain and how you think these could be resolved?

The lessons learned are the following:

The PMCA approach builds trust between value-chain stakeholders, leading to increased production, sales, and incomes of smallholders. We have learned that the

project intervention should also focus on adoption of improved production technologies so the production volume increases, leading to increase in income.

Icebreaking PMCA activities, such as drama skits, are important for stakeholders to understand their respective roles in the value-chain and to build needed trust. In the programs, wherever the participants are from different sectors, there should be a dramatic presentation of the realities.

It is important to have thematic group representatives from different types of producers, input suppliers, collection centers, traders, and local governments.

PMCA is more effective when thematic groups have specific resources for which they can design and implement activities. To be a component of project implementation, PMCA planning needs to be done within about 4 months. Thematic groups should then be integrated into project implementation.

There is variation in identifying thematic group opportunities, in some cases thematic groups were more general and in others were for very specific market opportunities, both approaches are valuable.

PMCA represents an effective approach for participatory value-chain development. In the past, IDE value-chain programs were developed by project staff consulting with stakeholders. PMCA represents a process where value-chain stakeholders design and implement programs with facilitation and capacity building by project staff.

PMCA represents an important tool to prioritize government and development program investment.

The concept of improved channelled marketing of vegetables to more sophisticated markets was not successful due to the low volume of collection.

PMCA seeks to include stakeholders from different sectors. This is a new IDE practice. Application of PPME through MPC Executive Members was another problem, which has been resolved by providing technical training to Executive Members and raising awareness among the beneficiaries.

Low volume of production quantity has been a major problem that continued for the whole period of project. Channelled marketing of small quantities of vegetables has been another problem, which also is continuing.

The above lessons have been shared with various government agencies, donors and various stakeholders; and are being adopted in various projects/programs.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number & Type of	Number & Type of	Male	Female	Total	Evidence Index*
	Indirect Beneficiaries	Direct Beneficiaries	Beneficiaries	Beneficiaries		
			(indirect and	(indirect and		
			direct)	direct)		
Households benefited	2,735	5,219 vegetable	Indirect: 1,614	Indirect: 1,121	Indirect: 2,735	For the reference of household
from marketing and		producers	Direct: 2,123	Direct: 3,096	Direct: 5219	reach, it has been extracted from
production services			Total: 3,737	Total: 4,217	Total: 7,954	RIU Project's October – December
						2010 cumulative quarterly report
						(attached)
Output 1 – Farmer		20 MPCs (11 from RPI			20 MPCs (11	Field database and annual reports
marketing groups		and 9 from SIMI			from RPI and 9	
formed		Projects)			from SIMI	
					Projects)	
Output 2 – Increased		Executive members:	1,941	1,054	2,995	Field reports and database
capacity of farmers for		202				
quality-based		Event Participants:				
production and		2,995				
marketing		Average event				
		participated: 14				
		RPI has provided				
		facilitation on input				
		service and technical				
		know-how on				
		vegetable production.				
Output 3 - Improved		RPI project has taken				RPI project has taken care of this
supply of quality farm		care of this kind of				kind of services and facilitation
inputs and services		services and				
promoting enhanced		facilitation activities				
farm productivity		through RPI project				
(existing project)		All 5,219 RIU hh have				

		benefitted from this				
		services of RPI and				
		SIMI projects				
Output 4 - Increased use		All 2,749 RPI	1,208	1,541	2749	Field reports and database
of micro-irrigation		households (100%)				
technologies (MIT) by		have adopted micro				
target farmers (for		irrigation				
Nepal (existing project)		technologies whereas				
		about 87% of 2,470				
		the Smallholder				
		Irrigation Market				
		Initiative (SIMI)				
		households have				
		adopted the				
		technology through				
		RPI project. With this,				
		4,898 hh (93.85%) of				
		total RIU hh of 5,219				
		have adopted the				
		MIT technology in				
		RIU project.				
Output 5 – Specific		Opportunity of				Market Assessment reports (report
market opportunities		tomato production				is in local language).
identified via market		around Pokhara				
chain assessment (RIU		Market to meet the				
PMCA)		high demand.				
		Possibility of selling				Indian border market assessment
		vegetables to Indian				report (attached)
		Markets				
		Possibility of				
		vegetable sales in the				
		local markets and				
		district markets in				

	surrounding districts				
Output 6 – Market chain	61 major interaction/	905 male	750 female		Field reports and compiled
actors' interactions are	meetings and	participants	participants		database
improved and linkages	workshops were	have took part	have took part		
become more organized	organized during the	in interaction	in interaction		
to take advantage of	project period. The	type of	events		
market opportunities	interactions involve	activities			
(RIU PMCA)	the participants from				
	govt. agencies and				
	government different				
	development				
	agencies				
Output 7 - New	With the formation of	1,489 male	1,259 female	2,748 total	Field reports and consolidated
collaborative marketing	18 Thematic Groups	members	members	Thematic	database
initiatives supported	across five project			Groups	
with business services	districts, there has			members	
(RIU PMCA)	been a good trust and				
	collaboration among				
	the producers,				
	traders and middle				
	persons				
Output 8 - Effective	Participatory Planning				Quarter reports, Annual reports,
monitoring, learning &	Monitoring and				PMCA poster, brochure (attached)
case studies	Evaluation (PPME)				
documented	tool has been				
	adopted by the MPCs				
	itself. This tool has				
	helped them evaluate				
	their performance.				
	Ten livelihood case				
	study reports have				
	been prepared in				
	local language. The				
	PMCA learning has				
	been documented as				

	PMCA poster a		
	project brochure has		
	been published.		

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report

Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

The baseline study of the MPCs was specifically focused on finding out the then status of MPCs infrastructures, availability of facilities, governance, income and transaction volume and value. The findings of the study were fully helpful to shape the project activities. Training programs were planned for the MPCs which were lacking with Collection Center Management trainings. MPCs were lacking with buildings, and storage facility infrastructures were planned for facilitation for construction of the buildings or storage rooms. These are some the examples.

The impact assessment study has just finished and the final report preparation is in process.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

RIU Nepal's program has targeted the existing projects' households such as Rural Prosperity Initiative (RPI) and Smallholder Irrigation Market Initiative (SIMI) to facilitate with PMCA. The existing projects have already reached the women and socially excluded groups more than RIU project proposal had targeted. RIU Nepal did not have to collect this type of information.

Any Other Comments

Please include any other comments that you would like to include and which you feel don't fit in elsewhere.

• For the application of PMCA for market development in the contexts of the smallholders, it is very important to consider the input delivery part

Project Title: Linking Farmers with Markets for Rural Prosperity

Lead Project Organisation: IDE Vietnam

List of Partners: the Womens' Union (WU) in three districts of Tien Phuoc (Quang Nam province), Thuong Xuan and Trieu Son (Thanh Hoa province)

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

PMCA: iDE Vietnam used R8418/CPH01 *Participatory Market Chain Approach (PMCA)* to organize the outreach and coordination among market stakeholders. This greatest advantage of this approach is its ability to build confidence and ownership among the value chain actors. Part of our goal is to strengthen farmer to access alternative rural/urban markets and to progressively meet market demands. During the implementation of this project, iDE has revised and adapted the methodology to the context of rural Vietnam and production/selling practices. As a result, as simpler 3-phase version of PMCA was put into use with the following tools employed:

- Tool 2 Market chain sketch, used in final event of phase 1
- Tools 3 and 4 Rapid market appraisal and Quantitative market study, used in supplemental market assessment to estimate potential market size
- Tool 5 Focus group (FG), used in phase 2 activities after farmer groups were formulated. The content of each FG was revised and modified according to the context of each farmer group. FG is used not only to facilitate group discussion for reaching agreement, but also to evaluate the effectiveness of each PMCA activity. Different scripts were therefore designed for different FG during the project.
- Tool 7 Business plan, used for group to plan their business. A business plan template was designed and provided to the farmer groups. However, use of written plan in business is a new concept to farmers; therefore, they are quite slow in using this business plan in their activities.

Non RNRRS generated knowledge used:

- Prism methodology: iDE has developed a unique market-oriented approach to rural economic Prosperity Realized through Irrigation and Smallholder Markets (PRISM). PRISM is a set of tools that are used to develop an understanding of the unique situation of the rural poor and to create sustainable solutions to rural poverty. PRISM creates sustainable opportunities through market-oriented interventions by: (1) creating networks of small enterprises to provide agricultural supplies needed by poor farmers; (2) working with farmers to improve small-farm productivity; and (3) linking small-farm families to markets for effective and sustainable poverty reduction.
- Facilitation skills: training on project/activity facilitation skills was provided to iDE staff and the partners during the implementation of this project.

- Social mobilization: iDE studied available documents² and adapted skills/knowledge drawn from the studies for forming pig raising groups in the targeted areas. iDE also provided training on group formulation to 97 project participants being partners, key farmers, and heads of farmer groups.
- Three-way-arrangement model: this model among input-production-output market actors was developed and employed in the project for feed suppliers, pig raisers, and pig buyers.

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project Output	Status of achievement	Deviations if any	Reasons for the deviation
Title			
 Increased income for poor rural households: 2,500 women pig farmers to earn net earnings of \$70-\$80 year 	By the end of the project, 723 poor smallholder pig raisers participated in PMCA activities, with 100% of them being women. Results from the rolling household income survey conducted between October-December 2010 for 100 PMCA pig raisers showed a significant increase in income for pig raisers. Compared to baseline, PMCA pig raisers achieved a net annual income gain of \$219.	The number of poor pig raisers participating in PMCA is lower than those originally proposed.	During the first quarter of 2009, iDE revised the project progress and the PMCA process in the context of Vietnam rural porker value chain with the consultation of MEDA. Based on the review and lessons learned (see details in section 7) and the context of the live pig sub-sector in the project areas, iDE Vietnam proposed a revision to the Project Scope of Work for a more feasible project implementation, in which, a simpler PMCA method will be applied; thus a reduced targets to 700 direct clients was proposed by the end of the project (see Annex 1 for the simplified PMCA process).

² "Collective Action: Opinions and Discussions" by M4P, November 2006 (Vietnamese version); "Instruction Manuals: market-based production and business farmer group formulation, operation and management", synthesis by Duong Hoang, June /2008 (Vietnamese version)

2. Farmer marketing groups form	The number of farmers marketing groups formed during the project is 63 with 1,858 participants in 3 project districts. Of which, 723 are poor and 218 are ethnic minority people.	The number of groups formed was higher than the proposed (in the revised scope of work mentioned above) of 35 groups maximum with 700 poor participants.	Poor pig raisers are the key target group of the project. However, input buyers and pig buyers are usually hesitant or even refusing to work with farmer groups consisting of only poor pig producers. Therefore, there must be some non-poor pig raisers in the groups so that the groups are more trustworthy for input suppliers and output actors to work with. Therefore, there are both poor and non-poor farmers in a group as an average ratio of 40%-60%. Also, from the beginning, the size of one group was very small (10 farmers); therefore, in order to achieve the number of poor farmers joining the groups, a total of 63 groups was eventually formed
 Increased capacity of farmers for quality-base production and marketin 	After being provided with technical training on pig raising and with market information on market requirement, farmers in groups have improved their capacity in quality-based production and marketing. In specific, farmers start to discuss with pig buyers to ask for information about specific market quality and quantity requirements for production planning. Farmers also seek market price from different sources to better negotiate with the pig buyers they are linked to. Most of them are selling to the linked buyers; and most importantly, they are no longer afraid of not being able to sell because pig quality is much improved and business relationships with the buyers have been established.	none	

		The increased capacity of farmers were also observed by the pig buyers. One pig buyer in Tien Phuoc district when interviewed commented that pigs purchased from the linked group members were of better quality that those purchased from other pig raisers. His profit (from selling pigs purchased from groups) was therefore usually higher.		
4.	Improved	At the end of Dec 2010, a supply chain of 111 providers have been		
	supply of quality farm	72 feed retailers and 22 yets		
	inputs and			
	services	Through RPI project activities, input suppliers have improved their		
	promoting	selling capacity and increased profit. They have become more		
	enhanced farm	flexible in providing products/services to farmers, for example, they		
	(existing	delivery Input suppliers also approach credit institutions in the		
	project)	local areas for credit application.		
		Project monitoring data have shown an increase in number of clients		
		served, sales, revenue, and profit among input suppliers. In specific,		
		by the end of 2010, pig feed suppliers sold more than 6,000 tons of quality food, their frequent clients increased from 20 to 50; yets		
		provided services for more than 30 000 nigs. All of these husinesses		
		are operating with profits, with the incremental annual income from		
		this market participation of \$200 - \$550 (or 20%-30% of annual		
		income for feed seller of about 70-80 customers/month), \$310 (for		
		vets) and \$610 (for vets with completed packaged vet services). In		
		general, these input suppliers are financially viable and sustainable.		
5.	Specific	Market outlets identified during market assessments prior to RIU	Danang market (an	The supplemental market assessment
	market	and supplemental market assessments conducted at the beginning	urban market north	conducted in 2008 showed Danang
	opportunities	of the project included:	of Tien Phuoc district)	was a very potential but very
	identified via	- For tien Phuoc pig producers: Tam Ky city (urban market), Hiep	was originally	competitive market for pigs produced

	market chain assessment	 Duc and North Tra My district (urban and rural district markets) For Thuong Xuan pig producers: Hanoi city (urban market) and Mong Cai (urban/rural market to transit to China market) For Trieu Son pig producers: Thanh Hoa city (urban market) and Sam Son town (urban market) Markets are outside of production areas; however, pigs are purchased, collected, and transported by pig buyers who are residents of production areas. 	identified as the potential market for this district. During the project implementation, this market was replaced by Tam Ky urban market, Hiep Duc, and North Tra My district markets of the same province as Tien Phuoc district.	in Tien Phuoc. Based on the findings, the project had linked farmers in Tien Phuoc with this market and a market test (see section 3 - Activities undertaken for putting knowledge into use - Phase 2 or explanation of "market test") of pig produced in Tien Phuoc was implemented. However, pigs produced by Tien Phuoc farmers did not meet the quality required by Danang market. Poor breed was identified as the key cause of the poor quality pigs produced by Tien Phuoc farmers. Since better breed replacement would take longer time that this project could afford to wait, iDE started to seek for alternative markets to the Danang one, and eventually Tam Ky city (urban market), Hiep Duc and North Tra My district (urban and rural district markets) were identified.
6.	Market chain actors' interactions are improved and linkages become more organized to take	Through project interventions, farmers are organized into groups and produce pigs as a group rather than as individual, i.e. they are more concerned about keeping the quality of pigs produced so that the whole group remains competitive to the output market. Through group activities and experience exchange, pig raisers are more informed of the market information (demand on quantity and quality, price). Also, they have more chances to discuss production and market information with the linked input suppliers and pig	none	

advantage of	buyers. Pig buyers; on the other hand, have become more proactive	
market	in providing market information to pig raisers so that farmers can	
opportunities	better plan for production and selling.	
	Feed suppliers who are linked to the groups also realized the	
	benefits of the linkage: they see it is the chance for increasing	
	revenue from the increased quantity of feed to be sold to groups.	
	Therefore, they start to offer credit to group members; especially	
	the poor ones. In general, the collaboration has been established	
	with benefits realized among them all: farmers were able to increase	
	their annual income by \$219/year, feed suppliers increase the	
	number of clients by 30-50, sales by 40%, and profit by 20%-30%; pig	
	buyers able to secure pigs locally with better quality, each buy from	
	about 24 new producers and their profit increase by \$1,900 each per	
	year. Pig buyers also benefit from less time spent on searching	
	supply, and when they are a big supplier in the market, they are	
	more competitive.	
	However, it is very challenging to establish the formal trading	
	relationship (written contract/agreement) between pig producers	
	and pig buyers promoted by RIU/PMCA because of the two	
	important factors. First, standard for "quality pig" is not clear at all:	
	conventional method is that pig quality is assessed in a very	
	"qualitative" way. Second, the "market price" term is not clearly	
	defined in the context that market price may fluctuate on a daily	
	basis. These two factors lead to the lack of trust between pig raisers	
	and pig buyers, which led to a "verbal" agreement when both sides	
	enter a more "formal" business relationship. Conflicts happen when	
	the market is not favourable for selling (i.e. price is falling or rising)	
	which could lead to a break of commitment on selling and buying. To	
	minimize risk, every actor requests "safe" terms which do not lead	
	to a compromise in terms of price and quality.	

		Furthermore, people, especially pig buyers, always switch to market opportunities that benefit them the most. In the live-pig subsector, each specific market requires different pig quantity and quality. Under that situation, it will be challenging for group members to stick to one buyer that they are linked to because it is difficult to produce pigs with different quality. This situation could lead to the break of commitment from pig buyers when they switch to a different market than the one they are working with pig producers.		
7.	New collaborative marketing initiatives supported with business services	By the end of the project, 63 farmer groups were formulated with 1,858 participants and linked to 78 pig buyers and 78 feed sellers, forming a business collaboration among the input suppliers-pig producers-pig buyers. Producers commit to raise pigs with better quality to the linked buyers; pig buyers agree to provide market information to the linked farmers and give them the first purchase priority; and feed suppliers offer credit to the farmer groups.	none	
		Results of the assessment conducted with 111 PMCA participants (99 pig producers, 12 private enterprises) indicated that most participants were satisfied with the business collaboration although there still exists the informal relationship between pig producers and pig buyers in the context of frequent price fluctuation.		
8.	Effective monitoring, learning & case studies documented	 RIU overall case study guidelines were prepared. These were adapted to the Vietnam context with the assistance of the iDE M&E team and RIU MIL Advisor. Proceedings of PMCA meetings were recorded. Learning process was continuously conducted among the project team, between project team and the local partners and market actors. iDE also sought advice from the RPI project consultants for reviewing and revision of PMCA process in its standard forms. These resulted in a revised, more simplified but doable PMCA process for the Vietnam project based on which iDE in Vietnam 	none	

re-shaped the activities and proposed a new Scope of Work (see
Annex 2). The review results and the revised PMCA process were
shared to the local partners of iDE in all 3 districts.
Based on the learning process, case studies were developed
during the third year: (a) Annex 3 "Documentation Report on
Participatory Market Chain Approach in ides' Porker Value Chain
project in Quang Nam and Thanh Hoa provinces, March 2011" by
Tho Pham (agro-economist) and Tuan Trinh (livestock system
specialist) – English version; and (b) Annex 4 "Field research in
value chains development - End of Project: Summative Lessons
Learned, December 2010" by Nigel Motts (from Meda): sessions
on PMCA – English version.

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

As mentioned above, iDE Vietnam applied PMCA into this project following the instructions described in the manual. The first attempt was to try to apply PMCA in its standard form during the first year of the project. In order to implement PMCA, iDE reviewed the methodology and provided training for the local partners and the district government and the district functional bodies on this new approach.

The project also worked with MEDA consultant on value chain development to review the PMCA process in its standard from and revise the process into the context of the live pig sector in project areas. A revised version of the process also included 3 phases (*see annex 1*); however, the whole process is a more simplified and shorter in time. Based on the revised version, iDE modified the plan and targets for the project. Although 6 PMCA cycles were proposed (3 in Tien Phuoc, 2 in Trieu Son, and 1 in Thuong Xuan), only 5 eventually carried out. The reason was that only one market outlet was identified for Trieu Son district thus only 1 PMCA cycle was conducted in this district. The 5 cycles work with 5 different value chains: 2 of them raise pigs to sell to the domestic rural markets, 1 to domestic urban market, and 2 to China markets via brokers.

The project followed the 3-phase PMCA process: (1) Market chain assessment and initial stakeholders meetings; (2) Analyzing potential business opportunities; and (3) Implementing joint market chain innovations.

Phase 1: Market chain assessment and initial stakeholders meetings

a. Based on findings from market studies conducted prior to this project, supplemental market assessments were conducted in Tien Phuoc (in year 1), Thuong Xuan, and Trieu Son districts (in year 2) to confirm and update the market potentials for farmers in these areas. 2 more informal market surveys were also carried out to re-assess the market opportunities. A total of 166 representing market actors, local partner members, and functional bodies were involved in these researches. Among those, there were 92 pig producers, 488 abattoirs/pig buyers, 6 pork sellers, 3 pig feed sellers, and 17 other members being local partners and key informants.

The main 'innovation' opportunity in the live pig sub-sector was identified from on the researches: "Establish value chains that enable buyers to obtain the required daily supply volume and quality of live pig from groups of poor pig raisers whose production is coordinated". Thus, the starting point for iDE was to get stakeholders to analyze this opportunity and these potential business solutions (rather than to hold back this knowledge and ask stakeholders to discover this for themselves).

b. 3 final events of phase 1 were conducted in 3 project districts to present the research results and opportunity. Further discussions to reach participants' agreements on business opportunity and ideas on identification of ways to tap the opportunity. Participants to the events are representatives of the pig producers, feed sellers, pig buyers, local partners, district functional bodies, and the district governments. Study tours were also organized for pig producers/buyers to the buyers/producers so that they could learn more about the market potentials and develop common interest in business relationship.

Phase 2: Analyzing potential business opportunities

- c. Based on the market outlets identified, the project assisted farmers in joining thematic groups to discuss which outlets they would be working with and form the PMCA cycles based on geographical locations of the producers.
- d. Market tests were conducted based on the context and needs of each group. The idea of market testing was to demonstrate business opportunity and build trust and goodwill: buyers are suspicious that poor farmers can raise a lean pig of high enough quality while pig raisers were not so sure if their good pigs could be accepted by the identified markets. This test consists of getting poor pig raisers to each raise some pigs by fully following the IDE pig feeding method and arranging for buyers to purchase and grade these pigs for 'leanness'. A positive test result should convince each side that it is feasible/attractive to agree to do business with the other. A total of 2 market tests were conducted in Tien Phuoc, of which, one failed (see section 2.5 reasons for the deviation). Other market was identified to replace the market that producers failed to meet the requirements. However, the success of the other test was enough to convince other groups in the same district thus no further testing was needed. In Trieu Son and Thuong Xuan district, pig producers were already able to meet the expectation of the markets they were linked to; therefore, no market test was conducted there.

- e. After the groups were formed, iDE and its partners facilitated the discussions on group business and production planning. Discussions with pig buyers were established after which group members already sold their pigs to. Farmer groups were also supported to hold periodic meetings with pig buyers to discuss business, shape the relationships, and update market information. In some groups, the 3-way arrangement (feed suppliers pig producers pig buyers) model was developed. The idea of this model was to address the "trust" issue raised in the final meeting, where pig producers were blamed not to maintain the requested investment on pigs to provide higher quality pigs and sometime conducted side-selling to other buyers. Pig buyers, on the contrary, failed to provide a satisfactory enough method of quality definition and did not offer a reasonable price to pig producers. The involvement of the feed suppliers in the model was to address the barrier faced by pig producers to investment, since it was expected that feed suppliers would agree to sell feed on credit to pig producers when they see a good enough and secured market demand from pig buyers.
- f. For any group after one pig raising cycle, a final meeting was conducted to evaluate the opportunity, the collaboration among producers and pig buyers, and to collect feedback from the pig buyers about pigs produced by the groups. Decision whether they would continue the business together was also made during this event. The result was that, though a formal relationship was not established yet, all market actors involved in the 5 PMCA cycles agreed to continue to work together and entered phase 3 of the process,

Phase 3. Implementing joint market chain innovations

During the last phase, group meetings were organized in 3 districts among the group members, feed suppliers, and pig buyers to discuss agreements on appropriate business model to prepare the business plan. After agreements were reached Using the Business Plan format developed by the project, all 63 groups participating into 5 PMCA cycles worked on their own business plan. After the business plans were prepared, the group representatives shared the plan with the linked pig buyers and with the project team and local partners on the final events of phase 3.

Further activities were conducted during the implementation of the project:

- g. Capacity building activities were provided to PMCA participants; in specific:
 - WU (local partners): training on PMCA (in standard original forms and revised version) and facilitation skills
 - Farmer groups: training sessions on pig raising techniques, on group organization and coordination for group leaders; provision of market information (price, demand, pig buyers) for group members,
 - Pig feed sellers: training sessions on selling skills, customer service, pig raising techniques, and provision of information on credit sources.
 - Pig buyers: training sessions on pig raising techniques (so that they can provide advice to farmers), provision of information on market outlets and opportunities.
 - iDE staff: training on facilitation skills and PMCA (conducted internally)

h. Rolling household income survey was conducted during October – December 2010 on 100 poor PMCA participants for impact assessment.

i. Guidelines and instructions on organization of PMCA activities were prepared, demonstrated, and shared to the local partners.

j. PMCA process was reviewed with lessons learned and case study developed by iDE external consultants.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

iDE's partners in this project included the WU of Tien Phuoc district (Quang Nam province) and Thuong Xuan district (Thanh Hoa province). During the implementation of the project, the WU of Trieu Son district (Thanh Hoa province) was invited to participate as the third partner in the district. The selection of WU as partner in the live pig sector is appropriate because women play the key role in pig raising. Reaching women would be a lot easier through the network of WUs at district and commune level. Furthermore, the Government of Vietnam requires international NGOs such iDE-VN to implement projects in close partnership with local institutions. Together with local authorities, iDE-VN had assessed a number of local partner options but found the Women's Union to be the overall best candidate.

However, being a social and political organization, the role of WU in market facilitation in collaboration with iDE in this project is very limited. Strong at promotion and group formulation, WU is good at disseminating good practices to their women members, forming pig raising groups, and playing a logistical role in field activities. WU is lack of motivation, incentives and skills needed to play the role of market facilitation as expected. Moreover, the WU, like other governmental organization, maintains a policy of relocating key staff to new locations and/or posts, thwarting iDE-VN's interest in building sustainable local capacities to continue the work after it ends.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i) Policy change was not proposed as an RNRRS output thus the project has not engaged with policy makers.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

i). By directly participating in the project, iDE has learned much about the PMCA process and its applications to the context of Vietnam. Because of the PMCA process, iDE field staff has become more focused on an output-market orientation, encouraging active participation from private entrepreneurs, linkages among market actors (rather than on looking at each actor in isolation), and facilitating activities rather than implementing them.

ii). These have been the positive unintended changes.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i) What lessons have you learnt about how to put research into use and enable innovation in agriculture? The following lessons are drawn from the previous quarter and annual reports of this project:

- For PMCA users, the PMCA process is a new tool introduced. In hindsight, it would have been easier for the users to be equipped with in-house or handson training of the PMCA process up front instead of trying to learn it from project documents. It is a more complex process than previously thought and iDE has had some challenges in Vietnam discerning the phased structure of the PMCA process and facilitation role in the process.
- Markets are enormously complex and varied. It is not realistic to expect that any specific standardized analytical tool or methodological guide can be widely applied without adaptation. PMCA is no exception.
- PMCA is best suited for use in mature value chains where substantial commodity consolidation takes place, where most actors along the chain both know and trade with each other, face profit erosion pressures and realize individually that 'something needs to be done' (and, so, are inherently

receptive to the collaboration process PMCA entails). It involves significant and sustained involvement by value chain stakeholders over a fairly lengthy time span (e.g.: up to six months). The small farmer pig raising sector in IDE Vietnam's project does not satisfy these conditions. It is essentially a spot market characterized by absence of consolidation and a mix of (a) opportunistic trading, and (b) many regular 'short chain' trading relationships (e.g.: a pig farmer prefers to sell to a favoured intermediary who on sells to a favoured butcher).

• PMCA implicitly assumes new end-market opportunities can be identified and served (e.g.: through innovations championed by the most influential actors in the chain) to benefit all actors along the chain. For pig raisers, no new end-market opportunities exist for live pigs.

ii) Have you shared these lessons with others and if so with whom and how?

Those lessons were shared with project partners and some other functional bodies in project areas. They are the WU (local partners), local authorities of the project districts, district Extension Stations and Veterinarian Stations. Lessons were shared mainly verbally in periodic planning/reviewing meetings with the partners.

iii) Also, describe what has not worked and explain the reasons why not.

- The participation of market actors was quite limited from the beginning due to the fact that they did not see the benefits in the short term.
- Small-scale pig producers, most of them are poor (the main target group of the project) are considered not competitive in markets. Small-scale which leads to high transaction cost is the consequence of lack of capital and confidence, and failure to meet quality demanded by the market have put small-scale producers in a less advantaged position compared to other larger-scale producers. Producers' grouping is considered a suitable solution to the problem.
- Linkages between pig producers and pig buyers were established; however, none of pig buyers agreed to enter a formal relationship (written contract/agreement) with pig raisers for fear of market price fluctuations and side-selling from pig producers. There exists a risk of breaking commitment (actually it has happened) where producers refused to sell and buyers refused to buy) between the 2 actors. There are two important factors that affect the relationship between pig producers and pig buyers when they enter a more "formal" relationship as promoted by RIU/PMCA. First, there is not a clear standard for "quality pig" available in the areas: the conventional method is that pig quality is assessed in a very "qualitative" way. Second, the "market price" term is not clearly defined in the context that market price may fluctuate on a daily basis. These two factors lead to the lack of trust between pig raisers and pig buyers, which led to a "verbal" agreement when both sides enter a more "formal" business relationship. Conflicts happen when the market is not favourable for selling (i.e. price is falling or rising) which could lead to a break of commitment on selling and buying.

iv) What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so

how?

- As for project implementation, iDE lacks staff skills in group formation and facilitation which are necessary in thematic group formulation and market facilitation. To solve this project, iDE employed and adapted the available knowledge (discussed in section 1 non RNRRS generated knowledge used) to the context of the project and sent staff to training course in facilitation skill development. For group formulation, iDE worked with the existing farmer groups which operate mainly for saving and credit provision purposes to upgrade into "business-like" groups rather than forming new groups. Also, WU who is another key partner of the project has also some basic knowledge on group formulation that can be used.
- Market actors tend to be quite hesitant to participate in new business benefits of which can only be realized in the medium term. Therefore, the participation in project activities and PMCA process has been viewed as of high opportunity cost for primary actors. To encourage their active involvement in the project, aside from awareness raising for these actors, iDE enticed participants by providing the high quality "market information" generated from the market assessment to the project participants. They are made aware that the PMCA meetings provide a venue to promote their industry sector and their own businesses.
- The PMCA process requires active participation and progressive ownership from market actors, especially primary market actors in the process of creating and implementing initiatives. However, in RIU project areas, it was difficult for primary market actors to own the process due to their very small scale of business, a tendency for risk aversion, and lack of long term business vision. As the leading institution, iDE had to take a very heavy leadership role in Phase I. iDE realizes that in phase II, there was still a very strong facilitation role for planning and guiding the thematic study groups. Initially, there was a slight misinterpretation of the relative roles of the "leading institution" iDE and that of the market actors in the thematic groups.
- The absence of demand and price forecast to enable production planning is the issue faced by pig producers and buyers. Demand and prices are crucial information that influences farmers' pig raising decisions (since one pig raising cycle is 3-4 months). Currently this information does not exists in the markets in the districts or nationally, which makes production and collection planning very challenging. Farmers usually rely on the promise made by buyers that "we will buy all pigs with acceptable quality." During the project, iDE tracked price fluctuation and provided price forecasts based on the price history; however the lack of systematic market information would be a challenge in upscaling the project.
- Business initiatives have not always come from the market actors. As instructed in the PMCA manual, market actors and/or thematic groups would be encouraged to provide initiatives. However, as observed from the first meetings, market participants failed to come up with any initiative or provide ideas on the business. The project facilitator had to introduce some initiatives for market actors to work on and agree with.

v) What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

• As mention above, PMCA is a new tool which needs proper understanding before putting it into use. Additional training on this approach would be necessary besides the manual.

- To put the knowledge into use, some important knowledge and skills must be there. Facilitation skills and mobilization skills are crucial for transferring the knowledge without being so heavily involved. More importantly, to facilitate a market, it is necessary for the facilitator to have some knowledge and experience on market development and market operation.
- There is currently no systematic market information (such as demand and price) so that market actors can access for business planning. Market info is being provided very unofficially by market actors themselves without any proper forecast. For farmers who are usually price takers in the market, the availability of such as systematic market will help them improve the negotiation skills with the buyers.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number &	Number & Type of Direct	Male	Female	Total	Evidence Index*
	Type of	Beneficiaries	Beneficiaries	Beneficiarie		
	Indirect		(indirect and	s (indirect		
	Beneficiaries		direct)	and direct)		
1. Increased income for poor rural	1,135 non-	723 poor smallholder pig	0	1,858	1,858	See annex 5 (Total
households: 1,858 women pig	poor	raisers				Participants)
farmers to earn net earnings of	smallholder	218 poor smallholders pig				Annex 6 for income
\$219 year	pig raisers	raisers are ethnic minorities.				impact (2.2, 2.3 and
						tables 8, 8, and 15).
2. Farmers marketing groups	1,135 non-	723 poor smallholder pig	0	1,858	1,858	See annex 5 (Total
formed	poor	raisers				Participants)
	smallholder	218 poor smallholders pig				
	pig raisers	raisers are ethnic minorities.				
3. Increased capacity of farmers	About 5,200	About 2,800 poor	1,600	6,400	8,000	Calculated from
for quality-based production	poor	representative farmers				training participant
and marketing	representativ	participated in output				lists (hard copies)
	e farmers	marketing-related training				

	participated in output marketing- related training session and in	session and in PMCA session				
 4. Improved supply of quality farm inputs and services promoting enhanced farm productivity (existing project) Pig feed suppliers sold more than 6,000 tons of quality feed, their frequent clients increased from 30 to 50; vets provided services for more than 30,000 pigs. All of these businesses are operating with profits, with the incremental annual income from this market participation of \$200 - \$550 (or 20%-30% of annual income for feed seller of about 70-80 customers/month), \$310 (for vets) and \$610 (for vets with completed packaged vet 	N/A	111 providers: 17 feed retailers cum. vets, 72 feed retailers, and 22 vets.	58	53	111	See annex 5 (Total Participants) Calculated from project monthly records
input suppliers are financially viable and sustainable.						
 Specific market opportunities identified via market chain assessment: 7 	For TienPhuoc:110For	 For Tien Phuoc: 38 For Thuong Xuan: 262 For Trieu Son: 423 	 For Tien Phuoc: 0 For Thuong 	- For Tien Phuoc: 148	- For Tien Phuoc: 148	See annex 5 (Total Participants)

-	3 for Tien Phuoc pig producers:	Thuong		Xuan: 0	- For	- For	
	Tam Ky city (urban market),	Xuan: 624		- For Trieu	Thuong	Thuong	
	Hiep Duc and North Tra My	- For Trieu		Son: 0	Xuan:	Xuan: 886	
	district (urban and rural district	Son: 401			886	- For Trieu	
	markets)				- For Trieu	Son: 824	
-	2 for Thuong Xuan pig				Son: 824		
	producers: Hanoi city (urban						
	market) and Mong Cai						
	(urban/rural market to transit						
	to China market)						
-	2 for Trieu Son pig producers:						
	Thanh Hoa city (urban market)						
	and Sam Son town (urban						
	market)						
6	. Market chain actors'	Farmers:	Farmers: 723	Farmers: 0	Farmers:	Farmers:	See annex 5 (Total
	interactions are improved and	1,135	Feed provider: 72		1,858	1,858	Participants)
	linkages become more	Feed	Feed & Vets: 17	Feed provider:	Feed	Feed	Annex 6 for income
	organized to take advantage of	provider:	Vet: 22	33	provider: 39	provider: 72	impact (2.2, 2.3 and
	market opportunities:	Feed & Vets:	Pig buyers: 78			Feed & Vets:	tables 8, 8, and 15).
-	1,858 farmers were able to	Vet:		Feed & Vets: 9	Feed &	17	
	increase their annual income	Pig buyers:		Vet: 16	Vets:8	Vet: 22	2010 enterprise
	by \$219/year,				Vet: 6		survey report by iDE
-	feed suppliers increase the			Pig buyers: 54		Pig buyers:	Vietnam –
	number of clients by 30-50,				Pig buyers:	78	Vietnamese version
	sales by 40%, and profit by				24		
	20%-30%;						
-	22 vets provided services for						
	more than 30,000 pigs						
-	78 pig buyers able to secure						
	pigs locally with better quality,						
	each buy from about 24 new						
	producers and their profit						

increase by \$1,900 each per						
year.						
 New collaborative marketing initiatives supported with business services: 63 farmer groups were formulated with 1,858 participants and linked to 		63 farmer groups were formulated with 1,858 participants and linked to pork traders/butchers and feed sellers	0	1,858	1,858	See annex 5 (Total Participants)
78 pork traders/butchers and 78 feed sellers		78 feed retailers are linked to pig raisers	39	39	78	See annex 5 (Feed suppliers)
		78 pork traders/butchers are linked to pig raisers	54	24	78	See annex 5 (Pig traders)
 8. Effective monitoring, learning & case studies documented: RIU overall case study guidelines Proceedings of PMCA meetings Learning process was continuously conducted among the project team, between project team and the local partners and market actors. A revised, more simplified but doable PMCA process was developed for the Vietnam project based on which iDE in Vietnam re-shaped the activities and proposed a new Scope of Work. 2 case studies on PMCA 	N/A	N/A	N/A	N/A	N/A	Annex 7 – Vietnam RIU Case Study Guidelines Annex 1 – Vietnam Simplified PMCA process Annex 2 – Vietnam trip report Annex 3 – RIU documentation Report Annex 4 – Vietnam Summative Lessons Learned – RPI VN 23 Dec 2010f

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

i). The project has contributed to the increase of income by an average of \$219 per year for 1,858 pig raising families, equivalent to 30% annual household income.

ii). Baseline survey was not conducted at the beginning of the project. Instead, iDE employed annual rolling household income survey for impact assessment following the methodology of that conducted in RPI project. However, the PMCA process and cycle were revised during the second year: it was expected that the project should wait for pig producers who have gone through 3 phases so that they have a chance to sell the pigs to the markets that the project connects them to and realize some real benefits. That is the reason why the only rolling household income survey was conducted between October – December 2010 (100 RIU participants who have gone through all 3 phases were surveyed).

iii). The impact assessment was the rolling household income survey mentioned above. The data analysed indicated that the total household income after participating into RPI and RIU project was \$909 compared to only \$691 at baseline (a net gain of \$219/year/family) – *see table 8 in Annex 6*. Also, after participation into PMCA activities, pig raisers have been able to increase the number of pigs raised to 9 per cycle (non-poor) and 5 per cycle (poor), which is 2.5 – 3 times higher than the average scale per cycle before the project.

Annex 6 is the rolling household income survey report which sections on RIU project can be found in 2.2, 2.3 and tables 8, 8, and 15.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). iDE employed an inclusive approach in involving the disadvantaged people in the project; most of them are women and ethnic minorities. As mentioned,

women play the key role in pig production business thus are the direct target group of all activities. They participate in the market assessment, planning, training, and promotion activities; therefore women have had good oppportunities to learn and to express their opinions. They are also the key members of the farmer groups. As producers of pigs, women are linked to input suppliers and output traders. Besides, village events were carefully timed so that women can participate (such as in the evenings, in low crop season...). It is estimated that 90% of the activity participants are women. Other project activities were aligned with this objective by consulting with women as key informants and stakeholders, identifying gender-specific market constraints, selecting women demonstration farmers, adapting technologies to meet women's needs. All key project beneficiaries are women. 40% of the total beneficiaries are poor women.

The socially excluded groups are ethnic minorities and they are also women. 11.7% of the project beneficiaries belong to ethnic minority groups. However, at least 30% of the participants are ethnic minorities.

Women and ethnic minorities participating into groups are now able to secure inputs on credit and sell pigs at the most favorable price. Also, they are able to share experience and access to market information. This results in the fact that pig raisers have been able to improve their market practices: they have been more active in inquiring market demand and prices and pig buyers to be able to sell their pigs in the highest possible prices. Besides, participating farmers were satisfied with the new raising method, which helped them save labor, have more time for themselves and for relaxing. It is estimated that about 50% of the participants used the free time from saved labor for other income generating activities.

ii). A Social Exclusion Assessment was conducted prior to project implementation in targeted areas which provided inputs for interventions. During the life of the project, additional data and information were also gathered during interviews/FGDs disaggregated by target groups (poor, women, and ethnic minorities) to refine the interventions. For example, create sale promotion campaigns were conducted to encourage the poor and ethnic minorities to invest in quality pig feed for quality porker for markets.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

The 3-way arrangement model among feed supplier, pig producers, and pig buyers is highly appreciated by most market actors as well as the local authorities in project districts. This model is considered one of the solutions to the problem of capital shortage and unstable market outlets and there is still much work to be done to make the model a more suitable one for many more participants. However, issues do exist when replicating this model, which are (i) pig buyers do not want to sign contracts with pig producers in the context of frequent price fluctuations and market demand change, and (2) feed suppliers lack of working capital to meet the increasing demand for feed on credit from the suppliers.

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

Project Title: Coalition to Diversify Income through Underused Crops (CoDI)

Lead Project Organisation: International Centre for Underutilized Crops (ICUC)/Crops for the Future (CFF)

List of Partners:

<u>Vietnam</u>: Centre for Agrarian Systems Research and Development (CASRAD), Fruit and Vegetable Research Institute (FAVRI) <u>India</u>: BAIF Development Research Foundation (BAIF), Winrock International India (WII)

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

The CoDI project built onto past RNRRS initiatives:

- R6297: using video to communicate and influence policy
- R7285: ethical trading and labelling
- R7494: mango marketing in India
- R7925: community-based NTFP commercialisation that is economically, socially and environmentally sustainable.
- R7959/8084: NRM at peri-urban interface (Hubli)
- R8280: policy dialogue in India
- R8399: fruit processing enterprises
- R8432: industrialisation and expanding crop markets (cassava in Ghana)

Etc.

An earlier project, R8399, had taken place in India, Vietnam, Nepal, Bangladesh and Sri Lanka. Impact assessments of some components of this project, in particular in Vietnam, India and Sri Lanka, led to the conclusion that rural enterprises needed a more long-term support service, integrated with market information, training facilities and seed supply systems. From this, CoDI was developed.

Non RNRRS generated knowledge used:

In addition to the RNRRS knowledge mentioned above, CoDI built upon existing initiatives of its five partners. This was perceived as an important asset

to achieve more rapid impact and sustainability.

- CASRAD: MALICA (Market and Agriculture Linkages for Cities in Asia), M4P (Making Markets Work Better for the Poor).
- BAIF: Wadi (Orchard) programme
- FAVRI: ongoing late longan/Thanh Tra pummelo research
- WII: ongoing rural development projects (e.g. RUPFOR: Resource Unit for Participatory Forestry), Developing Markets for Watershed Protection Services and Improved Livelihoods, Development and Implementation of Bio-resources based Business Plants for SME to Enhance Community Livelihoods)
- ICUC: promotion of underutilized crops globally; project management experience

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
1. Project coordinated	All indicators achieved		
2. MIL instituted	Most indicators achieved	Baseline report delivered late; impact report had to be preponed due to early closure of project	Data collection for the baseline report proved to be more difficult than anticipated due to the need to hire and train local enumerators. The development of the data collection strategy was delayed as input was sought from SSC Reading which was only available nearly 12 months after project start.
3. Communication Strategy implemented	All indicators achieved to large part	India's videos from 2 sites are available; Policy briefs not developed	Early project closure prevented policy briefs to be developed as planned. BAIF had planned to prepare its four videos at project closure in June 2011 but here too, the early closure of the project caused this to be unfeasible at two of the sites. Whilst at two locations planned had already progressed to a point that the films could be developed quickly, the other two sites could not step up planning so rapidly.
4. FPP operational and	All indicators	Less people reached than	More overlap than anticipated

active	achieved, albeit with	anticipated	
	less people. Training		
	courses were provided		
	on various aspects of		
	UC production,		
	maintenance,		
	processing and		
	marketing. In Vietnam,		
	safe production		
	certificates were		
	awarded and trade		
	marks developed.		
5. 16 VCFs held	All indicators achieved	Less people reached than	More overlap than anticipated
	albeit with less	anticipated	
	people; more VCF held		
	than planned because		
	these proved to be		
	very good exchange		
	facilities to the		
	communities.		
6. CGOs established	All indicators	Less people reached than	More overlap than anticipated
	achieved, albeit with	anticipated	
	less people; more		
	CGOs established as		
	nurseries established		
	spontaneously by		
	beneficiaries who		
	them sought training		
	from the project		
	through the FPPs		
7. 8 AKFs held	More AKFs held as	Less people reached than	More overlap than anticipated
	Vietnam held two at	anticipated	

some sites; not	
possible to ascertain	
the second indicator	
at present.	

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

As per the workplan, which was reviewed and revised if necessary throughout the project, the following activities took place (no comment indicates activity was carried out without major deviation):

1. Project coordination:

- Project inception workshop: planning, execution, write-up
- Annual Project team meeting coinciding with one of the AKF meeting in Hubli November 2009 and Hue August 2010
- End of project workshop: planning, execution, write-up done in March/April 2011
- Ongoing communication with project team; timely submission of financial, quarterly, annual reports to RIU
- Data management

2. Monitoring and Evaluation

- Data management
- Socio economic; Existing institutional structures (CBOs, WADI project, SHGs, credit systems etc); Capacity need assessment (for FPP)
- (Environmental impact assessment study) done as part of the baseline study
- Literature/knowledge review (existing BAIF work, RNRRS database, other FPP initiatives in South and South east Asia)
- Market study (including identification of potential market networks) done in Vietnam only
- Developing M&E indicators based on the baseline reports
- Implement the M&E process
- Undertake impact assessment studies: socio economic and institutional/environmental based on indicators developed in 4.1 a rapid appraisal was done prior to project end (Annex 2)

3. Implement Communications Strategy

- Detailed Stakeholder database developed for each site (and regularly updated)
- Project inception stakeholder workshop in each project site
- Identify government 'change agents' and maintain regular one to one interaction each field location worked with government officers but it was not possible to have them enlisted as change agents and continuously interact with them.
- Finalise communication strategy
- Set up a project website website went life in November 2008
- Design, print, disseminate materials (local language and English): pamphlets on: project and market info, roles of different stakeholders, importance/ benefits of UC; posters promoting concept of UC and FPP, update annually including a calendar for the year 2010
- Design print and disseminate project newsletter annually only one newsletter was produced
- Organise media meetings, prepare press releases to coincide with start of operations at FPP (India) or AKF (Vietnam) done as planned; good press coverage locally during AKFs
- Film on learnings from project in Vietnam, also several TV programmes were developed and aired on the national agricultural channel
- Organise exposure visits for farmer groups, students, school children etc. to project site, part of environmental education
- (Prepare and disseminate targeted policy briefs) not done during project; a policy brief is under preparation to summarize project results
- Participation in existing government/ongoing fairs
- Identify other initiatives for outscaling a new project was started in Africa, following some of the elements from CoDI; project elements, in particular the MIL component, was shared with other projects and donor agencies (e.g. IUCN, World Bank, Madhya Pradesh and Western Orissa Livelihoods project, also funded by DFID in India)
- in addition, team members participated in national and international workshops and conferences and published scientific journal articles
- some of the publications are attached in the Annexes 3-7 to this EOP

4. Food Processing Parks India

- Staff orientation and capacity building
- Stakeholder workshops: to announce project and mobilize participants; to finalise raw material, products and schedule of events
- Establishment of FPPs, purchase of equipments, arrangement for inputs
- Wider publicity about FPPs to increase participation
- Training of FPP users on processing and marketing e.g. in the preparation of papadums, pickles and juice
- Initiation of trial processing and marketing; production scheduling for FPP users a mill for processing millets was purchased for the site in Karnataka
- Development of market linkages and product distribution system the quantities of the different products available for marketing in the four locations are small and hence it was not possible to take up these activities in a systematic manner.

- Commencement of production for market **see above**
- Continuous processing and marketing see above
- Brand development, certification, publicity, information support service see above
- Training on enterprise development see above

5. Food processing parks Vietnam (Hai Duong and Bac Kan)

- Base line survey for knowledge on cultivation, post-harvest handling , processing and market demand
- Project inception workshop with a wide range of stakeholders
- Local policy dialogue initiated on the promotion of FPPs
- Identifying interest farmer and establishing farmer association (group, coop, associations) for FPP
- Training modules and documenting on technical and management, marketing
- Input and credit negotiating with Bank and VWU with Agricultural Bank and Provincial Cooperative Union in Hai Duong and with Farmer Association in Bac Kan
- Business plans for FPPs and park regulation developed
- Building the packaging or processing infrastructure
- Quality certification and licensing developed hygiene certification for sticky rice by Health Service and a business license for the Hoa Vang Sticky Rice Association
- Designing, developing and promoting brand name, trademark a collective trademark for Hoa Vang Sticky Rice has been submitted for protection; development of logo, label and packaging for both sticky rice and Bo khai vegetable is ongoing
- Strengthening market network, distribution systems, advertising e.g., exhibitions in supermarkets were also organized

6. The post harvest handling park for longan (in Hatay province); link market for pummelo (in Thua Thien Hue province)

- Baseline surveys for longan and pummelo production
- Establishing farmer group participated in project; organizer stakeholder meeting
- Procurement specific tools, materials
- Organize the training courses
- Implement post-harvest handling of product
- Making the certification for production certificates for safe production were awarded to 30 late longan producers and 53 Thanh Tra pummelo producers
- Product promotion e.g., linking with FIVIMART
- Strengthen market network, commercial development of production

• Link to market for pummelo production

7. Village Crop Fair India

- Formation of committee for event organisation
- Identification of locations, participants and special invitees instead of large gatherings, smaller events were prepared that enabled more intensive interaction amongst participants. As a result, the total number of fairs held was 24 instead of the originally planned eight.
- Preparation of handouts
- Making arrangements and sending invitations
- Development of schedule of events
- Holding of fair as planned

8. Village Crop Fair Hai Duong and Bac Kan

- Village seed/head-line plan fairs
- Village product quality competition (fairs)
- 9. Village Crop Fair Ha Noi and Thua Thien Hue
 - Prepare documents, publishing documents two technical manuals and a video CD were published for late longan and Thanh Tra pummelo production
 - Organize the crop fair in the village for longan
 - Organize the crop fair in the village for pummelo

10. Community Germplasm Orchards India

- Finalisation of locations, formation of Orchard Management Groups instead of centralized GCO, these were established as small nurseries which were run by farm families of groups of farmers.
- Training on nursery management practices, germplasm collection
- Sourcing of elite germplasm Elite germplasm of some underused fruit trees like karvanda (*Carissa carandas*), jamun (*Syzygium cumini*) and tamarind (*Tamarindus indica*) were introduced. Introduction of *Dioscorea alata* yam, coarse millets, sponge gourd, *Dolichos* bean and natice scented variety of rice are some of the other initiatives.
- Orchard establishment and aftercare
- Multiplication and sale of planting material seedlings of potential fruit species were raised and distributed/sold to participants at fairs.

- 11. Community Germplasm Orchards/nurseries established Bac Kan, Hai Duong
 - Training on technical and management skills
 - Building germplasm/nurseries
 - Management of germplasm
- 12. The Germplasm Orchards/nursery of original cultivars of longan (in Hatay province) and pummelo (in Thua Thien Hue province)
 - Maintain germplasm orchards of longan and pummelo
 - Establish and manage the nursery of longan and pummelo
 - Organize the training courses on cultivation propagation techniques of longan & pummelo
- 13. Annual Knowledge Fairs India
 - Formation of Fair Organising Committee; deciding contents, programme, date, venue
 - Identification of participants, invitees and dispatch of invitations
 - Preparation of publications, exhibits
 - Arrangements, logistics for conducting fair
 - Successful conduct of AKF AKFs were held in all four locations and the participation and knowledge sharing in each fair was overwhelming.
 - Internal deliberations on learnings and documentation
- 14. Annual Knowledge Fairs Vietnam
 - Prepare the Annual Knowledge Fairs
 - Annual Knowledge Fairs held in each Province

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

The Coalition partners formed a very strong team during the project. This was based partially on earlier interaction amongst individuals and also on a strong feeling of common interest in supporting smallholder farmers. Personal friendships developed during the project and at the end, several partners said that 'CoDI' had become a real 'brand name' and a point of identity. However, individual staff changes, progressions and career developments also meant weakening of the project at some of the sites, where successors joined the project at a later stage. This could not be avoided entirely. Interaction between some partners was strengthened by CoDI and is reflected in now increasing numbers of joint projects (e.g. CASRAD and

FAVRI are now working together in several other projects).

Coalition partners also developed 'secondary' partnerships at their intervention sites. These were partially technical (e.g. interaction of BIRD-K with University in Dharwad on millet processing and SPESD with the agricultural science center 'Krishi Vigyan Kendra') and partially political (e.g. interaction of CASRAD with local district council on behalf of the Hoa Vang Sticky Rice producers association). In Bac Kan for example, the Bo Khai producer group was initially linked to the local agriculture committee, and later moved to be under the gardening association as it was seen that this would facilitate and speed up information and knowledge exchange. The Agricultural Cooperatives in Dai Thanh, Lai Du and Thuy Bieu and the Hue Agricultural Research and Development Center were key partners for FAVRI.

WII linked up with Cambridge University, IUCN (HQ and IUCN India) and the World Bank to share and discuss monitoring and learning processes.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i). Implementation partners have engaged with local policy makers at district and provincial level, for example the Provincial Departments for Science and Technology (DST), the Provincial Department of Agriculture and Rural Development (DARD) and the Provincial People's Committees. Experience was positive in that the officials were interested in the project outputs (see iii.)

ii). In Vietnam, the district people committees and Vietnam Women's Union are key partners in upscaling and dissemination of information, that have been involved in project activities. The project interacted with policy makers through meetings and workshops and by inviting them to AKFs. For example, sensitized through the Village Crop Fair, the Kinh Mon district people committee set the policy to assist in the seed price to support the propagation group within the Association to enhance seed production and make conditions for producers to use capital sources well.

iii). Kinh Mon people committee has now set the policy to develop the area under Hoa Vang sticky rice into some other communes inside the district (Increasing about 200 ha in 2011). 50% of seed price was supported on this additional increasing area to promote production. Hoa Vang Sticky Rice is thus included in the new District and Provincial Agricultural Development Policy. The National Agricultural Extension Centre and DARDs of Hanoi and Thua Thien Hue provided supplementary funds for training courses on late longan and Thanh Tra pummelo; the DSTs of the two provinces provided funds for the establishment of geographical indicators.
Change has also been noted in donor-funded projects, where the MIL component was promoted by WII, specifically in a project by IUCN. The internal project monitoring protocol of this project was influenced by the MIL component developed for CoDI.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes?

ii). Have there been any unintended changes / consequences?

i). We believe that the project has changed the relationship between project staff and beneficiary associations and the local authorities, for example in Kinh Mon District, Vietnam. The Hoa Vang Sticky Rice Producers Association highly appreciated the advice and the support from the project because members found that it was really practical and effective. The local authority (at district level) also highly appreciated the results that the project brought about for local farmers and therefore, the local authority (Kinh Mon District People Committee) also became interested to support the development of Hoa Vang sticky rice seed in the future.

In Bac Kan province, the farmer group of Bo Khai vegetable consumption and production was originally established under the Cho Don District Farmer Association. The technical guidance from the district went through the commune to the group and was often delayed. Today, the farmer groups are directly under the District's Garden Association due to 2 reasons: (1) Bo khai vegetable is grown on garden land and can be intercropped with other kinds of crops; (2) The garden does not have commune level organization so the technical guidance from district will come directly to the groups, thereby facilitating and speeding up the process of knowledge transfer.

CASRAD also reported that the joint development and use of monitoring guidelines and the data management protocol for the first time allowed them to keep track of project development in 'real time' and allowed them to be more efficient when looking for background data, for example to develop a new proposal.

In more general terms, CoDI has increased interest within the partner organisations in working on underutilized crops. FAVRI's Director for example, stated that he would be very interested to continue working on other underutilized crops following the model developed by CoDI, now that the project had shown the relevance of these crops to farmers.

ii). In India, the focus was put less on commercialisation activities than in Vietnam. This resulted from in-depth discussions with stakeholders and beneficiaries at the beginning of the project which called for more knowledge about nutritional benefits of underused crops and the development of self-employment option with higher priority that market links. This has led to a greater difference of the India component of the project than originally anticipated.

Staff changes at Winrock India International, ICUC/Crops for the Future and BAIF have affected the project. The departure of Mamta Borgoyary in particular and the departure of Sunandan Tiwari shortly after her weakened CoDI's MIL component seriously. New staff were appointed to join CoDI

from WII, however at that time the project was already winding up so that their integration and influence could only be limited. Several of the initial project staff left BAIF, and at least in one case (BIRD-K) led to slowing down of activities. The coordinator of the project left ICUC/CFF but was kept on board on a consultancy basis to limit any negative effects on the project. Whilst this was the best possible option in this instance, it seems to have led to loss of confident in the project by RIU (it was mentioned as one of the reasons for the request for early closure).

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i). A list of 'lessons learnt' assembled during the project completion workshop is attached (Annex 1a).

The project partners started this project at a different level of experience with participatory and innovation systems approaches. Thus it is not surprising that some gained new knowledge regarding working with farmers (it takes time for farmers to adopt innovation in agriculture; linking knowledge transfer with acute problems (such as pest outbreak) will enhance the learning experience; use of appropriate printed material is important to improve knowledge; providing farmers with (non-cash) incentives to increase their interest). In addition, partners in India learnt that it is important to have a base onto which to build when promoting new technologies and that it is important to be situation specific, i.e. suited to the location. In the case of underutilized crops, the fact was highlighted that the stakeholders need to have basic knowledge of the 'new' crops, otherwise their interest in adopting a new technology is weak. Similarly, the need to build upon a clear demand (whether market or household level) is a prerequisite for successful introduction of underutilized crops or new products of existing crops. However, it was also mentioned, that previous knowledge may be detrimental to uptake, for example where a crop has traditionally a negative connotation (consuming millets limits brain development or leads to poverty). This association then has to be overcome with increased information and awareness raising which takes more time. It was also realised that developing a market-based approach with underused crops is challenging, because the volumes of produce are low (by nature of the crops being 'underused') and thus the quantities required for a sustainable market are difficult to reach.

ii). Other than in informal fora, for example the annual planning workshops, these lessons have not been formally analysed and presented. It is planned to present them at the upcoming Second International Symposium on Underutilized Crops, Kuala Lumpur 30 June - 3 July 2011.

iii). At some of the BAIF sites, activities were less successful than anticipated, in terms of actual marketing of processed crops. A variety of reasons may

be provided, including staff changes with insufficient hand-over (and subsequent lack of understanding of the need for record keeping and other MIL activities by the new staff), other priorities of the farmers and/or their risk aversiveness, technical faults at the processing equipment that delayed smooth operation, the fact (mentioned above) that the produced volume of the new crops was low and thus prevented sustainable marketing.

iv). Two kinds of challenges can be identified: (1) operationally, as stated under (i and iii) above, the fact that some of the crops to be introduced were relatively unknown and/or had a stigma attached to them, resulted in far slower uptake than initially anticipated. More training and awareness raising was required than had been expected by the team, given that CoDI built upon earlier engagement by the partners with the topic 'underutilized crops processing'. (2) The second challenge was administratively: the RIU team changed during 2009 and new priorities were introduced. This left CoDI somewhat confused and lacking a continuous contact at RIU. This was followed by a request from RIU to cut off the Vietnam component of the project, which at that time was showing promising first results. RIU's consequent focus on India ignored achievements in Vietnam, and led to a request for early closure of the project due to a lack of market links. These changes and shifts were not without consequence on the project team's focus.

v). A list of gaps identified during the completion workshop is attached (Annex 1b). In particular, a clearer market analysis is required for the Indian sites to determine which products have a potential and could be concentrated on further. A survey of similar activities will also be helpful to determine whom to link up with in processing activities, in order to concentrate efforts. In Vietnam, further research may be required on issues like pest and disease management, and also on establishing niche markets for some of the products, for example by establishing organic or geographic indication certification. In addition, new products and value chain may be developed, now that there is increased interest in underutilized, traditional crops.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number & Type of	Number & Type	Male	Female	Total	Evidence Index*
	Indirect	of Direct	Beneficiaries	Beneficiaries		
	Beneficiaries	Beneficiaries	(indirect and	(indirect and		
			direct)	direct)		
1. FPP	Not known	Vietnam,	Vietnam,	Vietnam,	Direct	Record books at each FPP site. These
		CASRAD: 6,100	CASRAD: 941	CASRAD:	only:	can be made available on request by
		Vietnam, FAVRI:	Vietnam,	5,159	10,497	the project partners.
		2,225	FAVRI: 1,506	Vietnam,		
		India, BAIF: 2,172	India, BAIF:	FAVRI: 719		

		Total: 10,497	1,237	India, BAIF:		
			Total: 3,684	935		
				Total: 6,813		
2. CGO (orchard	Not known	Vietnam,	Vietnam,	Vietnam,	Direct	See above
maintenance, sale of		CASRAD: 6,405	CASRAD: 974	CASRAD:	only:	
seedlings,		Vietnam, FAVRI:	Vietnam,	5,431	12,283	
		1,348	FAVRI: 886	Vietnam,		
		India, BAIF: 4,530	India, BAIF:	FAVRI: 452		
		Total: 12,283	2,604	India, BAIF:		
		,	Total: 4.464	1.926		
			,	Total: 7.809		
3. VCF	Not known	Vietnam.	Vietnam.	, Vietnam.	Direct	See above
		CASRAD: 12.262	CASRAD: 1.925	CASRAD:	only:	
		Vietnam. FAVRI:	Vietnam.	10.337	16.626	
		810	FAVRI: 518	Vietnam.		
		India BAIE: 3,554	India, BAIE:	FAVRI: 292		
		Total: 16 626	2 100	India BAIE		
		101011 10,020	Total:4 543	1 454		
			10001.4,545	Total:12 083		
Λ ΔΚΕ	Not known	Vietnam	Vietnam	Vietnam	Direct	See above
<i>4. A</i> N		CASRAD: 800	CASRAD: 300	CASRAD: 500	only:	
		Vietnam EAVRI	Vietnam	Vietnam	5 102	
		052			5,102	
		952 India DAIE: 2.250	India PAIE	India PAIE:		
		Total: E 102	1 007	1 162		
		10101. 5,102	1,007	1,405 Total:2.240		
			10101: 2,853	10101.2,249	Curra of	
					Sum of	
					all direct	
					beneficia	
					ries:	
					44,508	
	Vietnam, CASRAD:				Indirect	Newspaper, TV, radio and website

40,000 (est.)		only:	articles.
Vietnam, FAVRI:		Over	
22,918 (est.)		140,000	
India, BAIF: 80,898			
(est.)			
Total: 143,816			

*Please provide evidence for the figures included here as a separate attachment, use this column in the table to indicate where this evidence can be found. **Note 1:** Beneficiaries were in all cases small to medium farmers, small-scale entrepreneurs and women self-help groups. **Note 2:** There was considerable overlap of the same persons participating in all project events.

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

i). There has been an overall increase in income across the project sites. In some places, the increase in income has been recorded as high as five times, when contrasted with levels prior to the project intervention. Project interventions have led to increased options for income generation through improved quality of germplasm, improved capacities, better processing facilities, better market linkages (in VN), extended range of products from UC (in India) and increase in sale price of some UCs or their products. In Hai Duong, beneficiaries have a HH income 39% higher to that of comparable HH outside the project (over 8,000 HH). In addition, the project has increased paid employment in farmers' spare time through work at the processing plant (over 400 working days in 2 years). In Ha Noi, income to late longan farmers was increased by 25-50% from increased management, and additional jobs worth 1,000 days (ca VND80,000-100,000) were created through the FPP during the 2.5 years of the project.

Farmers have increased their area for plantation of UCs. For example in Hai Duong the area under production of sticky rice increased from 0.08 ha in 2007-8 to 0.13 ha at the end of the project. The District Agriculture Department in Hai Duong also reported that more and more farmers are growing Hoa Vang Sticky Rice. In India, there was a renewed interest in farmers for cultivation of millets.

The production of UCs has improved substantially from the baseline situation. There has also been an improvement in the quality. The improvement can be attributed to improved germplasm, better cultivation and harvesting practices. Improved germplasm for select UCs are available across sites within the project. Evidence of improved germplasm leading to better productivity and income, has been reported in the impact assessment study. The nurseries established through the project have proved to be an additional income generating activity to the local communities and individuals. These have the potentials to develop into full fledged retail or wholesale nurseries propagating other plant and fruit varieties along-with UCs.

The project has instilled a renewed interest among the farmers in the cultivation of UCs through its various events like Village Crop Fair, Annual Knowledge Fair and other training programmes.

ii). The baseline report was available rather late in the project life (copy attached). However, it was able to confirm the beneficiary selection and provided useful parameters on which to measure impact on. The baseline data also highlighted the need for capacity building of the beneficiaries within the project sites in terms of post harvest and other necessary agronomic practices and the fact that market linkages and market intelligence are two components that are rather weak across all eight sites.

iii). An indicative impact assessment was carried out during February 2011. The report is attached. It would be desirable if a more thorough impact assessment could be carried out following the baseline model in 1-2 years.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). The project had made special efforts to target women and other marginalized groups. Women self-help-groups (SHG) have been an integral part of the project across the project area. Women SHGs have been involved in development of Community Germplasm Orchards (CGOs). BAIF provided training to members from each Women SHG in each of the project village on value addition of different products from underutilized crops. The eatables prepared by women from the SHGs (such as papads) were sold collectively or individually within the local market. The SHG federation played a key role in supporting the members of SHGs in marketing of the products. For example the federation outlet in Jawhar town in Maharastra, India was the selling point for many products produced by SHGs.

In Vietnam, the situation in Hai Duong is characterized by many men moving to the cities or abroad for off-farm income, while the women continue to

cultivate the land. Members of the Hoa Vang Sticky Rice association were to 90% women. CASRAD conducted at least six training events for the farmers of the group, which included both in-house sessions and field demonstrations. The trainings included techniques of cultivation, density of sowing, management of product quality and management of group. The farmers now know scientific techniques to grow this variety and better use of fertilisers. As a result the average production has increased, albeit slightly, from 1.3 quintal (130kg) to 1.5 quintal (150kg) per 0.03 ha of land.

Baseline sampling was designed to include people from diverse communities. In Vietnam, predominantly households that fall in the 'medium' economic category cultivate / collect UCs. In India largely households categorized as 'below poverty line' or 'economically backward class' depend on UCs for subsistence, income, or both. In India, across three sites (Gujarat, Maharashtra and Karnataka) 52% - 91% of small and marginal farmers either cultivate or collect UCs. Conversely in Vietnam, except in the Bac Kan site where over 40% of small scale farmers cultivate / collect UCs, in the other three sites this figure varies from 2.92% to 8.51% Thus the baseline figure indicated that the CoDI project has targeted the population that it planned to work with.

ii). Project interventions were decided upon at the outset and they were targeting women based on project partners' prior knowledge and information. There was no need for change due to the baseline study or data gathered during the project.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

In India, the design of the GCO and VCF was changed to be more efficient and result in more direct interaction with beneficiaries.

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End of the Project Report

Enhancing the Impacts of Decentralised (fish) Seed Production (RIU-DSP) Project



RDRS Bangladesh The WorldFish Center, BAU, UoS (UK), IDE-Bangladesh, Practical Action, SACHETAN, PROVA, ACD IAAS (Nepal), OAS (India)

July 2011

End of the Project Report

Enhancing the Impacts of Decentralised (fish) Seed Production (RIU-DSP) Project

Lead Organization: RDRS Bangladesh

List of Partners: ACD, SACHETAN, PROVA, Practical Action, WorldFish, University of Stirling UK, IDE–Bangladesh, Bangladesh Agricultural University (BAU), One-stop AquaShop India and IAAS Nepal.

Introduction

Good quality fish seed is one of the most critical inputs for successful aquaculture, and improving the local availability of large, healthy fish fingerling to meet high seasonal demand of farmers is one of the most effective ways to stimulate fish production. A system of decentralised (fish) seed production (DSP) approach has helped to remove barriers hindering the growth of small-scale aquaculture, allowing members of the rural communities including the poor to gain benefits from fish culture. With financial support from DFID, Rangpur Dinajpur Rural Service (RDRS Bangladesh) and the WorldFish Center in collaboration with other national and international organizations implemented the project "Enhancing the Impacts of Decentralisd (fish) Seed Production (RIU-DSP)". The project is designed largely using DSP Approach – the approach to produce quality fish fingerling in rice fields and seasonal ponds/ditches involving large numbers of small-scale farming households in the Northwest (NW) and the Barind Tract (BT) regions of Bangladesh. In India it is implemented on a pilot scale with small-scale farming households in Purulia District in West Bengal and in Nepal in the Terai region. In both regions where the project implemented aquaculture is important and where the production and supply of fish seed to small-scale farming households is a major constraint of farmers to get higher production.

The irrigated rice fields of small-scale farming households in the project areas are important resources to produce large size fingerling of common carp and Genetically Improved Farmed Tilapia (GIFT) strain of Nile tilapia (Oreochromis niloticus). The seasonal ponds of the farmers are suitable to nurse fry of carps (rohu, catla and mrigal, silver barb) to produce large size quality fingerlings during wet months. Outcomes of the earlier studies showed that in order to get success in promotion of DSP, non-availability of quality broodfish of Nile tilapia (GIFT) is one of the most critical factors. The project used 'cage culture technologies" to rear broodfish of GIFT by collecting fry initially from well known hatcheries and later on by collecting fingerling from DSP farmers with rice fields, stocked and reared in nylon net cages set up in perennial ponds using quality feeds. The households with ponds involved in rearing of broodfish in the communities are Satellite Broodfish Rearer (SBR).

The RIU-DSP Project started on August 2008 ended on May 2011. The main objective of the project is to spread the proven ways of producing quality fish seed in ricefields and seasonal ponds of small-scale farming households to put fish farming within the reach of the poor, so that they can use their unused productive resources to increase fish production, income and household fish consumption thereby, leading to overall improvement in their livelihoods. The

End of the Project (EOP) Report developed based on the format provided by RIR which includes (1) Knowledge Being Put to Use (2) Project Outputs (3) Activities Undertaken for Putting Knowledge into Use (4) Partnerships (5) Policy Change (6) Organizational and Institutional Changes (7) Lessons Learned (8) Project Beneficiaries/Scales Achieve (9) Poverty Reduction and Income Generation (10) Social Exclusion and Gender (11) Unexpected Outcomes and (12) Any Other Comments explained about the major outcomes of the project achieved over the period.

1. Knowledge Being Put Into Use

The project gained substantial amount of knowledge through implementation of project activities; e.g. in the first year the project staff selected participants considering their wealth status, then emphasized on women participation and finally cared about their resources. However, during implementation of project activities, in some cases it was found that either the project site was far away from homesteads or not technically feasible for seed production in the rice field. Also due to distance many women were not able to perform actively in their plots. As a result their husbands or other male members in the home took care of their fish seed production activities. Taking this learning, in the following year the project shifted its approach. They initially select the suitable plot, then considered wealth categories and finally provisioned for women participation. This approach gave better result. However, this reduced the chances of direct participation of women.

In order to continue support to farmers from more than 1000 communities and for further scaling-up of the DSP approach to other potential farming households, a strategy on developing the "Lead Entrepreneurs (LE)" has been developed. Several successful DSP farmers were selected as LEs to work as local informal extension agents. Initiative was taken to enhance capacities of so that they can optimize their production by utilizing their resources and become fully motivated. These LEs were able to earn at least 20% of their household income from DSP. Further, linked the LEs with local service providers; e.g. fingerling traders, feed suppliers, seed suppliers of vegetables and local extension workers. It is anticipated that LEs would help to spread the technologies among their neighbours and other potential farmers.

The LEs were selected from three categories; the DS producers in rice fields, satellite broodfish rearer and local fingerling traders. One LE was selected from 2-3 communities from the DS producers and together with the fingerling traders and Satellite brood-fish rearer. The existing 208 SBR acted as LE; since they were trained in brood-fish rearing in cages and are already known to the community. The Fry Traders those worked with the project in 2009 were also considered as LE. The project provided orientation to the LEs and linked them with the local service providers (line agencies, NGOs, Private sectors etc) through arrangement of stakeholder lessons sharing workshops for information and training supports. Developing the LEs is one of the approaches for effective exit strategy for the project. As a result functional market linkages developed through the involvement of producers, traders, customers and service providers for DSP production to ensure quality fingerling in the local areas.

2. Project Outputs

2.1 Changes in Assets

Of the DSP ricefish farmers 23% of them have increased their land holdings (59% taking lease and/or mortgage, 41% purchase and/or clear mortgage of lands). Of the households who increased their lands the highest proportion are from Dinajpur (27%) and lowest in Nilphamari (7%). Of them households who increased their land holdings most of them in addition to ricefields have ponds used for grow-out for foodfish production where they re- stocked the DSP fingerling from ricefields. Of total household income, income from fish is increased at a significant level. This is happened due to re-stocking of quality fingerling from rice field to ponds and application of improve management practices for foodfish production.

Success Story 1: DSP rice fish farmer Rasheda Begum received Best Farmers' Award from Department of Fisheries (DoF) during the National Fish Week 2010 Programme.



Rasheda Begum of Paushim Dolljore in Saptimari union, Aditmari in Lamonirhat is a DSP ricefish farmer in 2009. She carried out the activities of GIFT fingerling production in their 14 decimal rice plot. By stocking 30 broodfish of GIFT she produced 21kg of large size fingerling 63 kg of foodfish in 2009 and earned Tk. 9600 with minimum expenses. She continued the DSP in 2010 and received 3kg fingerling and 80 kg foodfish earned TK. 10,050. Rasheda Begum used the income from fish for education of their children and in meeting household expenses.

Photo 1. DSP farmer Rasheda Begum of Paushim Dolljore in Saptimari Union, Aditmari in Lamonirhat with the National Fish Week Award.

Success Story 2: Mrs. Surjahan is a successful seasonal pond nursery farmer at Bagha Upazila in Rajshahi District in the Barind Tract region





Photo 2. Seasonal pond of Surjahan along with calves she purchased from income received from selling of fingerling under the DSP project

Mrs. Surjahan Begum a woman DSP farmer of village Amjadpara, Bagha, in Rajshahi District is among the successful farmers who carried out fingerling production in her 16 decimal seasonal pond. Stocked 1 kg fry of Indian major carp in 2009 and received 207 kg of large size fingerlings earned Tk. 12,700. She continued the activities in 2010 with her own initiative, stocked 1.5 kg of fry and received production of 294 kg fingerling/foodfish, and earned Tk. 19,995. With this income she bought 2

calves. Of the fish produced in 2010 Surjahan sold 262kg fingerling and used 28kg of fish for own household consumption.

2.2 Capabilities

The knowledge of majority (90%) of household members involved in DSP production in their ricefields build up on activities related to uses of technologies such as; selection of good plot, method of plot preparation, stocking of broodfish, feeding and other management, rearing of stocking and rearing of broodfish, method of harvesting of fingerling from plots and sale of fingerling to customers in which they able to carry out their activities with minimal support.

2.3 Empowerment of Women

Of the households involved in DSP in 29% of the households the female members able to take decision with their own to spend money they earned form DSP for education of their children (use the money to meet up necessary expenses to send their children to school) and

27% of them to take decision for use of money for treatment of their household members (see the doctor, send to hospital and purchase medicine).

2.4 Social Asset

Households involved in DSP production increased their position in terms of building up social asset, now they participating more in social events and community meetings. Among the DSP farming households 25% of them distributed the fish they produced as gift to their relatives and neighbours which strengthened their social relations to a great extent.

2.5 Production and Use of Fingerlings

In year 2009 of the DSP households 5% of them produced >2500 (7% in 2010), .95% of them produced <2500 fingerlings from rice fields. Of the DSP households in northwest region 58% of them carried out fingerlings production in rice fields in 2009 continued their production in 2010. However, the figure Barind Tract region is 10%. The low level of continuation in DSP production in 2010 is due to extreme drought in the Barind tract region. This is also related to the less suitability of their plots for DSP.

	re-stock	re-stock	
gift 6%	8% sold 33%	gift 7%	sold 32%
hh cons 53%		hh cons	

49%



(a) Year 1 (2009)

(b) Year 2 (2010)

Figure 1. Use of fingerling produce in DSP of households started fingerling production in rice fields in 2009 and continued in 2010 in the northwest and Barind Tract regions in Bangladesh



Figure 2. Use of fingerlings produce in DSP of households involved in fingerling production in 2010 in the northwest and Barind Tract regions in Bangladesh

Major proportion of the fingerlings produced used for sale and household consumption with minor changes over the years in which for households involved in DSP production in 2010 the proportion of households sold fingerling was higher compared to those started DSP in

2009 and continued until 2010 production season (Figure 1 & 2).

2.6 Income

For households started fingerlings production in 2009, 28% of them increased their annual income by Taka 2500, the figure increased among those who continued their production in year 2010 in which 44% of them earned on average Taka 2500. For households those started fingerling production in rice fields in 2010, 33% increased their annual income by Taka 2500 from fingerling production. The average income of 20,485 households involved in fingerling production in ricefields was Taka 2199.

2.7 Fish Consumption

Consumption of fish by households increased significantly through their involvement in DSP project activities. For households involved in DSP in ricefields the household fish consumption annually raised to 218 days and 149 days in northwest and Barind Tract region respectively at the end year of the project, which was 93 and 44 days during the baseline year (before project intervention). The average fish consumption of 75% of the DSP households was 14.5 kg.

2.8 Seasonal Pond Nurseries

It is estimated that 2586 producers under seasonal pond nurseries annually produced around 6 millions large size carp fingerlings from their seasonal ponds. The fingerling they produced sold directly to neighbouring grow-out farmers or through fingerling traders. The quality of fingerlings produced (size, shape) and local level production made it attractive to grow-out farmers to get such fingerling in order to receive better performance in grow-out

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production. Most importantly such the use of such technologies improved the livelihoods of many poor farming households in the project areas.

Success Story 3: Md. Bahar Uddin a farmer made success in fingerlings production in ponds



Md. Bahar Uddin of East Khuniatari, Ramkhana, Nageshwari, Kurigram who use his 6 decimal seasonal pond for production of carp fingerling. By stocking 2 kg fry of Indian major carp he produced 10 kg fingerling and 70kg foodfish in 2010. He earned Tk. 8200 from this production which he used to purchase one bundle of corrugated tin and meet up the annual examination fees of his son. The big amount of production and income form his small pond motivated him greatly for continuation of fish culture. By using his ponds in fingerling and foodfish production his household fish consumption increased two-folds than before, in addition he is very happy as it has given him opportunity to build up linkages with the field staff of local DoF and RDRS

Photo 3. Successful seasonal pond nurserer Md. Bahar Uddin of Kurigram District in northwest feeding the fish

2.9 Outcomes of Satellite Broodfish Rearer (SBR)

In order to establish production and supply of quality broodfish of GIFT in 208 SBR established with success in 2009 who continued their activities in 2010 against the target of

200 SBR (104% of target). In addition 2010, 27 new SBR developed as secondary adopter of the technologies to rear fingerling to broodfish for distribution to DSP farmers.

2.10 Fingerling Traders (FT)

Fingerlings produced in DSP opened a new avenue of getting supply of quality large size fingerlings to FT. In a random survey of 384 FT out of total 3000 FT in the project areas it came out that from the DSP farming households started fingerlings production in Year 1 (2009) and continued in Year 2 (2010) from them total 66 FT purchased 3,899kg of fingerling (59kg/FT) worth Taka 3,80,030 (5,758 Taka/FT). From households started DSP production in 2010 the figures were 130 FT, fingering sold 10,104kg (78kg/FT) and worth of fingerling Taka 11,54,550 (8,881 Taka/FT). The outcomes showed that over the years the involvement of fingerling traders increased together with the amount and value of fingerlings sold to grow-out farmers. Before project intervention (baseline year) the involvement of FT in selling DSP fingerling was very less in which only 5 of them sold 890kg fingerling worth Taka 80,500.

Table 1. Distribution of fingerling traders based on species of fingerling sold from DSP colleting from DSP farmers to grow-out farmers (number of sample fingerling traders 384)

Fish Year 2009 Year 2010

Species	Number	Fingerling	Value	Number of FT	Fingerling	Value (Taka)
	of FT	sold (kg)	(Taka)		sold (kg)	
GIFT	50	1459	115930	106	3888	392150
Carp	16	2440	264100	24	6216	762400
Total	66	3,899	3,80,030	130	10,104	11,54,550

Such promotion of DSP fingerlings and the benefits from selling of fingerlings encouraged the traders to open and establish new markets, in which a new fingerling was established at Nilphamari with success.

2.11 Outputs of Activities in Nepal

In 2009, worked with 115 households to carry out fingerling production in ricefields, in 2010, the number of households involved in DSP production in ricefields was 196. So, the total number of households involved in DSP production during the project period was 311 (62% of 500 households targeted) households. In 2009, number of large size tilapia fingerlings produced was 16704, in 2010 the number of fingerlings produced was 49,877 (380 kg) worth NRs. 73,687. In addition the total number of common carp fingerlings production was 523 which weight of 61 kg and production value of NRs. 12,110. On average per household produced 215 fingerlings from their ricefields. Although the production of fingerling and income were low the outcomes of the DSP technologies brought lot of interests among the farmers to get good quality fingerlings of GIFT, because there is no any source of supply of this fish in the country.

2.12 Outputs of Activities in India

A total of 2000 tilapia broodfish (size 100g) have been collected from Ramsagar and distributed to 166 rice-field farmers and to 23 farmers in small ditches and total 498 kg fingerling produced. In 2010 total 240 households involved in DSP production. In 2010 the prolonged drought in Purulia and the adjoining region has created water scarcity and the farmers faced problems for not having sufficient water in their fields. The problem in getting supply of water for DSP production later overcome to a great extent through establishment of linkages of this programme with the rain water harvest by digging of ditches in the rice fields programme of the local government. Overall, although the households faced problems in DSP production they (farming households, local government and officials) highly motivated about the technologies which provides income and supporting a great deal on household fish consumption in the areas. They are now planning to expand the activities with their own initiatives to farming households in Purulia and in adjacent districts.

The outputs described above briefly explained with few evidences the importance of the DSP technologies to farming households involved in Bangladesh, Nepal and India. These outcomes together with others are further noted below systematically based on the format provided by RIR.

Table 2. Output 1: Primary and secondary adopting households benefit from production of fingerlings by using the decentralised (fish) seed concept

Target	Status of Achievements	Variation if	Reasons
		any	
1.1 The asset base and	 23% of DSP-RF farmers increased their 		

capabilities of at least	land holdings. Most of the farmers	
80% of 21,000 primary	increased their land holding by taking	
beneficiary households	lease, shared in or mortgage in lands.	
will be improved	 100% of the DSP households increased 	

	 their level of knowledge on fish seed production in rice fields. 81% respondents gained knowledge about more than 50% technological know-how on fish seed production in ricefields More than 35% project farmers frequently and >62% farmers sometimes meet field staff of DoF/NGO, >25% frequently distribute/ receive food from their neighbours during crisis period 		
	• More than 27% women are now able to take decision regarding the education		
1.2 At least 70% of expected 36000 of non targeted households use DSP technologies as	Target of secondary adopters not achieved as per target, the adoption is not yet measured	Less than target	Adoption by secondary adopters appeared as a slow process
1.3 Annual production of 2500 fingerling for at least 70% of RF based DSP	34% RF DSP produced >2500 fingerlings annually from ricefields. Of them 10% produced >5000 fingerlings. It is calculated that 17,899 farmers produced near about 20 millions large size fingerlings from their ricefields. 58% producers in NW and only 10% in BT continued their fish seed production	Almost 2/3 rd of targeted households produced less than target amount	Extreme drought especially in the Barind Tract region hampers the production to a great extent
1.4 Annual household income will increased by Taka 2500 for at least 75% of RF based DSP	28% RF based DSP increased their annual income by TK 2500 in 2009, the figure raised to 44% in next year for those who continued RF based DSP production. For 2010 households with RF based DSP 33% of them increased their annual income by TK 2500. Mean income of 20,485 households involved in RF based DSP increased by TK 2199.	Less than the target	Drought and the other factors as mentioned in 1.2 & 1.3
1.5 Annual fish consumption will increased for at least 80% of RF based DSP	Fish consumption of RF based DSP households by days increased to 218 days and 149 days compared to 93 and 44 days in baseline year at northwest and Barind Tract region respectively. The average household fish consumption of 75% of households from RF based DSP was 14.5kg.		
1.6 90% of primary and 80% secondary adopters completely cease pesticides application in ricefields used for fingerling production	54% farmers completely ceased pesticides application in ricefields used for fingerling production. RF based DSP reduced cost of pesticide use by Taka 179 (51% of the earlier cost) per plot.	For secondary adopters it was not measured.	Due to discontinuation of RF based DSP of some of the households and their long practices to use such pesticides

1.7 At least 90% of	2586 producers have produced	
seasonal pond	approximately, 6 millions of fingerlings	
nurserers adopted carp	in their seasonal ponds. The income from	
polyculture, annually	fingerling is >Taka 6 million	
produce 5 million		
fingerlings and increase		
income Taka 1.5		
million.		

Output 2 Value chain for seed supply enhanced

2.1 At least 80% of 200 Satellite Broodfish Rearer (SBR) will continue their activities

StatusofAchievements

208 SBR established in 2009 and continued until 2010 (achievement is 104% against target).

2.2 At least 60 new SBR will be developed

StatusofAchievements

In 2010 total 27 new SBR developed; in 2011 the new SBR also increased (will put the number in EOP)

2.3. 80% of 3000 Fingerling Traders (FT) promote and sale large size fingerling.

StatusofAchievements:

Of a sample of 384 FT out of total FT in the project areas in 2009 DSP, 66 FT purchased 3,899kg of fingerling (59kg/FT) worth Taka 3,80,030 (5,758 Taka/FT). The figure was 130 FT, fingering sold 10,104kg (78kg/FT) and worth of fingerling Taka 11,54,550 (8,881 Taka/FT) for DSP households produced in 2010. It came out that the figure for total FT sold DSP fingerling was 515 and 1015 respectively in for Year 2009 and 2010 farmers. The figure was very high compared to the baseline year in which the figure was 5 FT sold 890kg fingerling worth Taka 80,500.

2.4 Fingerling from DS stocked by at least 60% of expected 600,000 foodfish farmers by 2011

StatusofAchievements:

On average per FT sold fingerlings to 132 fish farmers and thus it is calculated 1530 FTs have sold large size fingerlings to 201960 households, however, a large proportion of the households sold fingerling directly to the grow-out famers in the localities. So it is expected that >66% of the foodfish farmers received fingerling from DSP farmers in the project areas during the project period.

Output 3: Decentralised production of tilapia and common carp fingerlings increases supply of high quality fish seed for farmers in west Bengal and Nepal.

3.1 80% of the 500 in Nepal and 500 in WB adopt the DSP

StatusofAchievements:

Nepal: In 2009, worked with 115 rice-fish growing households and in 2010, worked with 196 rice-fish growing households. A total of 311 (62% of targeted) households (115 in 1st year and 196 in 2nd year) produced fingerling in RF in Nepal

India: In 2009, total 114 households involved in DSP and in 2010 total 240 households involved with DSP, which is about 71% of the target households.

<u>Deviationifany</u>: Lower than target

<u>Reasonsfordeviation</u>: Due to limited available of brood fish. As this was completely new technology to them

3.2 Annual production of 2000 fingerling for at least 70% of rice field based DSP

StatusofAchievements:

Nepal: In 2009, total number of tilapia fingerlings production was 16704 in winter and summer; in 2010, the total number of GIFT fingerlings production was 49,877 which weight of 380 kg and production value of NRs. 73,687. The total number of common carp fingerlings production was 523 which weight of 61 kg and production value of NRs. 12,110. In an average per household produced 215 fingerlings in their RF.

India: Production in around 300/houshold which increased in 2010.Annual household income will increase by Rs 1500 for at least 70% of DS producers

Output 4: Experiences from promotion of decentralised seed scale-up documented and shared with government, development institutions and private sector and linkages and communication between these and others stakeholders strengthened.

StatusofAchievements:

The project organized inception workshop in 2009. The relevant stakeholders (representatives from DOF, DAE, local NGOs, private sector hatcheries/fish farmers, input suppliers) were invited to participate. In the year 2010 sixteen (16) field days were organized to show the success farmers results to the community people and local stakeholders. The representatives from DOF, DAE and other elites were participated in the occasions. These programmes were reported in the national and local dailies. A national level workshop was conducted in 14

May 2010 in Rangpur. This workshop was presided over by the Honourable State Minister, Ministry of Land, Advocate Mustafizur Rahman. The project developed following documents:

- Brochure on "Enhancing the Impacts of Decentralized (fish) Seed Production"-English
- Poster on "Enhancing the Impacts of Decentralized (fish) Seed Production "-English

• Leaflet on "Producing Tilapia (GIFT) and Common Carp fingerlings in your Rice Field" – English & Bangla

- Leaflets on "Large size carp fingerlings production in seasonal pond"- English & Bangla
- 3. Activities Undertaken for Putting Knowledge into Use
- 3.1 Selection of Working Area of the Project

The knowledge on Decentralised Seed Production (DSP) approach developed from earlier projects of the WorldFish Center, CARE Bangladesh, Department of Fisheries (DoF) Bangladesh are used to select 10 (Ten) Districts; Dinajpur; Thakurgaon, Panchagar, Kurigram, Lalmonirhat, Nilphamari, Gaibandha (Northwest) and Rajshahi, Nowgaon and Chapai Nawabgonj (Barind Tract) in Bangladesh for the project. In Nepal the 2 (Two) Districts included selected are Chitwan and Nawalparasi in the Terai region. The Institute of Agriculture and Animal Science (IAAS)" in collaboration with "RIDS' a local NGO implemented the activities of the project in Nepal. The NGO RIDS worked with IAAS on aquaculture research and development in the earlier projects. The sites implemented in West Bengal in India located in the hilly upland areas of Purulia District. The sites selected in connection with the earlier works on fish culture carried out by local women lead NGO

'Dekunda Women Development Society (DWDS)' using One-Stop AquaShop (OAS) and Self Help Group (SHG) approach.

In Bangladesh, from each District 3 Upazila (total 30 Upazila), one Union from each Upazila (total 48 Unions) have been selected. The specific Upazila within District, the Union within the Upazila were selected based on information about the availability of suitable ricefields in the areas for fingerling production collected from the implementing partners, local DoF and other organizations working in the areas. The selection of 10 Districts and 30 Upazila have been completed in Year 1 (2009), however, the selections of Unions are done in two stages in year 1 (2009) and year 2 (2010). Total 48 Unions are included in the project. The Communities (Para) within the Union are selected to carryout the activities in year 1 are different from the communities selected in year 2010 but most cases the location of the communities are in same Union. In few cases some of the communities' very high suitability for DSP is selected from the adjacent Unions. In year 1 (2009) a total of 1035 communities has been selected, the number of communities selected in year 2 has been 955. The locations of the sites selected are shown in Figure 3.



Figure 3. Map of Bangladesh, India and Nepal showing the working areas of the project

3.2 Selection of Households and Formation of Groups

The households involved in fingerling production in ricefields are selected in year 2009 and 2010 almost equal in numbers (Table 1). In order to select households the field staff visited the communities and made the list of households with having ricefield plots. The household listed are grouped into different well-being categories. The well-being rankings are done with the help of key informants based on their land holdings, income, profession and social status. The households with poor and marginal well-being categories are then selected. From the same community list of households with ponds are collected, they are then grouped under different well-being categories and from them like the ricefish households those in poor and marginal categories are selected to seasonal pond nurseries for carp fingerling production. In the selection of the households the interest of households; to participate in the programme are given much importance. In 2009, 10567 households;

fingerling production in ricefields 8833 households and seasonal pond nurseries 1734 households are selected.

Based on knowledge about selection of households with suitable rice plots of year 1, in year 2 (2010) emphasis are given to select areas with suitable ricefield plots - scope for water supply from deep/shallow tube well or from open canal, water holding capacity of the plot, location of plots close to homestead areas, the dikes already raised due to road construction etc taken into accounts. Then the names of these households with suitable rice plots are listed, grouped into different well-being categories and the households with poor and marginal well-being with interest to involve in fingerling production are selected. In 2010 total 9918 households; fingerling production in ricefields 9066 households and fingerling production in seasonal ponds 852 households are selected from 955 communities. The distribution of households selected for different production systems are shown in Table 3.

Table 3. Distribution of households selected for fingerling production using DSP approach (ricefields and seasonal ponds) in two years (figure in parentheses are the percentages of households).

DSP System	Year 2009 (Number of households)		Ye (Number	ar 2010 of households)
	Target	Achievement	Target	Achievement
Ricefields	9000	8833 (98)	9000	9066 (101)
Seasonal ponds	1500	1734 (116)	1500	852 (57)
Total	10500	10567 (101)	10500	9918 (94)

Considering fingerling traders as important actors for promotion of DSP, the fingerling traders from the project areas are identified and provided orientation about the project and tried to link them with the DSP producers. Such linkages brought two-folds benefits; it directly benefits the producer households to sell their fingerlings they produce and on the other hand, the fingerling traders who are also the poor people in the community able to get new avenue from production of quality fingerlings from the DSP farmers and thus able to add extra benefits in their initiatives. The knowledge base they build up from the training and the experience they gained from their works of great help in the project for promotion aquaculture production through supply of quality fingerlings to the grow-out farmers. Some of the farmers with potential to involve in fingerling production in rice fields also adopted the technology with their help as secondary adopters. Finally, it is the traders who sold quality fingerlings to grow-out fish famers in distant areas and thus greatly helped in the increase production of fish in the project areas.

3.3 Techniques on Management of Broodfish

In order to provide sufficient number of quality broodfish of good strain Nile tilapia initially the project has collected swim up fry from a multinational hatchery called 'Symbiotic Hatchery Pvt. Ltd, Haluwaghat, Mymensingh, Bangladesh. In August 2008 a total of 3, 98,000 swim-up fry collected and stocked in 58 nylon net hapas in the government fish farm at Parbatipur to rear up to fingerling. Fiver months after rearing at Parbatipur farm fingerlings are transferred to the cages of selected 208 satellite broodfish rearer (SBR) at community level. During rearing from swim-up fry to broodfish around 52% survival occurred.



Photo4. Nursing of swim-up fry to fingering at the government fish farm at Parbatipur, Dinajpur and at Institute of Aquaculture and Animal Science (IAAS) at Rampur campus in Nepal



Photo 5: Cages set up for rearing of broodfish by SBR in ponds and discussion with farmers before distribution of broodfish to them

For 2009 production season to rear broodfish of GIFT for distribution to DSP farmers the SBRs are supplied with 2 cages each 1m³, provided required amount of feed to rear for 2-3 months to get sizable number of broodfish. Finally, 203,700 broodfish of GIFT are distributed from the SBR to the DSP ricefield. Most of the SBR (98%) received good success in rearing of fingerling to broodfish; it is only 3 of the SBR who lost their fish due to poaching and leakage of cages.

For households involved in DSP production in 2010, the quality fingerling (good size and shape) are collected from 2009 DSP farmers from ricefields. Each SBR stocked 600 fingerling per cage, a total of 237,600 fingerling are stocked in cages. The SBRs are now well known about the source of GIFT fingerling which is help for continuation of rearing of broodfish for sells to DSP farmers.

Some of the DSP ricefish farmers (11%) restocked their good size fingerling in their own ponds or shared ponds jointly for making broodfish for use in subsequent years. This practice is intending that project participants as well as other ricefield farmers to adopt this technology continuously, so in the sustainable point of view it can be a good example.

Error! Objects cannot be created from editing field codes. Figure 4. Broodfish development and management strategies applied in the DSP project

In Nepal, this rearing of broodfish is started in 2009 with the available Chitralada strains of Nile tilapia, however, in 2010 production season the GIFT strain of tilapia are used in which the quality fry was supplied from same hatchery 'Symbiotic' from Bangladesh, reared in the Institute of Aquaculture and Animal Science (IAAS), Nepal campus ponds before distribution to farmers.

In Purulia, West Bengal, India the broodfish from local source was used for distribution to rice fish farmers for fish seed production both in year 2009 and 2010.

3.4 Baseline and Endline Studies

In order to evaluate the changes against output of the project with status and achievements of stated outputs with evidences of the households involved in DSP the baseline and endline studies have been conducted taking representative samples of households.

The households with ricefields and seasonal ponds involved in DSP are selected using the following methods. One Upazila and union one union are selected randomly out of 3 Districts A total of 11 unions selected from 48 unions. From each union out of 7-58 communities 5-13 are selected using purposive random sampling. From each community 3 households are selected randomly out of total 6-10 households for DSP in ricefields and 1 household selected out of 2-4 households for DSP in seasonal ponds. In 2010 the total numbers of sample households with ricefields are 300 and 100 households with seasonal ponds. In random sampling the following formula are used to calculate the sample size at 95% confidence interval.

 $n = (Z_{1-\alpha}^2/SE)^2 (p) (1-p)$

Where n= the desired sample size when target population is >10,000

p = Proportion of the target population estimated to have a particular characteristic

 $Z^{2}_{1-\alpha}$ = standardized normal variant (1.96) for a confidence level of 95%;

Assuming an absolute 5% precision and 95% confidence interval, we obtained a minimum sample size of 384 households per comparable area by using the following sample size calculation formula

The data entry templates are designed in MS Access with data entry consistency checks and keystroke errors are detected and corrected by using control options in the data entry template. After completion of the data entry, before going to start the analysis all unexpected errors and out layering data clear out. The data analysis was done using MS Access and SPSS

15.0 Statistical Software.

3.5 Capacity Building of Project Staff

The WorldFish Center and RDRS carried out two day long orientation session for project field staff on participant selection (well being analysis, feasibility of the working area 'para' and some basic ideas about the project implementation process.

A master trainer cell was formed by four facilitators and they provided ToT to the PNGO staffs. Then the PNGO staffs provided training to the participants.

Training and linkage development activities to the "Fingerling Traders/ Fry Traders" have increased their knowledge and skills of doing the business profitably. This year the Fry Traders are visiting the villages of tilapia fingerling producers and asking for fingerlings.

In 2nd year the new 909 Fingerling Traders have selected. The selected Traders received orientation on their business relation issues at union level. Gradually the demand of tilapia fingerlings increased to grow out farmers for including in polyculture system. Beside, the project has planned to establish three new fingerling selling points in three different locations. The traders and DS producers showed interests to establish these centers where fingerlings will be bought and sold during the season.

It appeared that field staff experienced somewhat less difficulty in motivating farmers to prepare their rice plots for fish seed production in 2010 than in 2009 – possibly a result of both better plot selection and greater staff experience. It appeared that this might have freed up field staff time to enable them to work more effectively.

Changes in communication approaches resulted from the initiative and adaptations of FTs and FMs themselves based on experience of project implementation in 2009. Improvements in plot and participant selection were partly a result of greater field staff experience, but refresher training played a decisive role. In particular the final training of 2009, which included practical field visits, was credited as being an important factor. Leaflets distributed in 2009 were also considered useful tools by the field staff but were not available for distribution to participants of the 2010 cohort.

The group meetings used to communicate information in 2009 had been largely abandoned in favor of direct face-to-face contact between FTs and farmers due the time consuming nature of holding meetings and their poor attendance record.

3.6 Activities on Development of Functional Markets for Decentralized Seed

To build a functional market relation among value chain actors, following issues were found to be important;

- Establishment of linkage with actors (producers/traders/grow-out farmers),
- Location of actors (traders, grow-out farmers) close to the producers,

- Entrepreneurial attitudes of producers to income from sell,

- Amount of contribution from the activities (significant proportion) in annual household income

In order to develop market promotion, the project has initiated to establish "fingerling collection points" in three different places. The IDE Bangladesh coalition partner of this project placed posters, signboards at different market places in the community. The project organized linkage-building workshops for the Fry Traders, producers, government officials and other actions. In these workshops the Fry traders were informed about DS

producer's communities. DS producers were also advised to take the fingerlings in market places.
4. Partnership

Two types of staff of partner institutions are involved in implementation of the project, the part time largely professional staff and the full time professional as well as general field staff (e.g. Field Trainers) working in the project. All of the hired staff are recruited and posted on time to carryout the activities of the project. The general field staff are recruited only for a short duration (2 yrs) it was problem in their works both in the beginning and completion of their assignment. At the beginning they were not very clear about the technologies but when they build up their capabilities they have to leave the job. Other staff tried hard to involve them effectively throughout the period of assignment.

The experience of dealings with large numbers staff working in the DSP project from different institutions provided some valuable insights. For institutions where the staff are only project-based, not having any job security and provision for capacity building in short, medium or long term are less skilled and devoted in tier works even though they are from professional background. Based on this understanding in the project lot of initiatives is taken to mentor the staff through visits and discussions with them in the field together with the project participants by senior staff.

Table	4.	Human	resources	of	the	DSP	project	from	different	institutions	in	Bangladesh,
India a	nd	Nepal										

<u>RDRSBangladesh</u>	<u>SACHATAN, Rajshahi</u>	<u>WorldFishCenter</u>
Team Leader (%FTE) ¹	Executive Director (%FTE)	Regional Director (%FTE)
Project Coordinator (1)	Fisheries Manager (1)	Research Coordinator (% FTE)
Project Manager (1)	Field Trainers (5)	M & E Specialist (1)
Manager Fisheries (7)	<u>ACD,Rajshahi</u>	Data Manager (1)
Field Trainers (36)	Executive Director (%FTE)	Research Assistant (2)
Accountant (1)	Fisheries Manager (1)	IDE-Bangladesh
PracticalAction	Field Trainers (5)	Country Director (%FTE)
Program Coordinator (%FTE)	<u>PROVA, Rajshahi</u>	Programme Director (%FTE)
Fisheries Coordinator (1)	Executive Director (%FTE)	BDC (1)
Field Trainers (4)	Fisheries Manager (1)	ABDO-2
	Field Trainers (4)	<u>BAU,Mymensingh</u>
<u>OAS,WB,India</u>	IAAS,Nepal	Technical Specialist
Manager (% FTE)	Aquaculture Specialist (%FTE)	<u>University of Stirling, UK</u>
Assistant Manager (1)	Field Supervisor (1)	Communication Specialist (% FTE
Group Organizer (1)	Field Assistant (1)	System Specialist (% FTE)
1 Full There Franks a Level		

¹ Full Time Equivalent

The project applied the techniques to use simple training materials (leaflets on specific technologies such as; fingerling production in ricefields, fingerling production in seasonal ponds and management of broodfish) for distribution to staff and farmers. There training materials developed are redesigned based on lessons learned from the fields.

Unlike other projects in RIU-DSP there was provision (allocated budget) to put lot of effort right at the initial stages to develop project proposal with involvement of partners. Considering the major objective to spread (scale-out) the decentralised seed production technologies several partners selected from Bangladesh and abroad under two major categories (strategic and implementing partners). Institutions involved as partners are; RDRS Bangladesh (lead) and take major role in implementation, the other implementing partners were Practical Action – Bangladesh, ACD, SACHETAN and PROVA; the

strategic partners were WorldFish, University of Stirling (UK), IDE – Bangladesh and Bangladesh Agricultural

University. OAS India and IAAS Nepal were two implementing partners in India and Nepal (Figure 4).

Considering the variable capacities of the partners initiatives were undertaken to carryout the studies on 'Assessment of the institutions' capacity in promotion of DSP' with an objective to assess the capacity of the staff and their conceptual ability to understand the DSP approach, the mode of promotion of the approach, and its implementation methods, the system of organization management applied with institutions playing major roles in effective implementation of the project. The outcome of the study was useful for the strategic partners for providing support to the implementing partners for effective implementation in activities of the project. The value chain study carried out at the beginning by IDE Bangladesh was useful to understand the existing market situation and the actors' involvement which was useful to build up new market avenue for the fish seed produce under the DSP initiatives.

The lead partner (RDRS) worked for long years and they have excellent facilities such as; office, training canters at the district, Upazila, several affiliated institutions (e.g. Federation, group, FFS) these were of use in implementation activities of the project.

In Nepal the partnership build up with a local NGO 'RIDS' through other project used as a basis for implementation of the project in the field getting strategic support from IAAS. In India the institute Onestop Aquashop (OAS) it self is an approach worked in collaboration with DWDS a local women focused NGO in Purlia District used approaches like Self Help Group (SHG) of women and in connection with the Scheme of Local Government on Rain Water Harvest Project for the promotion of DSP.

Among the strategic partners WorldFish playing major technical roles on strengthening the capacity of the staff of the partner institutions of Bangladesh, Nepal and India using different techniques.

5. Policy Change

To Officials of Department of Fisheries at Divisional (Rajshahi and Rangpur), District (10 Districts) and Upazila (30 Upazila) a booklet with having list with detail address of most successful producers, fingerling traders and broodfish rearer (Lead Entrepreneurs 'LE') was distributed during the final workshop held at RDRS Rangpur. In addition beforehand, several workshops with local level actors (DOF, local government, CBOs and Lead Entrepreneurs) arranged in which the participants expressed their interest to carry out promotion of DSP activities. The high level of success and received of awards during the National Fish Week Programme of Government also help in influencing the local policy makers.

In addition the important outcomes of the DSP in quality fingerling production by small scale faming households using their resources in an integrated way with rice production has been presented in different meetings and forum, captured and published by different electronic an printed media during the project period.

Most importantly in two national level workshops organized by the International Food Policy Research Institute held at Dhaka on A Cereal System Initiative for South Asia (CSISA) study on

"Research and Extension of Rice-fish Technology in Bangladesh' the Dcentralised Seed (fish) Production Approach was presented most importantly undertaken as useful technologies to for effective use of ricefields for quality fingerling production using concurrent systems. Both of the workshops were well represented by the renowned academicians, policy makers, scientists and experts from national and international arena. It came out that the use of concurrent ricefish system is more feasible to produce quality fish fingerlings instead of foodfish due to limitations in water supply and culture duration with the advantages to produce fingerlings. The use of concurrent ricefields fields for fingerling production will augment the production of foodfish in alternate ricefish system especially in community based floodplain system with having high potential for promotion in the country.

The WorldFish Center in collaboration with IRRI and CYMMIT and funding from USAID is implementing the project Cereal System Initiatives for South Asia (CSISA)- Bangladesh in different regions (Hubs) of the country. Among others one of the important activities to be implemented under the CSISA-Bangladesh project will be the promotion of DSP technologies for quality fingerling production. Further, the CGIAR Research Program (CRP) 1.3 Aquatic Agricultural System Programme going to initiate for implementation in several countries of Asia and Africa where as part of quality fish seed production the DSP approach can be applied.

In the End of the project meeting held on 14 May 2011 the Chief Guest Honourable State Minister, Ministry of Land, Government of Bangladesh strongly pointed about the importance of production and supply of quality fish seed as important input to promote aquaculture production in the country and poor farming households the use of DSP approach noted as the most useful. He suggested all of the policy makers participated in the workshop to take this agenda forward.

6. Organizational and Institutional Change

6.1 Have you engaged with policy makers in this project and what has this experience been like?

In the project right from the beginning there were arrangement of workshops and visit and discussions with institutional stakeholder (e.g. DOF, the local Govt. and others) and later involve them by arranging of farmers rally, field days etc. There was really good and very high responses from them.

6.2 Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

These are the important policy makers/policy influencing groups that are important for upscaling the DSP technologies to large numbers of potential adopters in the country t the national level are; DOF, DAE, BFRI, BRRI, BARI, Universities, BARC, NGOs, CBOs, Community Groups, Private Sectors, Media, Local Government at Different Levels. At the international level these will include; WorldFish, IRRI, CYMMIT, IFPRI in which they can influence or support the policy makers at the national level and influence them to undertake activities relate to up-scaling of the DSP technologies to broader users with having potential for promotion to benefits. The mechanism were used to engage the actors during the project intervention which includes; (a) media publications of important outcomes which includes printing and

electronics media (b) arrangement of workshops both at local, national and international level and presentation of important outcomes to represent it effectively (c) To take part in the national and internal events to present the outcomes to larger audiences and to compete with extraordinary performance (receive of National Fish Week Award by the project participants) (d) Production and distribution of documents – posters, leaflets, policy briefs, magazine articles and (e) Arrangement of policy dialogues

6.3 Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

Several institutions already motivated to promote the technologies; the DOF, the Federation of RDRS, the local NGO and the partners' institutions already motivated and going to take this DSP approach for scaling up with their own initiatives. The project CSISA – Bangladesh is going to disseminate the technologies to six different regions of the country (called Hubs) in which the project is working directly with 60,000 farming households for promotion of agriculture and aquaculture technologies to increase productivity and income earning at significant level. There is great potential to involve some of the households in DSP technologies under this project.

The Department of Fisheries is running the National Agriculture Technology Project (NATP) with high potential to include the DSP approach of fingering production and some of the areas it is undertaken by the project beneficiaries.

In India the local government is highly motivated about the DSP approach and they are going to take initiatives for promotion of the technologies with their own funding initiatives. In Nepal the DSP approach showed lot of motivation and it is expected that in the upcoming EU funded Agriculture Nutrition and Extension Project it will be promoted to households considering its importance in improvement in household fish consumption.

7. Lessons learnt

i) What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii) Have you shared these lessons with others and if so with whom and how?

iii) Also, describe what has not worked and explain the reasons why not.

iv) What kinds of challenges did you face while up-scaling/promoting new knowledge under this project and were you able to address these and if so how?

v). what kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be

The outcomes showed that the development and promotion provides compelling evidence of multiple impacts and benefits associated with DSP, and of the most effective ways in which to promote it in new areas.

resolved?

Peak output of fingerlings from decentralised systems coincides with peak demand from farmers at be beginning of monsoon season (See Figure 5). Retaining fingerlings for growout in ponds or rice fields also increases supplies of fish during severe seasonal food shortages (monga) which affect Northwest Bangladesh. Access to large fast growing seed that quickly grow big enough to be sold and eaten can make fish culture a viable option for households with access to seasonal ponds and ricefields that could not normally be used for aquaculture. These features can stimulate fish production and contribute to improved food security for inhabitants of drought prone, flood prone, and upland areas where poor people without access to perennial ponds would normally be excluded from aquaculture, and serves as an adaptive response to increasingly extreme climatic conditions. The decentralised approach is particularly appropriate for remote areas where supplies of seed from hatcheries are limited.



Figure 5. Monthly variation in decentralised seed production and annual rainfall in two villages (Barman and Little, 2006)

There are five key indicators of whether a household is likely to adopt decentralised seed production that can be use to target those most likely to achieve success. The indicators are given below

Table 6. Description of indicators on adoption of ricefield based decentralised (fish) seed production

Indicator	Explanation
1 Household belongs to marginal or poor wellbeing category	4 Rice plot usually holds water during boro (irrigated rice)

- 2 Rice cultivation should be the households main activity
- 3 Rice plot is located close to homestead

Poorer households invest more effort in ensuring maximum production and are most likely to sell seed for cash, spreading the benefits of quality seed to larger numbers of end users

High levels of seed production less likely if household members work off farm or produce high value crops such as betel leaf

Encourages frequent observation, good management and participation by all household members, discourages theft or neglect

Natural water retention in the rice plot is important for the performance of the stocked fish

season

5 At least two existing rice plot Dykes should be raised to prevent fish escaping during flash floods.

9. Project Beneficiaries / Scale achieved

Table 7. Description of project beneficiaries/scale achieved for decentralised fish seed producers in the study areas

Project Output	Number &	Number &	Male	Female	Total	Eviden
	Type of	Type of	Beneficiaries	Beneficiari		ce
	Indirect	Direct	(indirect and	es (indirect		Index*
	Beneficiari	Beneficiaries	direct)	and direct)		
	es					
Output No 1- households	36,000 RF	20485 (RF	10702 (RF	9783 (RF	56485	Shown
benefit from the production	& SPN	17899, SPN	9430, SPN	8469,		in the
of fingerlings using DSP(1)		2586)	1272)	SPN1314)		text
Output No2 - value chain for		1530 FT			1738	Text
seed supply enhanced		208 SBR				
Outputno3-Decentralized		311 RF in			665	Text
production of tilapia		Nepal and				
&common carp fingerling		354 RF India				
increases supply of high						
quality seed for farmers in						
West Bengal & Nepal						
Output 4-Experiences from		20485 (RF	10702 (RF	9783 (RF	20485	Text
promotion of decentralized		17899, SPN	9430, SPN	8469, SPN		
seed scale-up documented &		2586)	1272)	1314)		
shared with govt. development						
institutions & the private		3000 FT				
sector & linkages &		208 SBR				
communication between these						
& other stakeholders						
strengthened						

1. Poverty reduction & Income generation

The outputs described with evidences and following the specific format explained about the achievements with respect to the targets to involve the households, production of fingerling, incomes. It came out that those who involved in the activities of DSP were largely from poor and marginal well-being categories. The actors who supported the DSP e.g. Fingerling Traders (FTs) were also from poor and marginal in well being. The project areas in Bangladesh (NW and Barind Tract regions) are areas with poverty. So, the promotion of DSP and its outcomes obtained largely meet the purpose of poverty reduction and income generation of the rural households directly through their involvement in DSP activities and also by providing supply of large size quality fingerlings useful to get increased foodfish production in grow-out by large numbers of small scale farming households in the regions.

The project areas in Nepal and the Purulia in WB in India are with presence of large number of poor people. The project tried included them to involve in DSP activities in their plots. The success whatever obtained also of help for them to meet up their needs and thus helped in poverty reduction as well.

The household survey was conducted. It was important for selection of the households and also for comparison of the baseline and end of the project outcomes (that is the impacts of the activities of the project on the households), yes the date analysed and the report has been completed and submitted on time. The impact assessment study has been conducted, the data collected, entered, checked and primary analysis has been done. The Report of the Study is also submitted along with the EOP Report.

10. Social Exclusion & Gender

The project used well-being ranking to select the poor and marginal households from the communities with ricefield plots suitable for decentralised fish seed production through involvement of both men and women members of the households. It used household based approach to ensure the participation of women and men in the training programme. In the Barind Tract region it has given emphasis to select households from indigenous Santal communities to involve in DSP production to get benefits from it. The success stories showed that both men and women farmers were significantly benefitted from the activities of DSP. It came out that in all the households involved in DSP the household fish consumption significantly improved benefiting both the men and women members of the households including children. It came out that women empowered through successful participation in DSP. The income they receive from DSP helped to take decision about the education of their children and treatments of own and other household members. In the context of Bangladesh where women in poor households with limited decision making power such improvement is of enormous importance to them.

The list of Lead Entrepreneurs provided to the actors of DSP during the End of the project workshop included many women farmers who actively took part in DSP activities and made significant level of success in fingerling production in ricefield and in seasonal ponds. In most LEs workshops along with the men LEs the women LEs participated, explained about their success and shared with others. Their presence in workshops also improved their linkages with the support providers which found to be of help for further inclusion of women of poor households in the DSP activities.

(11) Unexpected Outcomes

The extreme drought in 2010 with less availability of water even during the peak season with problems in continuation or setting up of DSP and the poor results in continuation of the activities by 2009 households (10%) found to be an unexpected outcome for Barind Tract region.

The process of slow adoption by secondary adopter of DSP due to problems in Barind Tract region and for unknown reason in the NW came out as unexpected outcomes. It is envisaged that secondary adoption needs times in which people observe, understand and then adopt. In

our upcoming projects we are planning to give lot of importance to understand about the factors that slowing or accelerating the secondary adoption in the context of large seasonal variability (drought, flooding or others).

(12) Any Other Comments explained about the major outcomes of the project achieved over the period.

The major outcomes of the project achieved over the project period confirmed about the suitability of the technologies (as indicated in Table 6). The purchased of large amounts of large size quality fingerlings from DSP by local traders from new sources really important in the context of promotion of small scale aquaculture. For example the fingerlings purchased by 130 Fingerling traders 10,104kg from DSP households that is 78kg/FT and worth of fingerling Taka 11,54,550 (8,881 Taka/FT) against a baseline of only 5 FTs showed very high potential for improvement in the markets avenue for fingerlings. Such markets development not only wills benefits the DSP households it can be of significant help to improve the business of the poor and marginal traders. Finally it is the end users the grow-out farmers those getting improve quality large size fingerlings useful for them to improve productivity of foodfish to a greater extent.

Finally the RIU-DSP project implemented with very active participation of the partners at different levels although it has been subjected to lot of challenges due to changes in the management, their time to time directions, this project brought lots of valuable lessons and opens a larger avenue in the field of quality seed production and improving livelihoods of the poor in Bangladesh, Nepal and India.

CLUSTER 3 Innovation in natural resource management

Project Title: Reducing poverty through innovation system in forestry

Lead Project Organisation: ForestAction Nepal

List of Partners: Federation of Community Forest Users Nepal (FECOFUN), Nepal Environmental Journalist (NEFEJ), Nepal Herbs and Herbal Association (NEHHPA), Department of Sociology and Anthropology (CDSA), Tribhuvan University Nepal,

Knowledge being put to use

Identify and describe all theknowledgeproducts/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

generated knowledge used:

Three major knowledge products generated from RNRRS were widely used in this project. The details of the knowledge used, lessons generated and process adopted are mentioned below:

a) Participatory forest management techniques including pro-poor and multi-product silvicultural practices, improved harvesting techniques of medicinal plants, and improved forest product utilisation (R6918, R8295).

Improved forest management bringing the efforts and meaningful participation of poor, Dalit and other disadvantaged people, degraded part of the land were cultivated with cash crops like medicinal plants, Bamboo, Amriso, Jatropha plantation, and plantation of different grass species, timber harvesting for variety of products fire management (nearly more than 700 people mobilised in Amar CFUG for making fire line, block system for ecosystem management and block allocation for poor for cultivation of NTFP, forest boundary demarcation, and boundary conflict resolved resulted illegal harvesting, plantation movement at the degraded part of the land

Varied modes of locally adaptive and contextually fits forest management indicators are developed (e.g. timber harvesting,), Lapsi seed harvesting for economic use (e.g. trained local people about making variety of Lapsi products: Lapsicandi, Lapsi pickle, at Lamatar region of Lalitpur district, Leaf plate production (Hilejuke CFUG of Baglung, and Sundari CFUG of Nawalparasi), Allo processing for making threads, Use of wild fruits like Amla, Harro

and Barro in making a popular auvedic herbal products called Triphalla at Sundari CFUG Improved forest products utilisation: Bio-briquette production by the use of invasive species at Lamatar cluster of Lalitpur district, timber use for making bee hive which ultimately contribute to household income, CFUG members started selling bee-hive to outsiders. Bee hive is prepared using hollow wood, which was used only for firewood in the beginning, and later they started such hollow wood for making bee hive which led to develop honey enterprise at CFUG level, Use of Amriso for making sweeping broom in Binai CFUG, Sundari, Mane dada, Janchetana

b) Innovative CFUG governance processes, including self-monitoring, hamlet-based planning and decision-making, joint reflections, social auditing, and improved communication strategies (R7514, R6918, R6778, R7889, R7975).

Numbers of initiatives have been started after RIU intervention in many CFUGs. Notice board at hamlet centre, and Hamlet based committee mechanism is established in more than 50 CFUGs, and such mechanism is institutionalised in more than 40 CFUGs in terms of decision making, conflict resolution, bringing voices of poor and excluded people in the policy arena. Similarly, the mechanism of community development by the establishment of thematic working committees (Forest and environmental development committee, community development committee, enterprise development committee, poverty reduction committee) has also been established in more than 30 CFUGs, and institutional development committee), mobilisation of local resource person to facilitate TWGs and hamlet committees, and executive committeetwo years strategies plan and 10 years visioning plan are institutionalised in many instances are recognised in government local institutions like VDCs, local forest offices, structural arrangement for bringing women in vital positions of CFUgs, networking and collaboration with the provision of district advocacy officer led to contribute to handover the government owned forest to the communities (five CFUGs which were waiting to get approval from the District forest office as community forest, were handed over due to intensive engagement of DAO in the negotiation), Tole assemblies are frequently held in most of the CFUGs, inclusive committee formation, knowledge on OP and CFUGs constitution has significantly (more than 70%) increased, provision of social auditing and change of monopolistic leadership(Pallopakha CFUG, Goldada CFUG, TalloPatle CFUG), time for meeting and discussions have been fixed in most of the CFUGs, which lead to increase the participation of women, Dalit and other members beyond the executive committee, and hence improve the group governance in each CFUG, reward and punishment system has been established in most of the CFUGs. Inclusive CFUG committee due to provision of hamlet committee, and ultimately elected CFUG committee have been formed, provision and mobilisation of tole representatives, and LRPs led to improve communication between executive committee of the CFUG and users,

c) Adaptive collaborative processes focussing on multi-stakeholder policy analysis and learning to facilitate policy reform (based on R8101, and Adaptive Collaborative Management approaches supported by International Development Research Center [IDRC] and Centre for International Forestry Research [CIFOR]).

Formation of CFUGs cluster level networking (14 in number) to enhance collaboration between and among the CFUGs and out-scaling of best practices among and outside of RIU CFUGs. Numbers of issue based discussions were held to collect local issues and to discuss with local and district level

stakeholders. A value chain analysis was completed in an interactive way, and identified the key commercial forest products to establish community based micro enterprises at the local level. Because of the collaborative culture of working, and involvement of federation of entrepreneurs in the project, the value and potential market of the key products was also taught to the users, which makes them to initiate the micro enterprises e.g. Timer enterprise at the Nawalparasi district (government already approved the licence to launch the timber enterprise in Amar CFUG of Nawalparasi). The CFUG people also feel secured about how to find national and international market and value of the potential non-timber forest products because of the partnership of RIU project with NEHHPA. Most of the cases, the representative from NEHHPA went to the field and educate orient CFUG member about the market linkage of the forest product. NEHHPA is itself the federation of profitable organisation, and thus guaranteed the market if the user maintain the quality of the product.

Non RNRRS generated knowledge used:

Concept of micro-institutions connecting with different theme: Five thematic working committees(*Forest and environmental development committee, community development committee, enterprise development committee, poverty reduction committee*)were formed in almost 60 CFUGs in order to speeding up the CFUGs development activities.

Payment of Environmental Services (PES) principle introduced in the potential CFUGs: community forest users started selling environmental services like water, eco-tourism, users learned to use rain water, made pond to harvest water and has started fish farming.

Economic innovation: practices of horticulture: orange plantation in large scale after RIU intervention (RIU team facilitate to make long term and short term planning, and based on these locally developed plan, the community people started to plant citrus species like Orange, lemon when they know that there is a potential market for these products.

Agroforestry practices have been enhanced, use of waste land as agroforestry (most of these practices have started in Baglung district) Equity in forest product distribution: allocation of separate land for the poor, at least 35% of the CFUG fund allocated for the poor

Project Outputs

Project Outputs	Status of achievement	Deviations if any, and reasons for the deviation
Effective use of forest management		
innovation by beneficiary CFUGs		

a) At least 30% of poor users and women within CFUGs are aware of resource stock and sustainable harvest levels.	(Since we put poor and disadvantaged people at the center of the project, had had several intervention targeting to poor people. Our data system said, we successfully reached 40% poor and 53% women users while working with 60 CFUGs . For example while conducting CF management and governance training, we included a total of 40% Dalit and disadvantaged people, and a total of 53% women of the total reach by this activity 2300 people.	
b) Locally appropriate ecosystem health indicators identified and CFUG level institutional mechanisms developed and documented to carry out periodic assessments along with proper recording	-Prepared and institutionalised 60 CFUG's two years strategic plan and 10 years visioning plan on forest management in relation to enhance the current prescription levels for potential forest products like Timber, fire-wood, and grass.	
 c) Silvicultural practices adjusted to favour the regeneration and growth of prioritized species d) Current prescription levels revised and adjusted to allow the potential sustainable yields. 	Since, we trained 2300 CFUG members on sustainable forest management and good forest governance, In addition to this, we reached to almost 8000 people through other cluster level activities which contribute to enhance capacity of forest dependent communities	
e) Forest products utilization levels in community forests increase in at least 80% of the CFUGs for both timber and non-timber forest products.	While working with 60 CFUGs, we noticed that more than 80% of the total CFUG we worked had started sustainable utilisation practices in a pathways of establishing micro-enterprises (e.g. Timber enterprise in Nawalparasi, Plant production necessaries in most of the CFUGs, grass enterprises)	
Effective use of governance innovations (visioning, tole based planning and decision- making, and self-monitoring) by beneficiary CFUGs	 -60 CFUGs governance workshops were conducted with 2300 people trained. -Prepared and institutionalised 60 CFUG's two years strategic plan and 10 years visioning plan on forest management. 	

 a) At least 500 SEG households receiving membership in the CFUGs. b) Increased representation and strengthened voice of SEG members in CFUG committee 	Total included HH in CFUGs during the RIU project period were 2558, of them 800 belonging to SEG households (RIU Field report) By the means of thematic committees, and Hamlet committee, number of SEG member got an opportunity to raise their concern and which is forwarded by LRP to the forest user committee. The institutional provision, and training on governance enhanced the opportunities for poor.	
 c) All of the 60 beneficiary CFUGs adopt tole based mechanisms for planning, implementation and monitoring of CFUG d) SEGs inside the CFUGS are aware of fundamental and legal rights and duties of being forest users e) CFUG membership extended to woman members of the household 	Almost all SEG in the group got opportunity to take part in RIU activities, and hence become aware about their right, and responsibility The provision of default membership: when a member of a HH say male become a CFUG member, women automatically become the member of that CFUG and has say in decision making and vice versa.	
40 out of the 60 CFUGs devise and implement different prices for forest products for users of different social categories.		
Adoption of planning and self-monitoring processes in enterprise development and marketing of forest products and services by		

CFUGs		
 a) Completion of value chain analysis of five key commercial forest products. 	-Value chain analysis was conducted and identified 9 key commercial species (Lemmon grass, Pipla, Kurilo, Amala, Churie, Babmoo, Lapsi , Harro and Barro)including other co-benefits like	
 b) Options for enterprises and products identified in three sites 	eco-tourism development, timber enterprise, report prepared, prioritised species identified, and market possibilities were explored.	
c) Enterprise planning workshop to sensitise CFUGs on the need to adopt holistic, enterprise based marketing of forest	-Enterprise planning and development workshops in each of the four clusters were conducted Four enterprise development workshops were conducted	
products and services	-Of the four thematic committees formed at group level, a committee on enterprise development is formed in each of the 60	
d) Collaborative mechanism set up by CFUGs and communication and sharing increased among the CFUGs on enterprise related	-Several enterprises are set up e.g. eco-tourism and Bio-briquette.	
matters	Lapsi product in Lalitpur, and Timber enterprise in Nawalparasi. CFUG members are trained to improve their skills on negotiation,	
e) Access to information and skills increased of CFUGs, individually or collectively, to negotiate their stakes with business groups, especially the traders and buyers downstream the value chain	and communication. Community based Resource Centre (CBRC)established in three districts, and these CBRC become information sharing plate form of the CFUG members -Emerging issues related to benefits sharing, national policy change and other conflict related with enterprise development are addressed through collaborative mechanism such as issue based	
 f) Increase in CFUG revenue from the sale of timber and non-timber forest products through effective linkages with business 	discussion, establishing cluster level networks, and orientation to them in relation to establish micro-enterprises, district stakeholders workshop and outside experts,	

 service providers and buyers g) CFUGs are aware of potential technologies and for value addition on key forest products (timber and non-timber) 	 Policy gaps (lack of clear policy on establishment of forests sector enterprises), were circulated with wider audience after conducting assessment with community members through discussion papers, seminars, and a number of interaction, Two years strategies plan developed in 60 CFUGs enterprise development matching the local needs and availability of raw, three enterprises were initiated. Local practices such as hollow wood use for bee hive, use of forest leaf (Sal tree) in making plate, value adding on existing forest products got started. Communities became aware of existing resources and their values, thus were able to claim profitable negotiation (e.g. A CFUG in Lamater region of Lalitpur started negotiation with a resort established near by the forest and using water from the CF catchment, and finally agreed to give 5000NRS per month to the CFUG for the use of water). 	
CFUGs are aware of the values of		
environmental services and agree to set up a mechanism for periodicating for payment of		
services used by the downstream users		
Service providers and collaborators of CFUGs	-Innovative and a very good working and collaborative relationship	
employ more adaptive and collaborative	was established after RIU intervention in between CFUGs leaders	
approaches to CF and become more	and DFO staffs (Ranger, Forest Officers), In most of the cases a	
responsive to the demands and concerns of	new types of collaboration (better relationship of working in joint	
forest users, including women and other SEGs	venture) was developed between RIU team members and DFO	
a) Changes in perception of CFUGs-DFO	staffs to work with CFUGs (e.g. in making model constitution in	
relations	two CFUGs of Lamatar region), Coordination between local level	

b) District and Local level FECOFUN	FECOFUN and district level FECOFUN become more reflexive	
(Village/Range Post/Municipality level)	responding to the needs and values of each others,	
where appropriate) become more active	-Several deliberations with state actors on emerging issues from	
and responsive to the needs and concerns	the RIU team have led to reconfiguration of challenges and	
of member CFUGs, resulting in greater	solutions, thereby leading to responsive solutions to local	
reflection of CFUGs' voice in the district	communities. Local communities also perceive the joint exercise of	
level discourses/movements on forest	state/non-state actors highly legitimate and responsive. Such	
governance	positive change in attitudes, support, relation, communication of	
c) CFUGs networks capable of	District Forest Office (DFO).	
negotiating/resisting extra-legal control	-RIU professional staffs developed a curriculum on "leadership and	
over CFUGs' rights and authority.	development" and then based on the developed curriculum, the	
	team organised a three days long interactive workshop targeting to	
	the District FECOFUN members, which lead to develop their	
a) CFUG-local government links strengthened	bargaining power, leadership and negotiation skills, which	
(for example joint plan of development	ultimately helped them to negotiate with DFO staffs and other	
activities in the area)	service providers and which we consider a milestone in	
	institutional development of forest users.	
e) Agenda of institutionalising non-	-While working with RIU team representing FECOFUN, two (a	
governmental technical service delivery	women, and a man from the so called Dalit community) of the four	
mechanisms promoted through media and	District Advocacy Officers (DAO) were elected as central members	
central FEOCFUN advocacy activities	of FECOFUN. These DAO experience with RIU in terms of capturing	
	local complexities and innovations along with their advocacy skills	
	can be expected to leverage more responsive solutions to the	
f) Coordination and communication	demand and concern of forest users including women and other	
mechanisms strengthened at Village	Socially Excluded group (SEG). Local chapters of FECOFUN have	
Development Committee, Range Post and	demanded more responsiveness towards their concern from the	
District levels (between CFUGs, local NGOs,	district chapters, necessitating the district chapter to be more	
VDCs, Range Post)	responsive towards their needs,	
	-CFUGs have approached several local government, non-	
	government agencies for possible support and joint activities	

	(Community Based Resource Center set by RIU as knowledge center has been contracted by the VDC to prepare the Lalitpur VDC profile, VDC allocate a budget with sum 50,00 in the name of CBRC, different kind support e.g. printing papers and other stationary). -Cluster and issue-based discussions have identified both prior and common issues of CFUGs and prepared their common strategy(e.g. national protest planning by 15 CFUGs in local groups). -	
Innovation systems approach (integrating		
collaborative learning and knowledge		
management) strengthened and		
institutionalised by community forestry	Three communities Based Resource Center (CBRC) have been	
a) Mechanisms in place to inform CFUGs, their networks and other locally based	established in three project districts which works as knowledge management plateform. The CBRCs are equipped with computer	
stakeholders about emerging issues and	photocopy machine and other communicative equipment. CEUGs	
opportunities around forest management	information is fed into the computer system in each CBRCs.	
and marketing	Local sharing practices initiated by RIU such as cluster level	
b) Increased media coverage of local forest	network, district level network can be expected to raise emerging	
governance issues, especially by locally	local issues, and seek responsive solution through these practices.	
based FM radio	Out-scaling mechanism through Community Based Radio Stations,	
c) CFUGs give attention to acquiring new	and National TV channel were established which led to contribute	
knowledge, including identifying	to bring the voices of poor and SEG people into the mainstreaming.	
information needs and learning questions in		
an ongoing basis	Four discussion papers were produced during the project period,	
d) Mechanisms in place for CFUG networks	and two are under development	
and other stakeholders to store, retrieve		
and avail locally relevant data, documents.	Lessons generated through RIU were presented in national (4) and	
e) Mechanisms in place for continued	international conferences (5)	
communication and collaboration among		
research and practice oriented stakeholders		

 of community forestry, including the five project collaborators themselves, for promoting pro-poor and contextually grounded innovations systems in forest governance f) Policy discussion papers produced and widely circulated (at least one issue paper around each of the five project outputs) Lessons from the project synthesized and shared with academic institutions for possible inclusion in the curriculum 		
Social change, cultural change	RIU intervention at community level have contributed to change people's attitude about untouchability, caste and gender based discrimination, increased women participation in meetings, workshops	
Diffusion effect	The capacity of RIU intervention in the community have led for further call and demand of similar intervention in different sector and sites. The diffusion effect particularly become functional due to CFUG network and CFUGs federation	

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

1. Selection and recruitment of Local Resource Person (LRPs) and training for them with designed curriculum:

A total of 60 LRPs one from each CFUGs were selected in consultation with CFUG leaders, and then they were invited for four days long training held in Kathmandu at the early stage of the project. The training provided facilitation and data collection skills to the LRPs based on the designed curriculum.

2. A base line survey and prepared baseline report:

The baseline report presents the detailed description of the number of CFUGs under the project, their socio-economic as well as cultural context, and description of the project locations, stock of forest products, and area and nature of forests. The report also assesses the possibility to establish forest based enterprises at CFUGs level, local knowledge about forest products use, and existing practices of use and selling of forest products at local and national market. The report also analyses the status of socially excluded people in the project districts, knowledge of general users on forest management and institutions, forest products, funding, decision making and benefits sharing systems.

3. Inception workshops in 60 CFUGs and selection of Tole(hamlet) representatives and formation of Tole committees

At the early stage of the project, numbers of inception works were conducted in order to know the opinion of CFUGs leaders about the RIU project and assess their interest to participate. Selection of facilitators was also taken place during the inception meetings.

4. CFUGs level forest management and governance training (60 in number) and two years strategic plans and 10 years visioning plan in each CFUGs was prepared together with formed five thematic working committees

Forest management and governance training is one of the most crucial parts of the project to reach to the poor and disadvantage people of the community, and for developing long and short term planning. The main objective of the workshop was to develop innovative and dynamic vision of the CFUG members in five major themes: (1) Forest and environmental conservation, (2) Institutional Development of CFUG, (3) Community Development, (4) Poverty Reduction, and (5) Enterprise Development. These trainings and work division based on the aforementioned five themes have provided an innovative space by forming five 'Thematic Working Committee (TWC)' within a CFUG. The 'forest and environmental conservation and development' TWCs in each CFUGs are responsible for the overall forest management and can provide recommendations to executive committee for present and future management challenges and directions. Thus, each of the thematic TWGs can play a crucial role in forest management of CFUGs, and capacity building of the CFUG members at the grassroots level. The training was held in all 60 CFUGs inviting at least 45 members from each CFUGs. The total CFUG members took part in the training were 2312 of them 1236 female and 1076 male. BY this training we have prepared 60 plans (two years plan and 10 years visioning plan).

5. Interaction and monitoring of CFUGs on their strategic plan through cluster level sharing workshops and issue based discussion which were organised in each cluster in every three months during the project period.

A total of 84 number of cluster level activities were held during the project period. By the means of such cluster level activities, we have collected local issues, documented them, and shared them with the district level and national level stakeholders. Number of issue based discussion were organised targeting the specific issues of the CFUGs. Cluster level sharing workshop were become crucial in terms of conflict management, issue generation, bringing the voices of poor and excluded people, capacity building of CFUG leaders.

6. Facilitation in preparing CFUGs exemplary constitutions in two CFUGs (Patle and Goldada CFUG of Lalitpur district).

The conventional approach of constitution making process was heavily dependent on forestry staffs, and participatory planning was lacking in most of the CFUGs. Therefore RIU team brought innovative ideas to develop model constitution participating people from each hamlet in the planning process, their needs were assessed through face to face interview. The model CFUG constitution included all contemporary issues like climate change and REDD, address the issue embedded with people's livelihoods including how to better use forest resources in poverty reduction, and how to make equitable distribution of benefits generated from CF. Since we developed a new kind of collaboration with government officials, and while conducting baseline research as a part of developing Model Constitution, District Forest Office (DFO) had deployed a staff to back up the RIU team. BY working with RIU team, the Ranger who was deployed for contributing to the model constitution making process, was trained and become experienced about how to make model constitution. Later the DFO office started to conduct such activities in other CFUGs of the district. They keep the copy as reference for developing the same. The model constitution had also included global agenda like REDD and climate change in their constitution which will play a vital role while making such constitution in other parts. " I highly appreciate the work of RIU team for this hard work, and I assure you that I will take this model as a process guideline of making other such constitution, said DFO of Lalitpur" in a program where we launched the Model Constitution.

7. Eco-tourism promotion workshops (4 in number) 1 in each cluster.

Based on the value-chain analysis, eco-tourism based enterprise was initiated in Lamatar cluster of Lalitpur district as Lamatar is very close to the Kathmandu city, and access with road and other basic infrastructure. Dependency of the people living near by area is not significant on the forest products such as fire-wood and grass for their daily needs, but they would like to see their forest green and beautiful. As per the interest of the people, an ecotourism development workshop was organised to orient people about the matter embedded with eco-tourism promotion such as home-stay (lodging and fooding system at home), tracking route (eco road), and how to behave with tourist (code of conduct for home stay). An action plan on eco-tourism development was prepared and then a eco-tourism management committee was formed among the key leaders of CFUGs in the region. As a part of eco-tourism promotion, People in the area are now preparing the basic needs for home-stay, making tracking route based on the action plan developed. A total of 72 people took part in the eco-tourism development trainings (2).

8. District stakeholders workshop (6) organised 2 in each project district

A total of six district level workshops were organised in all project districts in order to discuss the issues generated from cluster level activities (e.g. issue based discussions, LRPs and CFUGs leaders sharing workshop). The district level stakeholders in many issues resolved the problems raised by CFUGs leaders soon after conducting the workshop, which we tagged a milestone of research into use. District stakeholders due the RIU initiatives become more responsive towards their duties.

9. Value chain analysis

Value chain analysis was done to assess the potential medicinal herbs to establish of micro- enterprise at the community level. For conducting value chain, Value Chain Analysis training was designed and facilitated by Nepal Herbs and Herbal Production Association (NEHHPA). Three priorities area of enterprises were identified mostly were based on non- timber forest products (NTFPs). Participants were selected from individual CF who has already possessed some experience in the area of enterprise. Participants have conducted participatory resources identification, prioritization, analyzed the possible enterprise which is based on forest based resources and designed cooperative model for enterprise. Based on the five standard(e.g. resource availability, Market demand, accessibility of poor and marginalised people, people participation, interest of donors and entrepreneurs) the recommendation were made and the area of enterprise were prioritised.

10. Student thesis in RIU project sites (four Master's thesis completed)

Four students selected for Master thesis have submitted their thesis at the Central Department of Sociology and Anthropology (CDSA), and had completed their M.A. degree. They have conducted their study at the RIU sites. As CDSA is one of the RIU partner responsible for research and teaching the best practices from RIU sites to the University students. The approach contributed to out scale the best practices, and the initiatives that RIU launched at three different sites.

11. Community Based Resource Centres are established in each cluster

Three Community Based Resource Centres (CBRC), have been established in all project sites. Community-led management committees have been formed to oversee these CBRCs in each sites, and are managing day to day operation of CBRC. It is expected that these CBRCs would act as communicative platform to share, document and disseminate emerging issues and local knowledge. The CBRC of Lalitpur has already been recognised by local level government organisations like village development committee (VDC), Area range post office of Forest.

12. Radio and Television programs for out-scaling of knowledge

Three episodes of television program entitled "*Ankhijhayal*" were broadcasted from Nepal Television (National TV channel) covering RIU best practices reaching to people all over the country. The same program was also broadcasted from other TV channel (Avenues) which is also popular in Nepal. Likewise198number of Radio program (episode covering only RIU activities) have been broadcasted from different community based radio stations from three project districts media. were broadcasted.Regular radio program "*GaribiNyunicaranKaLagi Ban Karyakram*" (Forestry program for poverty reduction) has been airing in three project districtcovering local issues and innovation of projects since the start of the project. Four community F.M stations: Radio Sagarmatha in Lalitpur, Baglung F.M in Baglung and Vijaya F.M in Nawalparasi have been broadcasting radio programs in fortnightly basis. The program produced by Baglung F.M was rebroadcast through Radio Parbat near the project site of Baglung district. From November, 2008 to March 31, 2011,a total of 75episodes were broadcasted from Radio Sagarmatha, 59 episodes from Baglung FM and 64 episodes from Vijaya FM.

The F.M radio are playing the advocacy role to highlight the different forest related issues and RIU related activities going on community forestry to make new innovation system in forestry to reduce poverty. The Radio programs were focusing and given space to- i) news of events around the project sites and specific project activities; ii) interview of the members of participating CFUGs, project staff, coalition partners and stakeholders; iii) Forest related program organized by RIU coalition partner iv) Potentiality of establishing forest resources based community enterprise, iv) Concerns and voices of the women, dalit, indigenous community and marginalized groups (v) Meaningful participation of women and indigenous community in leadership and decision making process (vi) Participation and role of CFUG Executive Committee and User Group in forest management, good governance, doing well being ranking of User for equitable distribution of forest resources, meaning full participation of women, dalit and indigenous community and inclusiveness in CFUG (vi) Social, economic, development and organizational activities done by CFUG (vii) Knowledge sharing of implementation of RIU program in CFUG's (viii) Sustainable forest management and group governance in CFUG (x) Reducing poverty activities done by CFUG (xii) Including excluded group for membership of CFUG (xiii) Importance of innovation and research activities in CFUG (xiv) Impact of government decision to make amendment in community forestry provision in forest act (xv) Provision of membership in CFUG (xvi) Learning from project implementation to date.

13. Innovation and leadership training for FECOFUN district chapter members and key CFUGs leaders

One of the objectives of the project was to institutionalise the FECOFUN district chapters by developing their leadership skill together with enhancing skills on office management and organisational behaviour. For this, we have organised two such trainings one for FECOFUN Baglung members, and other for FECOFUN Nawalparasi members. This would also enable them about how to report to the central FECOFUN about the local issues, and also how to report project activities including prepare a financial report for the funding organisations (local NGOs, National NGOs). The another aim for organising such additional activities was to educate them how to continue the CFUG activities beyond the external support, how to raise local issues, and how to submit such issue to the concerned stakeholders.

14. Enterprise study tour organised

A "Study/observation tour on forest based enterprise development" was organized by Nepal Herbs and Herbal Associations Pvt. Ltd. to educate and aware Forest User Groups and FECOFUN leaders about existing practices of community-based enterprise development across Nepal. A total of 25 participants from 3 districts (Nawalparasi, Lalitpur&Baglung) took part in the study tour. Of the total, 5 were FECOFUN representatives, 16 CFUG members.

15. Refresher training on forest management and governance (Re-visit workshop) in 14 cluster with the leaders of 60 CFUGs In order to know the changes brought through RIU initiative over time in the CFUGs, the re-visit programs were organised in 14 clusters (divide 60 CFUGs of three districts into 14 cluster). The revisit workshops and data generated through this visit was very crucial in order to know social and economic changes resulted in the communities and how communalities started to work on their planning which were made during the forest management and governance training called (two years of plan and 10 years of visioning) facilitated by RIU team.

The major findings are mentioned as follow:



Figure 1. Identification, nursery production, pitting, plantation of useful species and

Table 1: Chi square values, p value and result before and after the intervention on identification, nursery production, pitting, plantation of useful species

Time	Chisquare value	P value	Result (At 5% at 5% level of significance
Before	36.429	.000	Significant
After	15.857	.001	Significant



Table 2: Chi square values, p value and result before and after the intervention on Forest protection

Time	Chisquare value	P value	Result (At 5% at 5% level of significance
Before	647	.886	Not significant
After	14.765	.002	Significant



Table 3: Chi square values, p value and result before and after the intervention on Bush clearance and silvicultural practices.

Time	Chisquare value	P value	Result (At 5% at 5% level of significance
Before	15.333	.002	Significant
After	12.056	.017	Significant

16. A Central Monitoring workshop inviting policy makers at the national level

Inviting LRPs, key CFUGs leaders, FECOFUN members from district chapters, and also from the central FECOFUNto discuss about RIU initiatives conducted at the local level held during 5-6 September, 2010. In this workshop we have also invited the key policy makers (higher level officials from Ministry of Forest and Soil Conservation, Media person, forestry experts), and presented our findings,

challenges the project had been facing at that time. LRPS, and District Advocacy Officers (DAO) had also presented their work. BY the workshop in presence of policy makers, we have realised that how local voices can be transferred into policy arena, and how it is possible to obtain immediate response from the policy makers about emerging challenges.

During the central monitoring workshop where 42 representative participants from all RIU clusters, communities expressed the need of practical exposure and sharing of the best practices and encountered challenges within these sites. These communities expressed the need to learn from each other's best practices and asked RIU facilitation to establish some exemplary innovations in these CFUGs. Sharing of exemplary CFUG constitution of Patle and Goldada CFUGs has been taken with great interest, with similar desire of other CFUGs to follow similar process in their CFUGs. Since each CFUG has their own constitution and Operational Plan (OP), and differ from other based on the socio-economic and bio-physical context. These representatives have prepared a list of activities (such as exemplary operational plan preparation, exemplary business plan for community based enterprise preparation etc.) and requested RIU to facilitate each of these activities in at least one CFUG. These representatives hoped that they could learn and disseminate from the piloted CFUGs, even if the termination of project in mid 2011 may not allow its wider expansion to each of RIU's CFUGs.

The additional activities conducted as a part of implementing the RIU activities

- 17. A central level research workshop for designing research and report writing
- 18. A report writing and data analysis workshop inviting students, researchers and staffs from the partner organisations.
- 19. RIU presentations in international conferences (8), for one presentation in Korea IUFRO conference, particl support was obtained from RIU, and rest are managed through external sources.
- 20. Regular meetings among RIU team members, with ForestAction staffs, with RIU coalition partners and with FECOFUN central members.
- 21. A women empowerment workshop held in Nawalparasi district
- 22. A Ph.D. research in RIU site without RIU funding (focusing on governance system of CFUGs, and adaptive management)

other activities than committed in the log frame and the reasons for planning such activities

Reason for making CFUGs model constitution mentioned in the activities above and not stated in log frame

Till date most of the CFUGs constitutions in Nepal are made in hurry only to fulfil the bureaucrat needs of forest hand over Thus, many CFUGs deferring in terrain, needs, economic situation etc. have same guidelines, which has obstructed identification local needs, priorities, and rule and regulation, which often create confusion about what initiative is needed at what context. Without having a ground base need documented and planned, the external support to them can function effectively. Therefore, the RIU team realised the fact embedded with the conventional approach of OP and constitutional making, and its impact, thus facilitate to prepare model CFUG's constitution in completely applying the principle of people's participation in planning and development.

Partnerships

Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

i) Partnership and collaboration are found to be more complex than initially assumed in the project, especially because different partner organizations have different capacities, different working modalities, staff motivation, and organizational hierarchies and sometimes have quite different approaches to development and innovation.

The mix of research and development adopted by RIU is new practice and at that time it was difficult to understand even by the partner organisation. One of the recurring challenges is the temptation to work in technology transfer model. For example advocacy partner wanted to conduct advocacy training without further interest on how the said training would be utilised in research, policy making and in local practice. Partnership working requires effective working relationships and communication. But individuals working procedures, individual's cultural context and organizational autonomy somewhat works in different ways. For example FECOFUN is an umbrella organisation of CFUGs with elected excutive body, and hence the national advocacy officer recruited as per the need of RIU was also an elected person. As civil society organisation, they have electoral system for selecting central members in each four years. During the mid of RIU project, the election took place and had changed the leadership at FECOFUN with sub siguent change of National Advocacy officer. This appointment of new person who was unaware about RIU, its objective, its need, and the new individual appointed for looking RIU needs re-orientation which required considerable time and effort. The then prevalent political rift within FECOFUN has led to constraint orientation between the old and new advocacy officers. Such problems also arose in district level FECOFUN too. Owning to delayed an incomplete transaction from central to district FECOFUN for condiucting RIU scheduled activities at the local level, many of the scheduled program at the local level had to be postponed or rescheduled or conducted without receiving the allocated budget. Because of this, the lead organisation has always faced severe grievances from the district chapter, LRPs, and DAO. They even did not send the report citing the reason that they would not do so until they receive the allocated budget to district chapter. This demanded several round of discussion with central and district FECOFUN to clarify the matter embedded with budget allocation which was taxing the entire project. Therefore, a key challenge identified in partnership working is managing the relationships between partners and accommodating different working styles. Sometimes lack of clarity on roles, responsibilities and leadership has also been making difficult in implementing the allocated task in timely manner. More investment of time is needed in coordinating and monitoring.

Problems of partnership working
- Need for constant follow up from the project leader and leading organizations to undertake project activities
- Limited internalization of innovation systems approach as against conventional development and advocacy approaches
- Problems of communication and power within the partner organizations sometimes create role confusion and delay in project implementation
- Difficulty in getting commitment to learning and innovations
- Limited self-initiative in undertaking tasks as per agreed roles and responsibilities.

Despite these problems and challenges resulted during the project implementation, the RIU team led by ForestAction worked hard, RIU center contributed financial support for two additional human resources at ForestAction, which helped to carry our project activities.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i).Yes, naturally we were engaged in policy makers at different events of national interest at different level. For example, RIU project leader in a consultation organised by the Ministry of Environment (MOE) play an influencial role in making the "National Adaptation Plan of Action (NAPA). RIU project leader then appointed as a focal point for NAPA at ForestAction and then invited in each consultation organised by the MOE. RIU team leader Dr. Dharam Uprety based on his experiences of working and continuous engagement with 60 CFUGs regularly keep updating and some time gave critical feedback realising the policy makers about the ground reality (e.g. role of local communities in adaptation). The MOE,

GON of Nepalbecause of our experience of working with local community, and innovative approach of working, learning, documentation and reflection of the lessons into national policy forums, RIU project leader Dr.Dharam Raj Uprety has nominated as one of the thematic group (TWG) members of Forest and Biodiversity TWG of NAPA and has been invited in several meetings, and seminars for providing necessary inputs on the NAPA draft.Dr.Uprety discussed the NAPA issues with the diverse experts of ForestAction and RIU Nepal team in order to provide scientific feedback on NAPA draft.Official of the Ministry of Environment and the Ministry of Forests and Soil Conservation have appreciated the work of ForestAction on NAPA draft (ref. e-mail from MOE),. The MOE before finalising the NAPA particularly TWG Forest and Biodiversity, send the document to ForestAction for necessary feedback. We were able to influence and successful to include the issue of poor, and marginalised people into the mainstreaming. Likewise, ForestAction was also an executive member of REDD and Climate change Cell, under the Ministry of Forest and Soil Conservation (MOFS), and being our strong research skills, we were invited while making REDD national policy including to complete REDD readiness proposal (RPP), where we gave critical feedback from both scientific and social point of view.

ii). Project team has contributed to Nepal's Readiness Preparation Proposal (R-PP) REDD (2010-2013) submitted to World Bank's FCPF programme: ForestAction Nepal is a member of REDD working Group representing NGOs of Nepal. The RPP submitted to the World Bank is now accepted (March, 2011).

ForestAction expert (Mr.Shambhu Prasad Dangal) was also a member of R-PP development core team and who also lead the component 2b " REDD Strategy Options" of R-PP.RPISF-RIU coordinator Dr.Uprety has provided valuable input the RPP development process.

RPISF-RIU coordinator Dr.Uprety also provided expert service to prepare component 4 : Design a Monitoring System" of R-PP using lessons from RIU interventions.RPISF-RIU coordinator Dr.Uprety in many times was invited in the discussion organized in relation to R-PP. Such as the issues embedded with monitoring, reporting and verification. We recommended a need of multi-stakeholders governance mechanism for monitoring and reporting, independent third party for verification. We also recommended a system for the measurement and valuation of environmental services for REDD+ cobenefits. We also defined the role of different stakeholders in MRV system (Ref. REDD MRV report, 2010). Analysis of the existing monitoring mechanism and prevalent gaps shows that we need to develop capacity for overall MRV system. This is important because MRV demands a rigorous process and needs a high level of diverse expertise. Capacity development is also important for getting national as well as international credibility Poor capacity means poor credibility and vice versa.. Capacity development is necessary for each level of implementation (from local level to national level) and also for measurement, reporting and to be ready for internal verification.

iii). Micro enterprise Development Programme (MEDEP), Project Number NEP/08/006 Sub-contract between ForestAction Nepal and the Government of Nepal entitled "Promotion of pro-poor Micro-enterprise Development in Nepal" – "Review of Forest Based Enterprise Related Policies" contract made in 9 May, 2010.

Because of our (RIU) partnership and working relationship with NEHPPA, the government has decided to select ForestAction for the study. Dr.HemantOjha who is also the advisor of RIU project lead the study, and during the study RIU team was consulted many times for the inputs.ForestAction leads the analysis of micro-enterprise policy and practice through which the lessons of RIU are being communicated to the wider stakeholders. Study submitted to the Government has contributed to making national policy in relation to establish, promote and marketing of enterprises in Nepal at different level... In contributing to prepare pro-poor enterprise policy, the RIU project has contributed to bring the evidence based knowledge which may not be as strong in case of RIU absence. It is true that ForestAction has been continuously working in making national forest sector policy in line to poor focused, but the RIU added value for making our voice strong. For example there was no HS-Code of Nepal for exporting NTFPs to third country. We as a partners of Nepal Herbs and Herbal Association 9NEHHPA), noticed such lacking in policy. We then submitted a recommendation through NEHHPA to Nepal Chambers of Commerce, which ultimately went to the concerned ministry. Now HS code for exporting edible products is in place, which is one of the milestones of RIU partnership with business organisation. We also got a conducive environment to learn about policy gaps by the RIU partnership. Similarly, there was a policy lacking to establish a community based timber enterprise. Because of our continuous engagement with all level of governance, and with policy makers, we were able to establish a community based enterprise in Nawalparasi district which now open the ways to other CFUGs to carry our such enterprise in their CF.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes? ii). Have there been any unintended changes / consequences?

i) Relationship development with development partners like DFID funded project entitled Livelihoods and forestry program (LFP), which contributed to financial incentives to the communities where we were doing RIU research. THE LFP project staffs initially observed our activities, and while they noticed that small investment resulting big outputs, then they started to collaborate in many ways: the local facilitators recruited by LFP has started to work collectively with RIU local resource person, and also back

up our field activities. We conducted value chain analysis, and based on the finding of value chain, LFP had also support to CFUGs partnering with FECOFUN to whom we were working with. Before, LFP project started partnering with FECOFUN, they were like opponent actors, but later their working relationship was significantly improved which also led contribute to LFP implement their project effectively.

- ii) Change in leadership at FECOFUN and NEHHPA (the central committee of these two organisation is formed through national election, which took place during the RIU project period has significantly affected the RIU activities at the ground level. The National Advocacy Officer recruited in RIU project was defected the FECOFUN election, which forced her to quit her job. Quiting a job of National Advocacy Officer resulted a cut off relationship between FECOFUN center and its district chapters. The newly elected member resume office after 2 months of its election, but lack experience of working and also RIU working modality. We gradually oriented him, but at the same time RIU project had over.ReconfigurationDFO/Rangepost: initially the District Forest officials (DFO) staffs did not response to RIU tem members saying they would not like NGO people. After conducting a RIU first year activities with CFUGs, they realised that RIU brought some innovative ideas, and later they started to work jointly, invited us as one of the key potential stakeholders in different meetings, and some cases (two case), the DFO staffs who actually opposed NGO modality of working were transferred to another places which result due to RIU complain to senior forestry officials about their behaviour and response with NGO staffs like us.
- iii) Leadership skill enhanced in district FECOFUN: Before conducting such training, it was very difficult to us to find more than three to four leaders show their interest of working with CFUGs. Though they were district level leaders, but we realised that they become leaders only to exercise their political will, and extend their political activities at all local level institutions. While we felt that it was necessary to trained them why they were elected as FECOFUN members, and what actually they would like to be.
- iv) We initially started working jointly inviting all coalition partners in each activities, later at the transition phase(in FECOFUN and NEHHPA), we have actually engaged in implementing the scheduled activities coordinating directly with district FECOFUN. The reasons behind this change were: general election of these two organisation resulted new leadership. In between the old and new leadership change phase, we have several scheduled field level activities, which we need to complete in time. In order to avoid any further delay, we took consent from the central leadership of these two organisations, and then started working directly with district chapters of FECOFUN, and consulted with NEHHPA as per need. NEHHPA in the mean time arranged a consultant when and where project demand.
- v) Outscaling of best practices using media by CFUGs at local level taking advantages of partnership with local community based radio program. This is completely a new test. Individually, many journalists oftenly go to talk with community people, but in RIU

partnership, with Nepal Environmental Journalists, and its connection with local level radio stations also open new avenews of collaboration for the CFUG to out-scale their best practices. CFUG members, while they conduct any program at local level inform to local radio stations in which RIU established its partnership.

- vi) District Advocacy Officers elected as FECOFUN central member, the executive central body of FECOFUN. DAO selected for RIU project, also used to be a FECOFUN district leader, but they both were looked shy in the beginning, with no motivation, lacking leading power. Because of their membership in a particular CF, they were elected as leader despite their strong interest. This means other people of the community insisted them to be a executive member of FECOFUN as they were free (jobless). Later when they selected as DAO of RIU, then they started working hard, and started participating in all RIU activities, practices of communication with CFUG leadership, and often communicated with RIU central team, and facilitate workshop etc. By the means of their continuous engagement with RIU, they feel confidence to be a central leader. And at the time of FECOFUN central election, they also file their nomination along with other candidate, and finally they won the election. Actually, RIU did not have any direct influence of their election, but they won election because of their leading power which we feel developed from RIU engagement.
- vii) RIU working CFUG (Binai CFUG of Nawalparasi nominated as an excellent CFUG of the district, and got the price worth of NRS 5000 with certificate) from District Forest Office, GON Nepal.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in forestry?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i) (1)Devolution of power to the lower units of Community Forest User Groups (CFUGs) such as hamlets can enhance groupgovernance, particularly when supplementary mechanisms of task-oriented networks (such as thematic working committees) are also devised to embolden the access and influence of the poor, women and marginalised groups. While formation of hamlet level committees to enhance group governance has been suggested by previous research (Dev et al. 2003; Malla et al 2001), these studies have not been sufficiently attentive to the processes through which the transmission of devolution at the lowest level of operationalization could enhance equitable access to democratic space, and empower local users in CFUG level deliberative processes. Our experience and evidence suggest that devolution of power at the lower units of operationalization (such as hamlets) do not necessarily lead to group governance. Most of the CFUGs in RPISF project site have the provision of hamlet level committees, and these remain idle in terms of raising forest concerns and issues. Most of the time, its position is limited to representation of democratic space that lacks its deliberative functioning. Our evidence indicates that various criteria such as allocating specific roles and responsibilities to tole committees in the form of thematic committees, instant decision-making and reflexive monitoring mechanisms at tole level, participatory selection and credibility oftole representatives, tole representatives either hold some position in or can bear certain influence in executive committee, close cyclic (tole to EC tole) communication of tole representative are essential to effective devolution at the tole level. In our experience, such mechanism have provided a sense of expansion of deliberative space to local users from forest user committee and hamlet committee, and has thus helped to widen communicative space, enhance transparency and incorporate innovative responses for conflict resolution, that in turn, hashelped to enhance group governance (see Figure 1).

(2) Participatory process, that are cyclic, reiterative and involve several reflexive platforms at different levels can challenge the status quo and lead to responsive solutions. As RPISF-RIU experience in "exemplary CFUG constitution" preparation in Goldada and Patle CFUGs of Lamatar cluster indicated, if participatory action and learning projects involve several deliberative platforms, these can help to challenge the current status quo, redistribute power mechanisms, resolute conflicts and have unified visioning of outcomes. The preparation process of "exemplary CFUG constitution" involved several deliberative discussions at several stages within and beyond community. These have led to an reiterative process of identification of issues, its causes and its potential solutions, repetitively refined in each discussions. As an example, when the facilitators inquired about putting women's name as the household head, there was uproar in the community men against it. Later, during the

discussion, the community men identified the role women play in forest conservation, and thus the credit to women in forest constitution was established by recognizing them as household head of the CFUG's constitution. Also, communities were earlier hesitant about undertaking well-being ranking for they thought that they do not necessarily want to be labelled as rich and poor (in fact, there have been fights before whenever attempts to such well-being ranking was made). When communities discussed and realized the differences in consumption pattern of rich and poor, they also undertook well-being ranking. Local people themselves crafted indicators and assigned households to particular ranks (rich, medium and poor). While the challenges of participatory exclusion of women and lower caste are still valid, the experience with constitution making process, indicates that participatory process, that are reiterative and involve several deliberative platforms at different levels can challenge the status quo and lead to process-rich outcomes. Such process rich outcomes (and not only mere outcomes) are of urgent need for fostering innovations in Nepal's forestry sector.

(3)With knowledge on networking and collaboration possibilities, CFUGs can seek for and attain greater support towards sustainably financing their poverty reduction and forest development plans from local governments and organizations. Local government and several organizations at local level have varied nature of programs and services, which CFUGs can benefits from. Yet, due to CFUG's prior experience with projects where projects used to heavily cater to CFUG's needs and aspirations, communities still behold the belief that project people will come to them to solve their problems. This constrains communities' knowledge and efforts to explore avenues of networking and collaboration in areas of their need. RIU intervention has informed communities about the gap and the opportunity. As a result, CFUGs have started to discuss with colleagues, project/RIU/DoF professionals about which organization could potentially help them to solve the specific needs. As an example, many of the CFUGs in RIU sites, after RIU intervention, have approached to local governments and organizations for support to already initiated or to initiate new activities. This was a BinaiBagar of Nawalparasi, has networked with HEIFER program and received 97 cows for milk production, with insurance cover both to the cow and the cow-owner (women). Likewise, many CFUGs in Baglung have consulted with District Development Committee and in turn, received environmental funds. The expansion of such networking possibilities can be expected to sustain the good practices and enhance communities capacity building, even after the project terminates.

(4) Monitoring of CFUGs at cluster level, maintained through "cluster networks of CFUGs" can lead to collective sharing and learning of best practices, while also solidifying diverse strategies to address common challenges. Such monitoring system is maintained through sharing of individual CFUGs' actions, lessons, best practices and encountered challenges with other CFUGs, with opportunity for questions and suggestions. This has led to identification of key local issues of CFUGs in these clusters as

well as their preparedness and plans for compelling strategy towards the identified issues. Also addressed were dimensions about community planning, prioritising the plan, development of accountability and sense of ownership. As an example, when the president of Jyotikunj CFUG narrated his troubles is gaining group collaboration for farming of non-timber forest products, other members of CFUG suggested him to rethink about his initiative and questioned whether the group has other alternatives in mind than that of non-timber forest products. Such exchange of issues and responsiveness has led clusters as unique mechanisms for CFUG leaders to convene, interact, network and collaborate with many of the CFUGs around them. Our experience also indicates that instead of 15 CFUGs' cluster, a cluster of 4-5 nearby located CFUGs with similar concerns can be of great advantage to facilitate identification of issues as well as in taking common solutions. After the proposed amendment to Forest Act (1993) that resulted prohibition of extraction of timber in 15 CFUGs in Nawalparasi district, these CFUGs have repetitively discussed about the effect of the proposed Act on their livelihoods and had called for a joint action. They have even prepared a note of dissent and handed it over to the district forest officer of Nawalparasi. While the decision is yet lingering, also due to political uncertainty at national level, these examples indicate the unique ways through which cluster networks can be effective to unify local communities and consolidate their learning and joint actions.

(5) Local communities envision Community Forestry as a platform for holistic development, not only limited to basic fulfilment of forest products, thus necessitating massive reconceptualization of the linkages amidst forestry, poverty, and development. CFUGs' 10 year-visioning plan with wide range of indicators from non-timber forest plantation to provision of health services to capacity building activities to transformation in existing governance processes indicate the immense link amidst several facets of poverty that these communities face, viz. in education, health, road connection, treatment to special people such as single mothers, disabled people, elite control, lack of skills etc. (see Annex 1). Thus, in the context of Community Forestry, the issue of poverty and livelihood is not only related with forest products or increased income per se, but also with holistic upgradement in all related indicators. Thus, communities perceive Community Forestry as a platform that interlinks all these important aspects of human development, and links various aspects surpassing the common forest products. In the present context, Community Forestry is still dealt as a few (e.g. timber, firewood, fodder) "forest products" regime by both state forest officials and many of the I/NGOs. On one hand, there is significant dissonance about wider local needs that communities want to derive from community forestry and the operational plans of CFUGs that prescribe the activities that can be conducted within Community Forestry to achieve the needs. On the other hand, the discourse of Protection/overuse is still dominant in the CF program, and in entire forestry regime, due to which sustainable harvesting forest resources is either lacking or poorly constraint. Due to the overly constrained focus on forest protection and orientation to few specific forest products only, community forest user groups can not in full fledge exercise and extract the potential that

they wish to avail from Community Forestry. Instead of having a single approach and purpose to manage CF (protection, management and use of forest product only), context specific analysis needs to be done to define, explore and prioritize subsistence, entrepreneurial and development function of CFUGs. Thus, poverty reduction and livelihoods enhancement practices in community forestry can sustain only if Community Forestry policies and programs allow enough spaces to anchor diverse needs of community, surpassing its current focus on few products extraction and forest conservation. Future research should thus deconstruct the single focus Community Forestry towards holistically development of forests for wider benefits to communities.

(6) Systems of relationships between CFUGs and other actors are more important than within the CFUGs for governance and poverty reduction in Community Forestry, requiring connection to upper layers of market, policy channel etc.. With increasing expansion of Community forestry to business entrepreneurship, local communities themselves are not in a position to solve all the local problems. With dynamic changes undergoing at CF, several actor's role, influence and importance can change, that can requires continuous reconfiguration of actors and working with them. To respond with such dynamic context, many of the local problems need to be mediated by wider networks (beyond local actors) and national policy and market. This can require experimenting new modes of cooperation and networks to address rapidly changing forest governing strategies in Nepal.

(7) Multi-stakeholder platforms that provide joint learning and interactions possibilities among stakeholders can lead to win-win deliberative decisions only if certain parameters are well incorporated while designing such platforms. Multistakeholder platforms in decentralized settings are characterised by tensions to assert their spaces, roles, claims and power positions, operating from local to national scales. Also, the extent to which multi-stakeholder platforms can bring in both deliberative positioning (e.g. saying that stakeholders are ready to do things) to decisions (e.g. conformity to actions) at different scales (viz. local, district, national), considerably varies. As an example, multi-stakeholder platforms with local communities require more informal, face-to-face environments for deliberation, whereas, at district level with political representatives, a formal type of program with dignified leaders and agency would better facilitate deliberation. The success of multi-stakeholder platforms depend on the nature of programs (formal/informal), objective of the program (whether the objective indicate the space for all stakeholders to benefit?), familiarity about diverse role, spaces and negotiation techniques of stakeholders, skill and agency of the facilitator team, maintaining "good-will" relationships amidst multi-stakeholders before bringing them to platforms, legitimacy of the facilitator (neutral and not having any side on the team). (8) Research processes that allow knowledge to emerge out of interaction, dialogue and validation amidst various actors (e.g. local people, development agents, extensionists, and researchers) can trigger and facilitate equitable negotiation of rules and practices. Such joint dialogue and interaction with concerned actors can not only indicate competing interests, conflicting allegiances and incomplete knowledge, but also provide avenues for common venture. In project sites, the project team has used reflexive and reiterative methods to capture critical dimensions of local issues and practices of management and governance. As an example, research team gains a prior understanding of existing local asymmetries and critical issues at individual CFUGs. Based on this understanding, "issue-based discussion" at cluster level is set up where the critical issues are discussed and validated with local users' reflection. The outcomes of these cluster-level meetings are then shared with districtlevel stakeholders (such as District Forest Office, district-level FECOFUN etc.) while also calling for joint action to solve issues, if any. This has helped to produce reflective, evidence-based, and issue-based research insights, which at times, has been used to increase the responsiveness of the concerned stakeholders in various ways. As an example, at a district-level stakeholder meeting, RPISF team has indicated the exclusion of socially excluded people in the recently revised constitution of a CFUG in our research site. These lead district stakeholders to respond promptly to the issue, eventually leading to the inclusion of the earlier excluded households into the forest user group. Further, this example also indicates that despite having the mandated roles and responsibilities of district level stakeholders, and the capability to do so, service-positioning seemed to be rather weak. Thus, reflective, reiterative methods when well-network with concerned stakeholders at different levels of research, can better capture several innovative processes as well as challenges from multiple perspectives, giving room to investigate the multi-faceted issues, not only limiting to "one-sided measures", judgment and conclusions.

(9) Though the democratic space and devolved rights to community forest user groups are often reported as instrumental benchmarks for economic innovation,, our experience suggests that democratic space and devolved rights do not automatically lead to economic innovation in community forest user groups. Our reflection indicates that community forest user groups, despite their motivation and preparedness, do not have autonomy for economic innovation. The state still controls the ideas and decisions concerning economic innovation in community forest user groups. Moreover, our reflection also indicates the likelihood of increased bureaucratic pressures from the state, when an opportunity for economic innovation exists. Thus, for community forest user groups the hurdles to economic innovation is manifold.Firstly, community forest user groups do not have sufficient right and power to exercise economic innovation due to control by the state. Secondly, even after an enterprise is set up, continual of bureaucratic control over the functioning and benefit sharing can not be expected to lead to equitable economic benefits. Such mechanisms can ruin the previously functioning equitable mechanisms and good

governance practices in community forest user groups. Further analysis in this direction should focus on understanding the bureaucratic tussle between the state and community forest user groups in the context of economic innovation. Such an analysis can also help to better understand and devise the mechanisms to foster economic innovation within community forest user groups.

(10) Mix of both internal and external facilitation is required to establish trust and initiate project activities on a positive note. While the internal facilitator may be well aware about local hierarchy, context and problems at times, he or she may be in constraining position to infiltrate those discriminating hierarchies. I those situation external facilitator can get apriory information about local situation, needs, social dynamics which is required to breakthrough the inequility, social discrimination, conservative cultural practices.

(11)In cases where project approach allows greater flexibility to address local needs, even if not related with the project's immediate objectives, are found helpful to speed up local innovations by responding to the immediate problems. Thus, instead of a strict, mandated, apriorly-fixed method, flexible methods can bring best solutions.

(12) Transaction costs will be important issues in sharing the costs/benefits from enterprises along with in Community Forestry. Poor, less educated can not have proper knowledge, education as demanded by the enterprises to run successfully e.g. accounting system, access to markets, education, nor the poor will have time to get engaged into the design phase, due to their own involvement in livelihood activities. A poor can fetch around Rs. 150 per day from labour work in Lamatar. How can they spend 1 day workshop organized by RIU or other organizations discussing about feasibility of enterprises? While almost all of such decentralized programs have targeted subsidy e.g. equitable price of forest product to poor, poor contributing free labour in lieu of free access to forest products etc., such subsidy package do not seem fruitful to induce poor's participation. Instead, creation of jobs and employing the local poor as the employee in various activities such as harvesting of forest products etc. can be helpful to induce their participation.

(13) Improvising relations between state, non-state actors and CFUG can add to increased accountability and responsiveness that in turn, can lead to common grounds for identifying conflicts and solutions. For "exemplary CFUG constitution" preparation in Goldada and Patle CFUGs of Lamatar cluster, ForestAction collaborated closely with Department of Forest, Lalitpur. This began with a meeting with Department of forest and its sfaff before starting the constitution making process, explaining the philosophy and rationale of RPISF-RIU along with the need of the preparing "exemplary CFUG constitution" by indicating several loopholes in the existing constitution. Department of Forest, Lalitpur has responded to collaborate and as a

result, Forest Ranger Mr. XX Baral of Sisneri Range Post, started to collaborate with RPISF-RIU team. Local users of the Patel and Goldada CFUG perceived the mix of state and non-state work as credible, responsive and accountable. Local CFUG perceived that with state's involvement, the newly crafted constitution will also earn a legitimate stand and CFUG can always turn to state forest agencies to seek for help, even after the project period. Forest Ranger, Mr.Baral, during district stakeholder meeting at Lalitpur, held on XX September, 2010 stated, "local people still hesitate to go to District Forest Office, for some kind of unknown fear or distantiation and even if Department of Forest alone facilitates any program for local people, local people are afraid to attend. When they feel such distantiation, how well can you expect that they come and open their hearts out about the issues in forest conservation. However, if the program is jointly organized with civil society like ForestAction or any other collaborators, people feel secure and participate and often claim ownership on the program. With state's involvement with non-state actors, CFUG's have also overcome their distantiation and started seeking help of Department of Forest, in times of need". While these indicate that existing organizations (such as state, NGOs, CSOs, etc.) should be involved and capitalized based on their experiences, future research need to understand how such relationship innovation with positive synergy can be created without discriminatory power positions and ultimately benefitting the communities.

(14) There exists enormous potential to develop community entrepreneurship through the use of both forestry and nonforestry products. Since high value forestry products such as timber entrepreneurship involves lengthy policy and bureaucratic hassles, communities need to be tailored to inform about the potential to use alternative forest products such as grass/fooder plantation leading to Dairy enterprise (e.g. BinaiBagar CFUG, Nawalparasi). Also, the definition of forest products is too narrow encompassing only conventional forestry products such as timber, fuelwood etc. The recognition and inclusion of unconventional products generated through forestry viz. eco-tourism, inter-cropping of species, broom grass plantation, enrichment of water quality etc. lacks in current forest policies and practice. Eco-tourism can be a forestry product as well and can generate substantive income to communities. As an example, the study tour on enterprises indicated that Jamun Bari CF located in Jhapa district earns upto NRs. 90,000 per day through promoting eco-tourism with proper management of Community Forestry.

(15) Public-private sector joint efforts, with common vision, can lay foundation for initiation of enterprise and business systems. One of our consortium members- NEHHPA, has provided strategic directions on possibilities and challenges of enterprenuerships in the sites by exploring and capitalizing business innovations. Public-private venture was also helpful to create business mechanisms profitable, and also making business just to the poor.

(16) Innovations in forest management and livelihoods are to a significant degree influenced by the extent of communicative linkages amidst local communities and with wider world (Thompson and Scoopes 2005), especially in areas that are being increasingly integrated with the markets and also where physical infrastructure for communication have developed. The project is testing a "Community Based Resource Centre" (CBRC) model to strengthen communication among local communities and between local communities and the wider world. Experience to date has shown that such facilities can provide an innovative platform of communication and interaction of local communities within the community and to national and international societies by reducing the existing knowledge gap and divide that exists amidst them. In our project sites (at Lamatar and Kusmisera), local people have shown keen interest and took enthusiastic measures to create and maintain such a knowledge platform. Our project sites can thus be considered as moving away from the situation of differential access to and use of knowledge which has often been reported to induce one-sided perspective of development, towards enhancing the flow of information to and from the local communities. It is now common understanding that much of the previous research on development, particularly the ineffectiveness of "technology transfer" approach stems due to the failure to exercise a common platform between research scientists and local people at research sites. While CBRC can be thought of as an innovative communicative platform for knowledge sharing, institutionalization of CBRC by variety of local actors is essential to sustain it in the long run. As an example, Village Development Committee of Lalitpur has contracted CBRC to prepare village development profile. While local initiatives have been started, the extent to which CBRCt can develop as a new paradigm of information exchange is yet to be explored. Future analysis in this direction can reveal the dimensions and challenges associated with the proper use of CBRC as a communicative platform.

(17) Partnership and collaboration are found to be more complex than initially assumed in the project, especially because different partner organizations have different capacities, different working modalities, staff motivation, and organizational hierarchies and sometimes, have quite different approaches to development and innovation. Our experience indicates that despite having similar political will, motivation and common synergy to work for the collective benefit of local forest users in the innovation process by multiple partners, partnerships and collaboration do not tend to function as initially expected. As an example, one of the partner organization, which at national and international level, is lauded for their work in representing and augmenting the voice of community forest user groups, was found to have its own internal governance problems of networking, communication and accountability. Thus, RPISF projectl has to devise several mechanisms and spend considerable time and effort to address such unforeseen challenges in seemingly participatory organizations. A series of other measures, such as in-house workshops, sharing of organizational culture, modality of each organization etc. has helped to gain the momentum and relationship amidst the partners. Approaching individual, small groups or chiefs are used when partners's

organization are not found that effective. Also, organizational help was sought for when individuals within organizations did not collaborate the way, they were supposed to. Further analysis to decipher of the associated complexity in the pluralistic context of collaboration, the internal governing mechanisms of various partners involved in participation process can help to devise novel mechanisms and joint actions in community forest management for democracy and deliberation.

(18) While disparity between development and research-based innovation projects exist, mainly in terms of providing immediate economical benefits to local people at research sites (considering the poverty-ridden CFs at research sites), engagement in research-oriented innovation processes can be successful if it can provide instant, reflective feedback, while also enhancing the quality of research findings through iterative validation of research process and synthesis. Such a reflexive and deliberative approach should consider local people as crucial partners/drivers in the research process, and not just mere respondents or recipients. With their increased participation in research and validation of research findings, local people can benefit from and appreciate the learning based approach to innovation and development. As an example, local people that were first reluctant about the RPISF project have started to actively participate after they started to benefit from various lessons learnt during the research process. While this approach is challenging and taxing, this can still be undertaken with proper training, attitude and orientation.

(19) Nepal, being a highly unequal and stratified society in terms of economic positioning, gender and caste/ethnicity, there is a continuing challenge of tackling with the discriminating factors (such as caste-based discrimination, gender-based discrimination, modes of new elites within novel democratic spaces) that can revert, nullify or decelerate the innovative mechanisms. Various mechanisms such as ensuring inclusive representation of people from all strata at all stages of project trainings/workshops, building good social relationship by the project teamas well as demonstration of individual project members' commitment against discriminating factors, have been proved productive to counter-act the discriminating factors. While such a commitment signals to the positioning and approach of RPISF against discrimination and social change, the future direction of research can focus on how local people perceive the system of discrimination and its potential impacts on community forest management and governance, and also on how and to what extent an external input from critical social scientists and activists is accessible to the local communities. Of interest is to understand the interface between activists and local leaders, and also the interaction between external, social scientific analysis and the local and practical ways of knowing the world. Further, an in-depth analysis of factors, mechanisms and structures at both formal and informal processes is necessary to understand the space and scope of deliberative resistance and movement. Such analysis can broaden our perspective on understanding the process of change required for deliberation in democratic space like community forest user

groups.

(20) Networks established at local and district levels can enhance novel opportunities for learning, collaboration and conflict, requiring continuous rehearsal, networking and deliberation amidst various stakeholders.

- i. These lessons have been shared with local communities, diverse stakeholders, academicians at national and international levels. During the revisit workshop, draft of lessons extracted till date was shared with communities, with possibilities for communities to accept, negate and modify the lessons. Local communities have called the exercise as the "Mirror" exercise where communities relate the lessons to their actions, challenges and outcomes. Likewise, the lessons were also shared within the project consortium team, including the district chapters of FECOFUN. The lessons have indicated the need for district FECOFUN chapters to be more responsive to communities' demand, which in turn, required further assistance and training to district FECOFUN members by the ForestAction team. Also, the lessons were shared through issue-based, cluster and district stakeholder workshops to various stakeholders from local and district government, Go/NGOs etc. At national and international level, RIU lessons have been disseminated through reflection reports of RIU events and discussion papers. A number of peer-reviewed papers, presentation and posters have been disseminated to wider international audience by the RIU team as well.
- ii) (1) Our envisioning of Local Resource Persons (LRP) as change agents for CFUGs have not been effective as expected. While previous RNRRS project have highlighted the potential role of LRP as change agent, our experience and evidence indicates that various factors have hampered LRP effectiveness. As an example, LRPs are mobilised with a minimal amount of salary (Rs. 500 per month) from RIU due to which LRPs have been tempting to look for other lucrative positions whenever possible. Also, positioning of LRPs as a new structure to the existing CFUG process required some kind of institutionalization, which RIU could not provide for. While RIU thought of LRPs as a mediating loop, lack of their institutionalization within EC or any other comittees as an accountable loop has rendered their positioning as "project driven" loop, which at times was not wanted by the communities. However, when executive members themselves acted as LRPs, they gained institutional legitimacy and could also influence the decisions that enhanced their effectiveness as well. Our experience indicates that instead of nominating LRPs, linking of thematic committee with executive committee and hamlet level committee have been instrumental in enhancing CFUG planning and preparedness towards governance and poverty reduction.

(2) Enrooting of gender and caste based discrimination had mixed results. In some cases, as in Baglung where stringent hierarchy on gender and caste was profound, breakthrough changes were noticed. As an example, CFUGs in Baglung came up with their plans and actions on single women, safe motherhood schemes, joint eating of the so-called upper and lower castes

during forest meeting, assemblies. In other cases, while structural spaces to include women and lower castes have been set up by increasing their numbers in decision-making spaces, enhancing these groups' influence in decisions would require additional capacity-building mechanisms, for which RIU did not have additional funds. Also, due to high transaction cost of participation of the poor in community forestry workshops and meetings (that do not pay any daily allowance), number of their participation in cluster and district level sharing is rather limited.

iii) The current tendency in development field to upscale products and not knowledge is one of the very challenges we faced. Most of the times, organizations were satisfied to promote forest products, while the essence of lessons through which such forest products were created was not deemed important while upscaling. Thus, even LRP reports lack the knowledge through which such lessons could have been achieved. RIU team has to talk to LRP, executive committee in persons and write reflection reports themselves to capture these processes and their feasibility to upscale the results.

Lack of funds to disseminate RIU related innovation and results in the international arena has remained a challenge. RIU's nature of programs, in itself, can indicate various value-add mechanisms to existing practice of both research and development. International forums, with audience and researchers from across the world, can be decisive platforms, to discuss the lessons and magnify those.

iv) RIU's mix of research and development is one of the recurring challenges that we faced. To solve such problems, current knowledge should be directed to enhance the knowledge and discourse on the related challenges and pathways of solutions associated with such mix of programs.

Techno-bureaucratic attitude of state forest officials, especially while working with RIU sites where timber governance is the major issues, has been problematic. Such attitude has been reformed through multi-stakeholder platforms and collaborative actions in RIU sites. And yet, future research can be directed to point the spaces through which democratic learning and sharing can be negotiated between state and non-state actors.

Proposed amendments to Forest Act (1993) have posed restriction on several of activities, earlier allowed in Community Forests. Many of the CFUGs wanted to develop their community forest as eco-forest with construction of small walking trails inside forest and construction of picnic spot. The proposed amendments have halted such initiation in CFUGs. Likewise, the proposed amendments also banned extraction of timber from community forests, which has also reduced CFUG's income drastically.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

		Beneficiaries		Gender	wise	SEG			
S.N	Activities							Other	Evidence Index
			Indirect						
		Direct Individual	Household						
		Beneficiaries	Beneficiaries	Female	Male	Janajati	Dalit		
	Output 1:Forest Management								
	Forest Management Workshop in								
1	60 CFUGs	1156	6939	618	538	310	167	679	Report
	Forest ManagementTraining for 60								
2	LRPs	76	60 CFUGs	25	61	20	11	45	Report
	Issue Based Discussion in three								
3	districts	159	60 CFUGs	23	136	52	13	102	Field reflection reports
			Executive						
	Orientation and sharing with		committees of 60						
4	CFUGs leader	326	CFUGs	105	221	88	20	217	Reflections report
5	Re-visit Workshop	210	60 CFUGs	71	131	44	23	135	Reports
	Output 2:Group Governance								
	Group GovernanceWorkshop in 60								
1	CFUGs	1156	6939	618	538	310	167	679	Repots
	Group GovernanceWorkshop for								
2	60 LRPs	81	60 CFUGs	25	56	21	1	59	Reports
			Executive						
	Orientation and sharing with		committees of 60						Reflection report and Minute
4	CFUGs leader	326	CFUGs	105	221	88	20	217	Record
5	Re-visits Workshop	210	60 CFUGs	71	131	44	23	135	Reports
	Output 3: Enterprise Development								
1	Value Chain Analysis in 60 CFUGs	66	60 CFUGs	22	44	17	8	41	Report

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

	Economic innovation through PES								
2	mechanism	64	3 CFUGs	21	43	15	0	49	Reflection Report
									Minute records & workshop
3	Ecotourism Related Activities	72	10 CFUGs	17	55	18	1	53	report
									Meeting minute record &
4	Bio-Briquette production Activities	93	4 CFUGs	34	59	18	6	69	training report
	MAP identification and Harvesting								
5	Training	15	15 CFUGs	4	11	3	1	10	Report
	Output 4:Stakeholder and								
	Collaboration System								
	Meeting and Sharing with								Minute records & reflection
4	Stakeholder	326	60 CFUGs	105	221	88	20	217	report
	Output 5: Innovation System								
	Support								
	Tole Level Meeting in three project								Database obtained form
1	districts	7012	60 CFUGs	3889	3123	2135	1987	3058	LRPs
2	CRBC inauguration in 3 districts	93	60 CFUGs	20	73	18	10	71	Minute record
	Media Program Preparation								
3	discussion	128	60 CFUGs	32	96	27	7	93	Database record
	Data Analysis and Report Writing								
4	training	15		3	12	2	0	13	Report
5	Radio programs	2061854							
6	TV programs and talks	4 episode							
	Total	2073438		5808	5770	3318	2485	5942	

*Please provide evidence for the figures included here as a separate attachment, use this column in the table to indicate where this evidence can be found.

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparasi in

Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report

Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

- BinayBagar CFUG has started cultivation Pipla (*Piper longum*) since 2008 after RIU project start working with this group in early 2008, and the CFUG started selling Pipla worth of Nepali Rupees (NRs.) 80,000 in 2010. The group is committed and have concrete plans to produce morePipla along with other medicinal plants in their community forest. A total of 322 HH are in the CFUG which comprises of 809 male and 821 female with total population 1630.
- About 15 CFUGs have begun commercial cultivation of medicinal and aromatic plants (e.g. Goldada CFUG and Padali CFUG in Lalitpur, Sundari CFUG, and Binaibagar CFUG of Nawalparasi established plant nursery in their community forest).
- Bamboo based enterprises have begun in five CFUGs (e.g. Bambo and fiber products production at Kusmisera cluster of Baglung district).
- RIU actions have contributed to commercial production of suitable NTFPs, and medicinal and aromatic plants (e.g. Amriso (broom grass), Rubber (Rubber plant) at Sundari CFUG; Pipla (Piper longum) production at Binaybagar CFUG of Nawalparasi) (ref. value chain report, 2008).
- Engaging local people to adopt new technologies can bring in new insights and vision to initiate community based micro-enterprises at local level that can contribute to uplift the household economy. As an example, bio-briquette production started in different CFUGs using leaf and other waste generated during forest management along with use of an invasive species like *Lantana Camera* (e.g. Lamatar cluster involving four CFUGs. A Biobriquette production and marketing committee has been formed to support and monitor the enterprise. NEHHPA one of the RPISF/RIU consortium members working for business innovation has guaranteed to buy the products. A MOU regarding the purchasing guarantee has been signed between enterprise group and NEHHPA in June, 2010).
- With support from RIU CFUGs are generating regular income through PES (e.g. Patle CFUG receives @ NRs. 300 (≈ USD 5) /Tanker, by selling the drinking water to private tankers.
- Pahelibhitta CFUG of Nawalparasi has earned about NRs. 80,000 by selling of Pipla (Piper longum) in the year 2009/10, with its total annual income

out of NTFP sale is NRs. 125,000.

- Sundari CFUG in Nawalparasi district has started to sell 'Tripphala' (a digestive product widely popular in Nepal) and has established link with NEHHPA for marketing these products. The CFUG has annual income worth of NRs. 3,061,007 by selling of timber, NTFPs and membership fee. Sundari CFUG has started to build two houses per year for the ultra poor people. Till date, 6 houses (cost invested per house was NRs. 50,000) has been distributed to the poor people.
- Padali CFUG in Lalitpur district has started sellingseedlings from their nursery following the business plan facilitated to prepare by the RPISF/RIU team during CFUG planning process (Visioning Plan) in the year 2008.
- About 61,000 rural people are directly benefiting from RPISF/RIU initiatives in the three clusters under RPISF/RIU project. The base line data also contributed to analyse the change resulted overtime because of the RIU intervention. It has also contributed to know what resources are where and how to use these resources through people's participation.

The RIU impact assessment study under progress, and we are expecting assessment report soon.

Social Exclusion & Gender

 i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.
 ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

- i) We have given high priority to the women's participation in all RIU intervention like trainings, cluster level sharing, committee formation (e.g. CFUG committee, Hamlet committees, Thematic committees). Our data says that the total number of women attended in 60 trainings conducted at CFUG level were 1236, of the 2312.total participants.
- ii) The constitutional provision was made while making the model CFUG's constitution in two CFUG in Lalitpur district to ensure the maximum number of women participation in forest users committee. According to the model constitution, both male and female from a HH are consideredas the legal users and both are considered authorised member. They have a to membership fee according to HH, but both male and female have equal right in decision making. These new provisions ensure the more women participation in CFUG activities. In addition to this, almost all the CFUGs after the RIU intervention have included women in vital position (e.g. as CFUG president (4), secretary (10) or treasurer (22). Also, there is increasing incidence of registering both men's name in the forest constitution of the CFUGs.

- iii) We have also given high priority to bring the voices of poor and disadvantaged people in CFUG decision making body. The project team strongly engaged to minimise the caste and gender based discrimination which have been rooted in the Nepalese society since many years ago. As an example, many of earlier excluded groups got entry into CF. Also, earlier socially excluded groups whose voice was marginalized in Community Forestry's decision-making process, were provided various structural and procedural spaces to enhance their voice in CF benefits and decision-making. During our revisit to CFUGs and discussion with women members, women members stated that they now frequently participate in tole meetings and raise their concerns and achieve the solutions. When women get time, they also attend general assemblies. In many CFUGs, women reported that they asked for the forest constitution from the executive committee and either read it themselves or if unilliterate, had their children read for them (e.g. Shiurpata CFUG).
- iv) External facilitator such as training specialist were also guided to tackle existing gender/caste based discrimination. As an example, in SaniChaur, KotBhairav and Dhaireni CFUGs in Baglung district, external facilitator observed that so called low caste people were served food first and once they are done, they used to go outside the meeting hall so that the so called upper caste can have their food. At the end of the day, the RIU facilitator asked that he would stay that night at "x" person's home (who actually belongs to one of those lower caste people). The specialist, a so called upper caste men, with whom the communities confided in, did that on purpose to demonstrate that such caste discrimination need to put an end. On next day meeting, he even ate together with the low caste people, and even some of the young upper caste men joined him. Such indication of reflexivity through the behaviour and dynamics of external facilitators was strongly maintained throughout the project period.
- v) Ensuring women's participation in workshops/trainings have provided strategic spaces to include women's voices. In many CFUGs, women groups prepared their visioning how the CF should look alike in next 10 years with the list of services it should provide. As an example in many CFUGs in Baglung district, women envisioned CF providing health and specifically support with safe motherhood services. As a result, many of the CFUG's have allocated services to ensure safe motherhood services either by setting up free health check up schemes in villages, or through payments made to would-be mothers to receive safe delivery. Also, considering single women's concerns and workload, special provisions such as priority in revolving fund schemes and income generation activities, reduction in labour days to perform silviculture activities in forest were undertaken. In Nepal which is still considered socially caste-stringent and gender unjust, the provision of safe motherhood and special provision to single mothers through CFUGs can be taken as an indication that holistic development and unjust practices may be well tackled through the CFUG's 2 year strategic and 10 year visioning plan.
- vi) We of course use the data as reference to educate people in different sites. For example, while talking with the members of CFUG in Baglung district, we told them the best practices, and active participation of women in Lalitpur district, and also in

Nawalparasi district. vii) Because of the RIU intervention, the socially excluded group of people are included in Forest Users's Committees (e.g. out of 60 CFUGs, Dalit and ethnic minority were elected as CFUG's president (22) and secretary (28). viii)Share of women and lower castes's benefits from CF has increased. Examples, directly social excluded group reach of RIU activities were 5803 number.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

Fund raising in Goldada CFUG was one of an unexpected result occurred in a short interval after RIU intervention in the group. The CFUG committee surprised while almost all the users started to raise group funding by managing their forest resources, membership fee etc. The total sum they collected within six month of RIU intervention was NRS 60,000.

Change of CFUG leadership after 17 years after the CFUG members took part in the Forest management and governance training organised by RIU in Pallopakha CFUG of Baglung.

700 CFUG members of Vedabari CFUG of Nawalparasi went together to make fire line in their CF in March, 2011 while they noticed that fire could go into their forest from the neighbouring forest. The Vedabari CFUG before implementing RIU program was very poor in terms of activenees, governance and office system. But, after conducting Forest management and Governance training in that CF, more than 70% users started taking part in all CF activities, build theur own office, and training hall, started poor focused activities e.g. Wodden Bed distributed to poor and SEG household, medical and health support to poor HH, equity in firewood and other forest product distribution. Evaluating the performance of all CFUGs working RIU project, the said Vedabari CFUG was selected excellent among 15 CFUGs.

A women advocacy officer of RIU, who was very shy while joining the RIU team from FECOFUN, later after two years, she was elected as central member of FECOFUN. "I was very shy, and hesitate to talk with others, but now I can facilitate training programs, can talk with wide range of stakeholders, have enhanced my writing and leadership skill, and all these are due to my involvement in RIU, said YeshodaBista in a closing ceremony of RIU on 31 March, 2011.

Any Other Comments

Please include any other comments that you would like to include and which you feel don't fit in elsewhere.

This EOP has several lessons on governance and enterprise innovation in community forestry. RIU taught us, how a little investment can bring into social and economic change society.

Integrated Floodplain Management in Bangladesh

Research Into Use Asia innovation challenge fund project

End of Project Report

Dhaka

May 2011



Bangladesh Environmental Lawyers Association



Banchte Shekha

Center for Natural Resources Studies





Flood Hazard Research Centre



MRAG Ltd.

End of Project Report

Project Title: Integrated Floodplain Management in Bangladesh

Lead Project Organisation: Bangladesh Environmental Lawyers Association

List of Partners: Flood Hazard Research Centre Middlesex University; Banchte Shekha; Center for Natural Resources Studies; MRAG Ltd

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

Modification of **PAPD** (Participatory Action Plan Development), which was developed, promoted and assessed through several RNRRS "R number" projects in Bangladesh, notably **R7562**. This explicitly includes women as a stakeholder group.

Adaptive co-management and learning approaches (Validated RNRRS output FMSP07) developed under the Fisheries Management Science Programme (FMSP) - R7335 – Adaptive learning approaches to fisheries management; R8292 – Uptake of adaptive learning approaches for enhancement fisheries; R8470 – Synthesis of FMSP experiences and lessons learned for fisheries co-management.

IFM resource management recommendations and outcomes of testing were built upon from the earlier NRSP projects R7868 - Better Options for IFM, and Uptake Promotion R8306.

Lessons on IFM institutions came from Project R8195.

Fish-friendly water management tested in NRSP project R6755 and in the FMSP project on the integrated management of sluice gates and water levels in modified floodplains for the benefit of fish catches as well as agriculture and flood protection (R8210)

Non RNRRS generated knowledge used:

Knowledge and processes concerning rights and legal framework for community based management of floodplain resources

Integrated Pest Management

Alternative methods of jute retting

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any)that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
1 Innovation system for	1.1 Innovation-stakeholder-communication plan and matrix finalised as	None	
IFM stakeholders and	a project management tool through participation of CBOs and other		
technologies developed	stakeholders by September 2008. Done as scheduled.		
and applied to inform the	1.2 Messages and media developed are understood by +60% of people		
other Outputs	living in areas covered by participating CBOs by 2011. In a KAP survey		
	of CBO members and others living in floodplains in 2010 all agreed		
	that "dry season water management is important for crop and fish	Above target	
	production". Overall +60% of respondents gave responses in support		
	of IFM concepts and principles for 10 out of 14 attitude statements		
	(including for example limits on fishing, learning from other		
	communities, and involvement of the poor and women in decisions. A		
	counter-IFM view was supported by +60% for only one statement "we		
	need to increase rice production even if it is at the cost of fisheries".		
	1.3 70% of CBOs disseminate and share their best practice messages by		
	2011. 87% of 248 CBOs assessed at end of 2010 report being active in		
	network workshops and meetings in last year, although only 26%		
	reported having specific dissemination activities in their areas		
2 Participating floodplain	2.1 Representation of poor in CBO membership increases to 70% by		
CBOs adopt appropriate	2011. Average of 62% of CBO members are poor (own under 0.5 acres	Below	Difficult for CBOs to
and tested pro-poor IFM	of land)		change membership
related options and	2.2 All CBOs hold at least one consultation a year with poor	Below	Some CBOs largely have
technologies	stakeholders by 2009. In 2010 92.3% of participating CBOs reported		poor membership and
	holding at least one consultation with poor stakeholders		separate consultation not
	2.3 At least 90% of CBOs change their management systems by	None	needed.
	including at least one IFM innovation arising from RNRRS research in		Some IFM related
	their management plans and implementing this by 2010. In 2010 90%		technologies that were
	of CBOs reported adopting at least one new IFM innovation (34% fish		not identified in project
	related, 54% water related, 62% crop related, 38% other IFM		design were added at the

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
	components; not including IFM innovations already adopted prior to		request of CBOs (e.g.
	project).		mushrooms, floating
	2.4 Over 70% of CBOs that adopt IFM innovations deliver direct and	Above target	gardens)
	indirect benefits ³ in their floodplain and disaggregated by gender and		
	poverty groups by 2011. 86% of CBOs adopting alternative crops		
	report this is profitable, CBOs that adopted the "package" of IFM		
	innovations (fishery conservation, improved water management,		
	alternative crops, etc) reported a significant increase in fish catches		
	compared with no change among CBOs with more limited		
	management activities. The incomes of poor non-fisher CBO members		
	increased significantly over 2 years, and access of CBO members and		
	other fishers in the same communities to aquatic resources was		
	ensured by CBOs. Moreover the set of IFM innovations enhance		
	resilience to threats and hazards faced by participant communities.		
	[More complete data in the technical report.]		
	2.5 Over 50% of members of each adopting CBO use and comply with	Above target	
	IFM innovations by 2011 (disaggregated by gender and poverty groups).		
	Only 7% of CBOs reported any conflict over NRM within their		
	communities and in 97% of CBOs fewer than 25% of members broke		
	any rules		
3 Participating CBOs are	3.1 Secure access for a further 5 years to floodplain resources	Activities	Noted in status column –
capable of sustaining IFM	(waterbodies) for participating CBOs by 2011. Not fully resolved as	undertaken	external factors at policy
and their access to	requires a policy change that Ministry of Land has not been supportive	aimed at	and political levels
floodplain resources, and	of. On a case by case basis some CBOs have been able to extend their	achieving some	
of overcoming challenges	access for 10 years. On 28 April 2011 Ministry of Land and Ministry of	of output	
and threats	Fisheries and Livestock agreed in principle to extend the lease period	indicators	
	under their previous Memoranda of Understanding, but there was no	depended on	
	specific decision regarding actual agreements and waterbodies. The	decisions outside	
	Chair of the Parliamentary Standing Committee on Land at our project	project control.	

³ Direct beneficiaries are considered to be the members of the participating CBOs. Indirect beneficiaries are all of the other users of the floodplains managed by those CBOs.

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
	workshop on 22 May 2011 after hearing CBO and project team voices		
	asked for details list of waterbodies where CBOs will lose access. BELA		
	sent him the list of waterbodies along with a formal letter for		
	extending the lease period the following day . BELA has stated that it		
	will continue to pursue this after this project ends, and to provide		
	legal advice and aid to CBOs. FHRC will keep contact with the CBOs,		
	continue to facilitate adaptive learning workshops into 2012, and to		
	take up issues raised by the CBOs. World Bank has raised the issue		
	with the Secretary Ministry of Fisheries and Joint Secretary Ministry of		
	Land and DOF and World Bank have an interest in achieving this as		
	they plan to continue supporting these CBOs.		
	3.2 Mechanism for providing legal support to CBOs established and		
	effectiveness demonstrated by 2011. Achieved but so far operated		
	only by BELA in response to demands from some CBOs – CBO leaders		
	contact BELA by phone or via other partners in the project informing		
	of an issue, examples of responses and cases taken up are given in the		
	technical report. BELA plans to continue to support the few CBOs		
	facing legal cases after the project ends. BELA is pursuing water		
	pollution with the concerned authorities, otherwise BELA will file		
	cases before the court under its regular activities if CBOs approach it.		
	3.3 At least 70% of CBOs encountering conflicts that do not go to courts		
	(legal cases) have these conflicts resolved satisfactorily. BELA reports:		
	"Most of the conflicts resolved without interference of Court. Even		
	some of cases for instance Morshina Baor, went before court initially,		
	but resolved outside the court." FHRC reports from CBO assessments:		
	"The percentage of CBOs reporting conflicts fell from 26-30% in 2007-		
	08 to 17-19% in 2009-10, but conflicts resolved steadily fell from 75%		
	in 2007 to 27% in 2010. The remaining conflicts are harder to resolve,		
	and more of those faced in the last 2 years (since last national		
	elections) are politicised."		
4 Participating CBOs	4.1 At least two-thirds of participating CBOs commit to continuing	Output indicators	CBOs took interest in and

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
empowered to adopt and	cooperation among one another for adaptive learning for IFM by 2011.	were broadened	valued this as their own
continue employing	Achieved: four CBOs withdrew from the network, but all of the	by adding saving-	
adaptive learning and	participating CBOs have reportedly paid their membership fees to	revolving funds	
accessing relevant new	SWRM although a few are behind in their subscriptions, and/or have	as CBOs showed	
knowledge, services, and	attended workshops in the last six months but continuation of the	interest in this	
policy levels	adaptive learning process depends on external funding. FHRC will	and	
	continue this for at least the western two regions through support for	approximately	
	a research project on collective action and risk coping to late 2012.	achieved target	
	4.2 At least two-thirds of participating CBOs have established effective	level	
	links with service providers by 2011. In 2010 91% of CBOs reported		
	having linkages with government or other organisations, 43%		
	reported receiving government advice/support in the last year for IFM		
	activities and 24% reported having established linkages with other		
	private sector/non-government bodies.		
	4.3 At least two-thirds of participating CBOs have established saving-		
	revolving fund programmes by 2011. In 2010 75% of CBOs reported		
	operating their own savings schemes and 62% operated a revolving		
	fund to make small loans.		
5 Poor women use RIU	5.1 At least 75% of additional CBOs involve women in IFM by 2011. By	None	Despite inviting CBOs with
supported innovations and	2010 55% of these CBOs received training of women in IFM and in 50%		relatively higher
are linked with institutions	women were reported to have taken up IFM options/innovations.		involvement of women to
/CBOs involved in uptake	5.2 Increase in women's participation and activity in the additional		participate and join the
of IFM	CBOs to 25% on average by 2011. The average % of CBO members who		network through RIU
	are women dropped in these additional CBOs from 27% in 2008 to		support, and providing
	23% in 2010; but the percentage of these CBOs consulting with		training to women in
	women on key decisions increased from 88% to 96%.		these CBOs it proved
	5.3 Women in participating CBOs perceive benefits from IFM		difficult to ensure greater
	innovations. In 71% of CBOs it was reported that women benefited		representation of women
	from the CBO and IFM activities.		 – some CBOs added
			women members but
			others dropped women.
6 Successful IFM and	6.1 Target organizations identified and covered by a range of	None – but less	This depended on interest

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
adaptive learning	communication activities. Done: a communications strategy was	focus placed on	from other projects and
approaches adopted by	developed that systematically identified different communications	providing directly	organisations serving
concerned agencies and	stakeholders and their information requirements, more details of this	information for	those CBOs
organisations in key	and the communication products delivered to these stakeholders are	other CBOs to	
ongoing programmes and	in the final technical report.	access.	
projects working with new	6.2 At least 50% of sampled staff in target organizations understand		
CBOs in NR management,	IFM concepts. Repeat KAP surveys of 31 upazila (sub-district) officials	Information on	
and process for	from five relevant agencies indicate that over 50% consider fishery	officials KAP	
mainstreaming this	management and fish-friendly water management components of IFM	survey in	
established	to be beneficial, but only 19% thought alternative crops could help in	technical report,	
	this. Overall 51% said IFM as a whole could highly benefit floodplains	but was limited	
	in their areas.	to one region	
	6.3 At least 2 relevant stakeholder organisations incorporate IFM	and not higher	
	related innovations and concepts in their projects and/or regular work.	policy makers	
	GIZ has incorporated IFM as the basis of its EUR 3.5 million Wetland		
	Biodiversity Restoration Project in Pabna District with Department of		
	Fisheries, based on support for project design, planning and		
	monitoring from FHRC and ongoing implementation through CNRS.		
	World Bank and Department of Fisheries are emphasising fishery		
	management through existing and new CBOs and lesson learning in a		
	US\$ 156 million Integrated Fisheries Livelihood Project being planned,		
	for which staff of FHRC have been consultants to the design process.		
	LGED expressed interest, but did not take up IFM. Danida is		
	supporting FHRC to test IFM innovations with four CBOs in a coastal		
	area under its agriculture development programme and is considering		
	building on this. FHRC and CNRS have both incorporated IFM and		
	related innovations in components of projects under DFID's shiree		
	programme in Bangladesh. FHRC received a Farmer Voice award from		
	the ALINe programme for IFM and adaptive learning networking.		
	6.4 A substantial number of RNR dependent poor people covered by	Some of the	
	other CBOs have access to IFM related innovations arising from RNRRS	initiatives in 6.3	
	research by 2011. Full number not estimated. Number covered by on-	are at early	

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
	going initiatives noted in 6.3 likely to be in excess of 3,000	stages, and data	
	households, with potentially about 250,000 households to be covered	is not available	
	by the planned World Bank project.	for others	
	6.5 The process of mainstreaming IFM is documented. Technical report		
	summarises project process and communication activities.		

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

1.1 Identify innovation stakeholders and develop innovation support and communications plan based on review of effectiveness of communications strategy under R8306 (and other related research projects). **Done – prepared communications plan in 2008 and updated in 2009.**

1.2 Within intermediary organisations, including government agencies and projects, identify potential champions and document entry points for uptake of knowledge. Done, but not used so effectively, made use instead of official members of project steering committee representing three government agencies, and personal contacts with donor agencies, although steering committee has not been active in last year and some government members were not so enthusiastic.

1.3 Review and elaborate appropriate DFID RNRRS and other research outputs that are IFM options or consistent with IFM approach. **Done for internal use in project.**

1.4 Develop materials, processes and activities to enhance adaptive learning and exchange of knowledge on IFM among participating 250 CBOs and to voice CBO experience, document and disseminate best practices and lessons of CBOs in implementing IFM. Done. CBO federation (SWRM) formed, federation members wrote up experiences in their own newsletter, shared experiences in exchange visits, and one policy brief was prepared by the CBO federation itself. These are all examples of CBOs documenting and disseminating best practice, although the focus of information sheets developed in the project was more on different crops and components of IFM than IFM as a whole as this was more useful for CBOs. CBOs also demonstrated and explained their lessons and achievements in a market place at 2009 dissemination workshop.

2.1 Profile, assess and select about 100 additional participating CBOs in consultation with concerned government agencies and NGOs. Done

2.2 Baseline and impact assessments at CBO level for all CBOs covering indicators such as resource management, participation of the poor and women, and governance. Done in 2008 and late 2010 with additional mid-term assessment of all CBOs in 2009 to help guide project implementation.

2.3 Baseline and impact assessment surveys of sample households disaggregated by social strata and gender for representative locations/ CBOs. **Done** in 2008 and again in late 2010 covering 384 households (with a few having left by the time of the repeat survey).

2.4 Participatory planning for IFM among participating CBOs through initial modified PAPD/ reflective learning with all key local stakeholders for each participating CBO to help plan, assess feasibility and incorporate IFM options in their natural resource management activities. **Done with PAPD in 25 CBOs.**

2.5 Provide small grants, training and technical advice to CBOs for taking up IFM options agreed in adaptive learning forums. Done – 207 of the participating CBOs (81%) received small grants to take up between one and ten of 38 different IFM options (including different crops) identified and discussed through adaptive learning workshops.

2.6 Building on the innovations approach developed for Output 1, exchange knowledge among CBOs through, for example capacity building and exposure visits by CBO representatives to CBOs that already adopted pro-poor IFM options. **Done, series of exchange visits made each year with all CBOs invited and almost all participating, also regular learning workshops held at regional level and CBOs exchanged experience and lessons through their newsletter and by direct contact not sponsored by the project (e.g. telephone and meeting neighbouring CBOs).**

2.7 Develop and support adoption of participatory impact monitoring and feedback systems between and within CBOs. Participatory feedback between CBOs developed through reflective learning sessions – mainly in southwest and northwest regions.

3.1 Assess common pool resource status and access issues of participating CBOs in their areas. **BELA: "Through conflicts over access to and use of** natural resources, the poor and marginalised people are continuously losing their traditional rights and entitlements to the resources. Conversely, with undue access, the rich and powerful elites of the society overexploit the resources without considering the future productivity and sustainability of the resources. Therefore, in terms of subjective ranking of policy crisis, access and justice issues involved with resource management are identified as the prime concern in the RIU project in Bangladesh."

3.2 Training and capacity building for CBO leaders on policies and laws related to floodplain resources and in conflict resolution, advocacy and lobbying. Four trainings organised for regional committee members of SWRM (CBO federation) and one for central committee members to develop CBO leaders' skills and knowledge on legal and administrative issues involved with resource management, to help influence decision making at the

local and national levels and promote collective rights.

3.3 Legal aid and assistance to CBOs to overcome problems such as resource access. **BELA provided advice to the CBOs from time to time to deal with** their disputes at legal and administrative forums. Most of conflicts were resolved out of courts. However, some of the disputes reached the courts for settlement and BELA provided necessary legal aid and assistance. Four cases are still pending: Khafrikal Khal, Rangpur district [Local Court], Chakrazapur Beel, Rangpur district [Land Tribunal], Morsina Baor, Jessore District [Local Court], and Rangia Nodi, Sunamgonj district [High Court Division of Supreme Court].

3.4 National and local level workshops to raise practical issues on access and legal obstacles, and to pursue long term access agreements and better informed pro-poor land use planning. National workshop held in March 2010 with Minister and Secretary from Ministry of Land attending and issues of long term access for CBOs to jalmohals raised by CBOs and project team. Similar issues also raised in convention and AGM of all participating CBOs also in March 2010 where the chair of the parliamentary standing committee on land was the chief guest. A final workshop was held on 22 May 2011 with the chair of the parliamentary standing committee on land as the chief guest where IFM impacts were presented by the project team and participating CBOs and sustainability issues were debated between officials (Department of Fisheries, Department of Agricultural Extension, etc) and CBOs. A rally and press conference was organised by SWRM, Banchte Shekha and FHRC in Jessore (south-west Bangladesh) in May 2011 and enabled CBOs to raise their concerns in mass media coverage by TV and newspapers. In these forums the key guests have heard the views of CBOs leaders on the leasing issue and have committed to promote community based resource management, particularly to act for the interest of CBOs in the ongoing lease extension process.

3.5 Support to strengthen links of CBO networks with legal and policy related service providers. When dealing with the conflicts of CBOs, BELA assisted to those CBOs to communicate with legal and administrative forums with due process. BELA provided training on how to write to concerned local service providers regarding their remedies to claims. BELA also made a link with local lawyers to assist them pro-bono and made the CBO leaders aware of the opportunities of free legal assistance from the legal aid committee of the local Bar Council formed under the Legal Aid Services Act, 2000.

4.1 Support adaptive learning through regular workshops and other knowledge exchange among CBOs to address gaps in knowledge and systematically test, review, and document lessons from implementing IFM options through two 1-year cycles of IFM activities and local management plans. Done – workshops held roughly as scheduled, exchange visits held each year, key lessons from CBOs documented in their newsletters and in a policy brief prepared by SWRM central committee.

4.2 Facilitate participating CBOs making links with local service providers. Done, for 25 CBOs PAPDs helped significantly, overall by 2010 24% of participating CBOs had links with local private/non-government service providers and 43% received support and advice from government agencies for IFM; although as CBOs become stronger they may seek less support from external agencies.

4.3 Assist interested CBOs to formalise their network with a commitment to continued adaptive learning and IFM. Done – SWRM formalised as network/federation of CBOs

4.4 Develop and promote cost-effective best practice arrangements for continued adaptive learning and IFM based on CBOs experience, through joint effort of project team and CBOs. Lesson learning and sharing by CBOs has proved effective, informal links between CBOs through personal contacts and mobile phones will continue after the project. Both the CBOs and research team identified workshops, exchange visits, demonstrations of new crops etc, and smaller meetings to review lessons as the more effective components of adaptive learning, these require more resources than the participating CBOs can manage themselves. The project team have been searching for further resources to support the CBO network/SWRM at its early stage of development, but with limited success so far. At the CBO level the benefits of IFM innovations such as alternative crops are sufficient to indicate that they will continue to spread among local farmers with in many cases the CBO actively promoting and encouraging this.

4.5 Strengthen and streamline existing governance, accountability and financial management of CBOs (including savings, revolving funds). **Supported** through peer pressure and advice to CBOs in adaptive learning networks and through exchange of lessons and good practice.

4.6 Process documentation, reflective learning and participatory assessment of adaptive learning process. **Undertaken by project team and by** participating CBOs in focused reflective learning sessions in northwest and southwest, and reviews of the process within adaptive learning workshops.

5.1 Preference for CBOs that are women based/ have higher women's participation in selecting new participating CBOs. Followed, new participating CBOs that joined through RIU support had on average 27% women members when they joined compared with 17% women for CBOs already participating in the adaptive learning network.

5.2 Baseline and impact assessment on poor women's empowerment (contribution to decision making, access to resources, etc.). Part of completed baseline and impact household surveys

5.3 Identify strategy for addressing issues of poor women's empowerment within floodplain CBOs and natural resource management. **Done – capacity building modules and approaches developed.**

5.4 Capacity building for women members of participating CBOs. Provided by CNRS, Banchte Shekha and FHRC following different approaches in different areas. In the north-east 80 women and 20 men were trained directly by CNRS on "Women Empowerment in IFM". In southwest and northwest 26 women resource persons (one per CBO) were trained by BS and FHRC and then assisted to train 294 women in growing alternative crops and as local extension promoters of IFM options within their areas (e.g. alternative jute retting).

5.5 Target RNRSS outputs suited to women for uptake through participating CBOs and local women's groups – reserve part of support to uptake for activities best suited to women. Not properly implemented, no evidence of grants to CBOs being reserved for proposals from women members of CBOs. In southwest and northwest FHRC with BS provided support to over 200 women from CBOs to try alternative crops and vegetables near their homesteads, and oriented them to promote some IFM options in their areas.

5.6 Promote links between CBOs and existing women's groups within CBO areas to enhance representation of women and their involvement in IFM. Activity undertaken by CNRS in north-east. Women from participating CBOs of Jamalganj are mostly also members of other groups under LEAF/SHAMRIDHI project where they are involved with various income generating activities including IFM options like vegetable cultivation, duck rearing.

6.1 Implement activities identified in the innovation support and communication plan that target IFM related stakeholder organisations and agencies in order to encourage adoption and implementation of IFM strategies. e.g. Capacity building in selected IFM activities and related planning processes for practitioners in government agencies and NGOs. **Some capacity building provided through trainings in regions which involved government agencies as well as CBOs and shared learning. One orientation seminar held in LGED with over 30 senior LGED staff. IFM included within two short courses run by FHRC and Independent University Bangladesh participated in by university staff, NGO staff and students. But more planned activities could have been done**

6.2 Facilitate influencing policy based on CBO adoption of IFM. e.g.:

a. Field visits for key stakeholders including champions and senior officials to CBOs demonstrating IFM best practices. Held for local officials, but not for any higher level champions.

b. Round table conference between CBO leaders and concerned target agencies. Not held separately but open discussion in final workshop organised in round-table format served some of purpose and enabled CBO leaders to directly raise issues with some concerned target agencies.

c. Communication materials. Full list annexed in this report.

d. Final workshop involving all stakeholders with a focus on findings on the research-into use process and outcomes of the project. **Held 22nd May 2011**

6.3 Periodic assessment of attitudes and practices related to IFM in target organisations and agencies. **KAP survey (baseline) largely of upazila (sub**district) level officials (Fisheries, Agricultural Extension, Social Welfare, Cooperatives and Engineering) conducted by CNRS in April-June 2009, repeat survey conducted by CNRS in early 2011. Considering those informants interviewed both times, this indicates that although these stakeholders have not changed their views on components of IFM, in general more report that IFM-related guidelines are now in place in their organisations (e.g. 32% reported they had guidelines on fish friendly sluice operation in 2009 and 52% in 2011; 30% having guidelines for fish sanctuaries in 2009 and 61% in 2011;; 26% reported their organisation had guidelines on fishing effort limits in 2009 but 55% in 2011.
6.4 Review of project documents and other reports of innovation stakeholders. Refers to documents of target stakeholders for uptake of IFM, only documents related to projects noted in output indicator 6.3 reviewed.

6.5 Policy briefs and final reporting (including paper and web based materials). Three policy briefs produced in 2010 two more policy briefs including one by CBO federation produced in 2011, pages on FHRC website developed, and updated in early 2011,. Several conference papers also presented, and peer reviewed papers (see annex).

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

i). Partners have not changed during project. Discussion among the partners concluded that the project design of having partners with different complementary skills was a good and appropriate one, but the outcomes and working relations among partners have been less than expected. The main gap has been in coordination and communication between partners which has limited some of the planed activities and outputs. There have also been differences in the level of motivation among partners and by dividing responsibilities for supporting participating CBOs among Bangladesh partners by region the respective partners did not provide the level of cross-cutting services in their respective areas of expertise that was expected for all CBOs and the project as a whole. For interactions with other agencies the steering committee started well in bringing together government departments and the CBO federation and project team, but was handicapped by changes in official representatives and meetings were not called sufficiently often. At the local level interaction with officials in CBO events, trainings and participatory planning has helped strengthen support and recognition for CBOs in IFM. For future programmes greater clarity in responsibility for output deliverables and separating specialist support sub-teams could be an improvement.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

i). Yes – discussions and interactions with Ministry of Land over ensuring continued access for CBOs to jalmohals (public waterbodies) which otherwise may expire shortly. This experience has been frustrating. The Ministry of Land sees jalmohals as its preserve and has not been open to meaningful discussion on its policies either for the CBOs that have enjoyed access rights and responsibilities, or for the many other jalmohals in the country. In this regard it has not changed significantly its responsiveness in the last two decades. Moreover in 2009 it formulated and declared a new jalmohal management policy without consultation with communities or other stakeholders, although this incorporated some positive points in support of sustainable management and some components of IFM as well as in principle sustaining access of existing CBOs, in practice it is not implementing this policy in favour of existing CBOs that have managed waterbodies well. The project has also engaged with Ministry of Fisheries and Livestock and Department of Fisheries. Despite accepting and on paper promoting community based management of waterbodies, and having gained a role in waterbodies that were reserved for community management, it took time for MOFL/DOF to become active in pursue sustaining CBO access. The opportunity to take assistance offered from the project team in documenting CBO achievements could have been used. At a lower level in the field, engagement with relevant District Fisheries Officers and even Deputy Commissioners (chief administrator in a district) on policy implementation in favour of CBOs has been positive.

ii). The following policy-relevant groups were engaged with for scaling up purposes (mechanisms of engagement described):

- 1. Local Government Engineering Department (promoting in water management) through the steering committee, a seminar for its staff, and workshops.
- 2. Ministry of Land (constrain or enable IFM in jalmohals) through workshops, CBO convention, and direct meetings with officials.
- 3. Department of Fisheries/MOFL (promoting in fishery management) through steering committee, workshops, district meetings, and support by team members for designing its future projects.
- 4. Department of Environment (potential uptake in conservation areas, pollution control) not targeted although covered in KAP survey.
- 5. Department of Agricultural Extension (crop components of IFM) through steering committee, workshops, and MOU with CNRS.
- 6. Donor agencies (funding for upscaling) FHRC involved in support to design major projects incorporating IFM and CBO approaches for GTZ/GIZ and World Bank, also advice and workshops.
- 7. NGOs that are members of committees linked with ministries (influence) no specific mechanisms or engagement.
- 8. Parliamentary standing committees (land, fisheries, environment) joined CBO convention, informed in meetings.

iii). In the field BRAC saw some of the crop demonstrations of maize and sunflower and then promoted these crops to their members. FHRC incorporated an IFM-based approach into two projects (respectively supported by DFID's shiree programme and by Danida) that are piloting this approach in the coastal region of Barguna district based on restoring dry season water for crops and fish. GIZ adopted IFM as the basis for its ongoing Wetland Biodiversity Rehabilitation Project in Pabna as a result of FHRC involvement in project design and planning and CNRS involvement in project implementation. World Bank and DOF have adopted community based management and networking among CBOs (existing and a major expansion of more CBOs) in the ongoing design of their Integrated Fisheries Livelihoods Project-Bangladesh, which will also pilot expanding into coastal areas and make use of tools such as assessment of CBOs performance.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes? ii). Have there been any unintended changes / consequences?

i). Within the project team partners have learned and shared knowledge, for example BELA has learned about IFM and has newly become directly involved in supporting CBOs and in providing small grants to them – grass roots field support that it was not previously involved in. The participating Community Based Organisations (CBOs) have formed a federation that is formally registered as the "Society for Water Resources Management" with about 252 CBOs as members. This is promoting good practices and IFM and has the potential to influence policy. Although in 2010 LGED reported that it would adopt IFM in its future small scale water resources projects, there was a lack of internal support for taking this up.

ii). A number of CBOs have adopted improved organisational practices such as holding elections, consulting with their wider community, improvements in financial management, and links with local service providers. SWRM has had a positive impact on individual CBOs – promoting changes rather than this arising directly from the project team, but at the policy level it has been difficult to have an impact due to the constraints noted earlier. The SWRM has shown an unexpected capacity to analyse problems and gaps in policies, but lacks direct access to policy makers who prefer to engage with their own circle of officials and organisations. BELA now has a clearer idea of the reality at grass roots level. The functioning of the CBO network in enabling CBOs to support each other is a positive change and the development and formalisation of their federation is a commitment to new ways of representing local interests.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved?

i). Lessons on putting research into use and enabling innovation:

1. need flexibility to support unexpected innovations (e.g. bee keeping),

- 2. field based demonstrations by farmers of innovations (crops) are effective and necessary,
- 3. exchange visits promote learning and innovation among CBOs and others,
- 4. the adaptive learning network process enables and encourages innovation at community level,
- 5. fact sheets were very useful for farmers and CBO leaders,
- 6. reflective learning sessions among participant CBOs strengthened adoption of IFM options and improving practices through comparisons with before, and
- 7. market place formats for CBOs to share their expertise and lessons in workshops and CBO attendance at local fairs promoted wider adoption.

More generally the IFM approach and adaptive learning both promoted by the project have contributed to improving resilience. For example, adoption of a wider variety of livelihood options e.g. beekeeping, low-water demand crops that increase resilience to potential future drought situations, short-cropping cycle crops increase resilience to early floods, all help the rural poor cope with hazards and changes. In addition the processes taken up by participating CBOs and partners such as participatory planning, reflective learning and sharing between communities strengthen flexibility to adapt and cope.

ii). General lessons and findings have been shared, but not specifically lessons on putting research into use. The adaptive learning network itself aimed to share lessons between CBOs, and this process and method has been shared with practitioners and researchers. Within and among CBO members their executive committees, general meetings, and demonstration plots are the main routes for lesson sharing. Training sessions were interactive and involved local officials who informally learnt through this process. Workshops, seminars, information sheets and policy briefs were used to share lessons with outsiders.

iii). There are three areas where aspects of the project have not worked as planned:

- 1. The policy advocacy and influence component of the project did not work well enough, the team underestimated the effort that would be required for this, and did not find really effective methods to engage with some key policy makers, but also the policy making targets of the project were not receptive and did not show any meaningful will to listen or respond. There is a need for a broader government level policy/culture of learning lessons from the field, listening to and valuing the experiences and opinions of CBOs and poor people in general in a more collaborative approach to policy-making and government. Changing this culture is a challenge, government agencies may take greater interest in the issues and lessons when they are formal partners in a project, but then they expect to lead in the project and tend to be less flexible than an NGO based project. Moreover, only one government agency can lead implementation of a government project, severely limiting influence on other departments and ministries. A project or component specifically to train and build capacity and understanding for officers from a range of departments and ministries by offering free in-country training and study visits might best address this gap.
- 2. Some of the IFM options have not worked:
 - a. Duck rearing gave some CBOs returns but ultimately did not sustain as it required higher skill levels, and there were losses due to disease,

and it requires more support from the wider community for example CBOs were unable to convince everyone to stop using pesticide.

- b. Some of the same problems affected bee keeping, but this has continued in CBOs in the south-west but not in the north-west, so most likely climate (colder winters) in the north-west affected survival.
- c. Berke rice did not give good returns in the north-west due to lower than optimal monsoon season rainfall.
- d. Fish friendly sluice management was not properly tested, and although a number of CBOs report that they have adopted it the fisheries CBOs did not have sufficient influence or control over sluices. Ex-LGED CBOs do have full control over sluices but their decisions are still dominated by the needs of rice cultivation. With hindsight more research and review of how CBOs could address this should have been incorporated in the project.
- 3.

Although women have become more involved in some CBOs through the project, women's involvement in IFM has been low with only 5-10% of IFM actions involving/benefiting women in the south-west and north-west and none in the other two regions. Ultimately the main IFM components – capture fisheries and crops are male preserves.

iv). One challenge was the weather – although IFM in general improves resilience by for example promoting low-water demand crops, some interventions were affected by floods – for example early flash floods in the north-east affected some crops and prevented timely testing of sanctuaries and plantations, similarly Berke rice was found to be relatively sensitive to having sufficiently timely monsoon rains.

More importantly the participating CBOs are very scattered so that while within a CBO there was some uptake of IFM innovations that were tested there, different CBOs undertook different trials and other CBOs would not necessarily take up an innovation based on a demonstration they had not seen. Moreover the dispersal of CBOs meant that it has been difficult for them to develop strong links between one another.

Other challenges include: the limited government extension agency interest and support for IFM; the fact that policies are separate and sectoral and do not favour integration in natural resource management; farmer conservatism and preference for cultivating rice; the rent seeking nature of local officials – for example re-excavation of canals and waterbodies for the public benefit requires local government approval and if this is not a government own programme this requires pay offs to officials; and the limited time for supporting taking research and innovations into wider use (effectively two complete annual cycles).

These challenges have been partially addressed, for example exchange visits and the adaptive learning process encourage uptake between CBOs, but in reality with limited resources have achieved less than was hoped for.

v). Several challenges remain:

As CBOs started growing new crops such as sunflower there is a challenge of how to market this. There is an opportunity for the CBO federation (SWRM) to take a lead in marketing and branding the products of CBOs as sustainable community products, but this would require it to have a trade license, register products, and organise so that it can enter into trading or processing agreements and develop mechanisms to manage costs and

returns, rather than at present sharing lessons, coordinating trials and trying to raise issues.

There are conflicting policies affecting floodplains that need review and for government to take seriously a more integrated and harmonised approach, which will require support from a range of stakeholders.

The SWRM is still weak and cannot expect to influence policy when as an organisation and its constituent member CBOs lack capacity in this area and self-confidence, moreover the SWRM committee members (13 in the executive committee) have limited interest to invest significant time in this as they are volunteers and do not see a direct benefit, and SWRM has very little financial resources, while the wide dispersal of member CBOs puts a strain on the organisation. To overcome these issues SWRM would need to take up specific funded activities or projects.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number & Type of Indirect Beneficiaries	Number & Type of Direct Beneficiaries	Male Beneficiari es (indirect and direct)	Female Beneficiari es (indirect and direct)	Total	Evidence Index*
1 Innovation system for IFM stakeholders and technologies developed and applied to inform the other Outputs	na	na	na	na	na	As this was an intermediary output to enable other outputs there are no separate beneficiary numbers
2 Participating floodplain CBOs adopt appropriate and tested pro-poor IFM related options and	Estimated 2,227 farm households took up three most popular alternative crops through	863 farmers helped to test alternative crops	7,650 for crops	7,200 for crops	14,850 for crops	Direct beneficiaries are CBO member households, indirect beneficiaries are other households living in villages using the floodplains and waterbodies managed by CBOs. Conversion to men

Note: supporting evidence in technical report

Project Output	Number & Type of	Number & Type of	Male	Female	Total	Evidence Index*
	Indirect	Direct Beneficiaries	Beneficiari	Beneficiari		
	Beneficiaries		es (indirect	es (indirect		
			and direct)	and direct)		
technologies	demonstration					and women is based on the national
	effect					average household size of 4.8 persons
	Fishery: estimated	Fishery: 87 (35%)	Fishery:	Fishery:	Fishery:	and national sex ratio of 106.4 males:
	47,670 other	adopted all	129,165	121,395	250,650	100 females (Bangladesh Bureau of
	households catch	categories of IFM				Statistics 2001 census), it assumes that
	fish for income or	innovation and				all members of a benefiting household
	food in	reported fishery				benefit (from shared food consumed
	waterbodies	improvements –				or income received). Data from final
	managed by 87	16,000 members of				CBO assessment gives estimates of
	CBOS	whom about 4,530				beneficiaries, IFM adoption and fishery
		tish for income.				changes. Data from CBO grants,
						participatory crop and uptake
						monitoring gives estimates for farmers
						fishery management actions that they
						did not have before household data
						showed non-members and other noor
						were allowed access to fishing through
						CBOs
3 Participating CBOs		118 Fishery CBOs			Not	Direct beneficiaries are CBO members,
are capable of		depend on leases to			calculated	indirect are users of resources. Secure
sustaining IFM and		jalmohals (17 other			as security	access is not an issue for 117 CBOs
their access to		CBOs also use			of jalmohal	(water management, environment and
floodplain resources,		jalmohals). All CBOs			access	some fisheries CBOs). More generally
and of overcoming		face other threats.			remains an	a majority of CBOs have links with
challenges and threats					issue	government to help in addressing local
						threats and challenges, and also make
						use of their network with other CBOs –
						see technical report

Project Output	Number & Type of	Number & Type of	Male	Female	Total	Evidence Index*
	Indirect	Direct Beneficiaries	Beneficiari	Beneficiari		
	Beneficiaries		es (indirect	es (indirect		
			and direct)	and direct)		
4 Participating CBOs empowered to adopt and continue employing adaptive learning and accessing relevant new knowledge, services, and policy levels	Population covered or influenced by member CBOs (excluding CBO members): 346,100 households	Members of 252 paid up member CBOs: 50,148 households	997,600	937,700	1,935,300	Based on numbers of CBOs that have subscribed to SWRM (list in technical report) and then their membership/ community coverage and converting households to people as noted above
5 Poor women use RIU supported innovations and are linked with institutions /CBOs involved in uptake of IFM	None yet	In southwest and northwest 26 women resource persons (one per CBO) were trained and then assisted to train 294 women in alternative crops and as local extension promoters of IFM In north-east 80 women and 20 men received women empowerment training to address low involvement in IFM due to social barriers and illiteracy.	Northeast: 20	Southwest: 294 Northeast: 80	394	Training data. In addition from CBO assessments those CBOs where women's role was enhanced during the project can be identified, the number of women members is known
6 Successful IFM and	Barguna: none	200 extreme poor	Barguna:	Barguna:	Barguna:	Conversion to men and women is
adaptive learning		households	2,100	2,000	4,100	based on the national average
approaches adopted		undertaking IFM	Northeast:	Northeast:	Northeast:	household size of 4.8 persons and

Project Output	Number & Type of	Number & Type of	Male	Female	Total	Evidence Index*
	Indirect	Direct Beneficiaries	Beneficiari	Beneficiari		
	Beneficiaries		es (indirect	es (indirect		
			and direct)	and direct)		
by concerned agencies and organisations in key ongoing programmes and projects working with new CBOs in NR management, and process for		under a shiree programme component in Barguna (southwest); 656 households are members of 4 CBOs adopting IFM packages under a	400	200	600	national sex ratio of 106.4 males: 100 females (Bangladesh Bureau of Statistics 2001 census), it assumes that all members of a benefiting household benefit (from shared food consumed or income received). Estimates from other project documents of beneficiaries covered by influenced
mainstreaming this established		Danida supported action research project in Barguna CNRS reports that there are 600 beneficiaries of crop adaptation (potato, chilly, ground nut, oakra, wheat, coriander, garlic, sesame etc.) in the north-eastern floodplains through another SHIREE project				projects etc have not been made available. There are likely to be more in future from projects being designed. Source: reports on the respective projects

*Please provide evidence for the figures included here as a separate attachment, use this column in the table to indicate where this evidence can be found.

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

i).The project did not have specific targets of this type in the logframe. Out of 252 CBOs almost all have adopted components of IFM and 35% with a total membership of 16,000 households report adopting the mix of actions that comprise IFM (complementary water, crop and fishery management innovations). This is consistent across CBO types, although uptake was less in the central region where there are more fisheries oriented CBOs. The 87 CBOs adopting the combination of IFM innovations achieved on average a 12% increase in fish catches compared with no change for other CBOs. About 52,000 households are estimated to catch fish for income or food in floodplains and waterbodies managed by these CBOs. This is a conservative estimate of benefits as fisheries in some of the other CBOs taking on a range of fishery management initiatives clearly benefited over the 3 years, but these were not counted due to downward fluctuation in fish catches in some other CBO areas where management was difficult (e.g. rivers) or where increased jute cultivation and jute retting caused local problems in the last project year - 2010. Farmers who adopted alternative dry season crops are estimated to each have earned Tk 400 to 3,500 more than they would have from growing irrigated rice in the same plot in 2010 based on average plot sizes used for each crop and returns reported by farmers for each crop. They also reduced their irrigation water abstraction by an estimated 270-750 m³ per farmer. The four most popular crops (garlic, mustard, maize and sunflower), including known and estimated uptake by farmers not supported by the project, are estimated to have generated just over Tk 3 million in additional income for about 2,700 farmers.

ii). Baseline data at household level was tabulated but not put into a full report. As this was for only a sample of the CBOs it was not used in shaping project activities. Whereas the data from the baseline CBO assessment (in the form of listings of data and scorings of their status against seven main themes for each CBO) was shared with the respective partners responsible for working in each of the four regions to highlight weaknesses and strengths of individual CBOs, and this was used to direct some of the support, training and exchange visits.

iii). Yes – data being analysed (compared with baseline survey) and reported in full in final technical report to accompany this EOP report. The household impact survey reveals some impacts including changes in attitudes, but the period was too short to see major income changes. However it does confirm that CBOs ensured access to fisheries for the poor including fishers who are not members of CBOs. Comparison of baseline and impact assessments of all of the CBOs also reveal changes in their management practices, participation, decision making, financial management etc.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). The PAPDs helped bring women's voices into local planning in those CBO areas and encouraged increased membership of women; training courses were run for CBO leaders on gender awareness and to develop a set of women CBO members as resource persons to mobilise greater participation by women in CBOs and IFM, peer pressure among CBOs has also encouraged some to increase women's participation. Overall 19% of participating CBO members are women (this was 27% for those CBOs that were added to the process through RIU support). By 2010 94% of CBOs reported consulting with women before taking key decisions, in 55% of CBOs women regularly speak out in meetings, and it was reported that in 70% of CBOs their activities improved poor women's livelihoods. In addition traditional professional fishers are often a socially excluded group in Bangladesh, 57% of the participating CBOs were formed for fishery management and are comprised largely (about 70%) of fishing households and the project has helped to strengthen their organisation and networking, social standing through the CBOs, and linkages with government and other stakeholders and service providers.

ii). Data on women's participation in CBOs from the initial assessment of CBOs was used to identify gaps and shared to encourage per pressure for increasing women's membership and role in CBOs. But household level data was not used for this (it only covers a sample of CBOs).

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

The Ministry of Land's jalmohal (waterbody) policy shift in 2009 has threatened the security of access of a number of the CBOs to public waterbodies. What efforts have been made by the project team to influence this policy in favour of the CBOs have had raised the issues and voices of local communities and CBOs with policy makers but in terms of ensuring longer term access rights have had limited success so far.

Previous research had tried fewer alternative dry season crops, more were added that took into account differences in conditions between regions. The CBOs also proposed and supported options that did not arise from the earlier research.

The project had not expected that CBOs could be a means for testing and extending other innovations. For example, Berke rice variety was a product from other DFID supported research that was not a planned component of IFM, but the CBOs proved a cost effective way of spreading farmer trials/demonstrations over a wide area and a means whereby successful farmers could then sell seed to other members of their CBOs.

A schools programme for growing vegetables was tried with some CBOs with encouraging results.

For dissemination a market place in one workshop helped show the achievements of CBOs to a wider audience than traditional presentations.

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

Annex 6 Research Into Use Programme - final reports from Asia Innovation Challenge Fund

Annex

Integrated Floodplain Management communication products

Information sheets

During 2009 500 sets of a folder with 12 information sheets were produced by the project (coordinated by CNRS) and distributed to CBOs and farmers, as well as some external agencies.

Jointly with the IDRC project (and coordinated by FHRC) another folder with 19 information sheets (1,000 of each) (covering: ducks, fish sanctuaries, garlic, rats, rice - BR28, eco-tourism, snail conservation, mustard, grass-pea, jute retting, pen culture of fish, maize, jujube, mug dhal, mushrooms, sunflower, arum, bee keeping) were printed in March 2010 and distributed in workshops and through direct contact to policy makers, government and NGO practitioners and CBOs.

All information sheets are in Bangla

Posters

Two posters on IFM were developed (led by CNRS) and printed by the project in 2009, and 500 of each distributed to participant CBOs, government officials and NGOs.

Policy Briefs

These were distributed to policy makers and key stakeholders in government, NGOs, researchers and donors (all in English except for no. 5):

- 1. Multiplying benefits through adaptive learning networks (FHRC)
- 2. Benefits of an integrated approach (FHRC)
- 3. Participation of the poor in planning and governance (CNRS)
- 4. Implications of floodplain aquaculture enclosure (FHRC)
- 5. Key lessons and needs raised by CBOs (SWRM, in Bangla)
- 6. Water management for IFM (MRAG)

CBO newsletter

A total of five issues of the SWRM newsletter were published and distributed to CBOs and local officials, each is in Bangla and comprised of articles submitted by CBOs.

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

Conference papers presented

Sultana, P. (2008). Integrated Floodplain Management approach in Bangladesh. Paper presented at the International Association of the Commons 12th biannual conference in Cheltenham, July 2008.

Sultana, P. and Thompson, P. (2009). Scaling up Integrated Floodplain Management through Adaptive Learning Networks. Paper presented at the Innovation Asia-Pacific Symposium, Kathmandu, 4-7 May 2009

Thompson, P., Sultana, P. and R. Arthur (2010). Community management of wetland biodiversity. Poster paper presented at the Zoological Society of London symposium "Linking Biodiversity Conservation and Poverty Reduction: What, Why and How?", 28-29 April 2010, Zoological Society of London, London.

Sultana, P. and P. Thompson (2010). Natural resource conflicts and community organisations in Bangladesh. Paper presented at CAPRI workshop on Collective action, property rights, and conflict management, 28 June – 1 July 2010, Siem Riep, Cambodia.

A panel on IFM and adaptive learning was organised by the project team at the International Association for the Study of Commons 13th biannual conference: Sustaining Commons: Sustaining the Future, Hyderabad, India, January 2011, where the following papers were presented:

- Thompson, P. Sustainability of Community Based Organisations in Bangladesh.
- Halder, A. and Islam, M.A. Co-management of wetlands and its contribution to the livelihoods of poor people.
- Sultana, P. and Thompson, P. Implications of floodplain aquaculture enclosure.

Peer reviewed publications

Thompson, P., Sultana, P. and Arthur, R. 2010. Integrating biological conservation into management: Community adaptive learning in the wetlands of Bangladesh. *Biodiversity* 11(1 & 2) 21-30.

Sultana, P. and Thompson, P. (in press.) Enabling Integrated Floodplain Management by communities through an adaptive learning network. In Ojha H. (ed.) Research into Action: Understanding the Evolution of Adaptive Collaborative Approaches in Agriculture and Natural Resources Management. Earthscan.

Other media

In 2009 a pod cast on the project (based on an interview with Dr Parvin Sultana) was made available through RIU grapevine.

TV programme on IFM in north-east of Bangladesh broadcast by the national channel BTV in its Matio-Manush program on 24 March 2011.

Website information on IFM, ALN, partners including SWRM, and the project is available on the FHRC Bangladesh website: www.fhrd-bd.org

Estimates of benefited population from crop and fishery components of IFM

Alternative dry season crop benefits in 2010-11

Crops	Supported		Uptake	in 2010	Estim	ated	Averag	Net	Increment	Increment	Gain	Total	Total	Water	Reduction	Volume of	Volume of
	No CBOs	No farmers	No CBOs	No farmers	No CBOs	No farm ers	(dec)/ farmer	(Tk/ha)	over rice (Tk/ha)	(Tk/dec)	per farm hh (Tk)	(acres)	al return (Tk)	(mm	compared with rice (m)	water reduced per plot/farmer (cubic m)	water reduced total (cubic m)
Garlic	24	64	5	159	24	763	9	63,700	44,000	178.1	1,603	69	1,223,097	150	750	273	208,482
Mustard	37	76	5	205	37	1,517	24	24,000	4,300	17.4	418	364	633,567	160	740	719	1,090,325
Wheat	8	15			8	15		41,500	21,800								
Sunflower	89	270			89	270	22	49,000	29,300	118.6	2,609	59	704,338	300	600	534	144,233
Groundnut	1	1			1	1											
Musuri	3	5			3	5											
Peas	3	9			3	9											
Potato	5	7			5	7											
Rice - Barke 3004	68	318			68	318											
Maize	26	81	15	97	26	168	28	51,129	31,429	127.2	3,561	47	598,783	240	660	748	125,743
Arum	2	4			2	4											
Vegetables	12	13			12	13											
Total	278	863		461		3090						Total	3,159,785				1,568,783
						2227	uptake		all								
conversion	men	2,135				5,511			7,647	net return o	of irrigat	ted rice e	stimated at	Tk 19,7	'00 per ha		
to people	wom	2,007				5,180			7,187	Water dem	and of i	rrigated r	ice:	900 mr	n		

en

Note assumes all alternative crops replaced irrigated rice - in some areas these replaced fallow land so benefit is greater

some CBOs tried multiple crops but different farmers were involved

Sunflower: most trials in 2010, few in 2009, limited uptake beyond trials so far

Berke rice: level of continued uptake not estimated yet, but this component is an additional benefit from IFM initiative, not itself part of IFM approach

Vegetables: uptake not easily estimated as vegetables already grown in homesteads

For crops with small numbers of supported farmers the conservative assumption of no further uptake has been made

Fishery benefits

Category of	CBOs	Per CBO				Totals			All population		Members		Fishers	
СВО		Member-	Population	Fisher hh	Member-	Population	No fisher	Male	Female	Male	Female	Male	Female	
		ship (hh)	served	in	ship (hh)	served	hh in	benefic-	benefic-	benefic-	benefic-	benefic-	benefic-	
			(hh)	population	total	(hh) total	population	iaries	iaries	iaries	iaries	iaries	iaries	
				(income			(income							
				and			and							
				subsist)			subsist)							
Adopt IFM	87	183.91	1,600	600	16,000	139,200	52,200	344,439	323,721	39,591	37,210	129,165	121,395	
package														
Not adopt all 3	161	222.5	1,600	600	35,823	257,600	96,600	637,410	599,070	88,640	83,308	239,029	224,651	
aspects of IFM														
All CBOs active	252	199	1,600	600	50,148	403,200	151,200	997,686	937,674	124,087	116,623	374,132	351,628	

Conversion to men and women is based on the national average household size of 4.8 persons and national sex ratio of 106.4 males: 100 females.

CLUSTER 4: Other projects

Project Title: Rat Management for Rural Communities

Lead Project Organisation: Association for Integrated Development-Comilla (AID-COMILLA)

List of Partners: Natural Resources Institute (UK), Bangladesh Agricultural Research Institute (BARI), Department of Agriculture Extension (DAE), SHUSHILAN, MUKTI Nari, LDRO, ARBAN, PrompT, BRMA, MAWTS

Knowledge being put to use

Identify and describe all the knowledge products, processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

Despite the major economic impacts of rodents, they remain poorly managed in many situations through a failure to appreciate the range and scale of damage, to understand the population ecology of specific rodent species and appropriate management strategies, and ultimately to assess the costs and benefits of rodent pests and of their sustainable management. RNRRS knowledge (R8424, R8184) was generated in Bangladesh to address the problems with pest rodents experienced by people living in rural agricultural communities. This research showed that 5-10% of stored grain was lost to rodents over each 3-month storage period (each household losing $\approx 200 \text{kg/yr}$). Contamination with urine and faeces was also severe (200 > 1,500 droppings per kg). In common with most of Asia, Bangladesh farmers routinely plant 2 rows of rice for the rats for every 8 rows sown (pre-harvest losses ranging from 5-17%). Farmer damage assessments highlighted some of the more overlooked impacts of rodents, namely physical damage to houses, personal possessions, roads and fields. This damage requires extensive repair time to houses and fields, and significant financial expenditure when clothes, blankets, fishing nets, baskets, utensils, etc. are damaged. EBRM strategies were shown to reduce the impact of rodents by 60-80% for different measurable indicators. This was established through comparing intervention villages with non-intervention villages using case-control study designs. Similarly, farmer assessments showed EBRM strategies were roughly the same cost (financial and time) as former practice, but with a much higher benefit (rat population reduced by >75%). Furthermore, RNRRS actions trialled a training and dissemination system for delivering the knowledge required by rural communities to more effectively manage their rodent pest problems. Training materials in Bengali (video and manuals) were produced to assist knowledge extension.

The RIU initiative aimed to build on these previous RNRRS investments by establishing links between NGOs, commercial enterprise and the Bangladesh government Department of Agricultural Extension to deliver training, technology inputs and demonstration to a large number of farmers based in the Southeast, Southwest and Northern regions of Bangladesh. Creating this network of stakeholders was deemed the most appropriate way of identifying and overcoming bottlenecks in the supply of knowledge and tools to improve rodent management within rural agricultural communities. The problems around rodent pest management delivery are largely related to lack of knowledge at all levels of society about the scale of the problem and the potential solutions. Awareness raising and education were considered key issues that needed to be addressed in order to build end-user

demand and competence for better rodent management. Methods for creating end user demand for rodent management were a main action of the RIU project. Bottlenecks related to the supply of rodent management were related to the provision of appropriate knowledge and technology/strategies to end users. Therefore, methods for supplying knowledge and tools were a main activity of the RIU project. The premise of the project is that increasing the supply of rodent management knowledge and tools will lead to increased demands and a virtuous cycle of sustainable supply-demand infrastructure.

Significant evidence through RNRRS and other donor research programmes operating in parts of Africa and Asia have developed a strong consensus around the paradigm of Ecologically-Based Rodent Management (EBRM) as the most appropriate solution for managing rodent pest problems, particularly in developing countries where the impact of rodents on people's livelihoods is severe. EBRM has been shown to be cost effective, even in the context of poor subsistence level agricultural communities, and to be environmentally sustainable. Social anthropology is an important methodological component of EBRM as adoption must be at the community level in most circumstances, to ensure high levels of "buy-in" to the process and minimise "free loaders". Social sustainability is, therefore, another essential component of successful EBRM programmes.

The knowledge products and processes of this RIU project align with the project's five outputs, described in Section 2. Two of these outputs deal with education, training and knowledge delivery, one output with knowledge dissemination pathways, one output with technology supply/delivery and the final output with policy recommendations. This process involves training communities by providing them with basic knowledge about rodents to create awareness about the problem. For example, few are aware of the health problems caused by rats. As part of this training programme, key management activities are demonstrated within the community. This involves how to make indigenous household stored rice containers rat proof, how to minimise rodent nesting in haystacks and reduce rodent nest sites in houses, village environments and rice fields, how to carry out rodent trapping (location, placement, baiting), and how to organise rodent management at the community level. This training also targets and involves local opinion makers such as teachers, important farmers and local government officials as a means of increasing awareness, adoption and support within communities.

Non RNRRS generated knowledge used:

Ecologically-based rodent management is a paradigm that is not specifically attributed to the RNRRS programme and has developed through parallel funding received from a number of donors, particularly the EC research framework, EC development fund, World Bank, UNDP, ACIAR and AusAID. Much of this rodent management research has informed the thinking behind the RIU project in Bangladesh. History and links related to rodent management research, particularly in Asia can be found at http://sites.google.com/site/rodentmanagement/home

Project Outputs			
Project Output Title	Status of achievement	Deviations if any	Reasons for the
			deviation
1:Improved institutional	This output is 100% complete. Institutions involved in delivery of EBRM	None	
knowledge and capacity to	received training at the outset of the project through formal lectures		
deliver EBRM to rural	and practical. Staff at these institutions are subsequently putting this		
farming community end	knowledge to use within the community training activities (output 2).		
lanning community end	Through this, we can see that knowledge uptake and retention has		

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users	been very high, and the training received has been positively assessed		
2. Improved knowledge and capacity of end users to implement sustainable and cost-beneficial EBRM	by all those that have received it. Community training is nearly complete and on target (15,000 participants). Project partners have been impressed with the enthusiasm and depth of understanding shown by participants. Follow up monitoring has shown that participants do understand the knowledge given, can remember key facts, and are able to put the knowledge into practice. Monitoring of the impacts of the training has been ongoing throughout the project and changes in behaviour and practice were captured by the project monitoring and data management strategy.	A reduction in the number of end users was agreed with RIU management.	At the time of the project contracting, the value of UK Sterling was unusually high. This exchange rate was used during the formulation and agreement of the project's budget. Soon after signing the contract, there was a large, rapid fall in the exchange rate, after which the value of Sterling remained low. As fixed contractual costs in Bangladesh could not be changed, the solution was to reduce the number of
3. Improved availability of rodent management tools that are cost effective for rural farming communities	Commercial manufacturing of a new design rat kill trap was established in Bangladesh. Preliminary evaluations have tested the trap, and it proves to be nearly as good as those manufactured in the United States. Weak areas have been addressed in further manufacturing batches, but there is still some room to improve the durability of the traps. The great majority of traps last more than one year. The current cost of the local production is 80 taka per trap which is much less than the purchase and importation of similar traps from the US. Discussions	None	farmers trained.
	with communities in the different regions suggest there is some regional variation on the price people are willing to pay. Suggested prices by those that have used them range from 30 to more than 120 taka each. End user demand for the traps is very high, and it has not		

	been possible to fully meet this demand. Creating a steady stream of trap supply for selling through commercial partners and NGOs has been difficult. This is largely due to institutional changes at the partner MAWTS that has manufactured the traps. These changes have made it difficult for traps to be stockpiled without payment in advance. It is likely that a different institution will have to be found to manufacture the traps to get around this bottleneck.		
4. Improved knowledge dissemination pathways for EBRM	We have begun to establish a wide recognition of our project across many stakeholder levels. Many donors, development institutions and communities are now more aware of EBRM and the difference it can make to people's livelihoods. We have achieved this through the creation of our website, publishing popular articles in newspapers and institutional magazines of the DAE, holding lectures and meetings with academics, donors, international agencies and holding press conferences and ensuring journalists are always invited to key events. Awareness raising has also happened by ensuring the attendance of high profile VIPs to meetings, which further attracts journalists and media to publicity events. We have especially targeted communities as the main recipient for dissemination using a combination of leaflets, posters, banners, billboards, training manuals, video, songs and drama. These forms of dissemination are designed to make the issues of EBRM accessible to local communities, teachers, councillors and respected community members. The project's communication strategy will continue to escalate beyond the life of the project through continued action by NGO partners.	None	
5. Improved policies and recommendations on rodent pest management	We have developed a strong relationship with the DAE. We believe the DG will provide us with an opportunity to improve policies within the DAE after the project has completed. Project team members have met with the FAO country coordinator, WFP and UN staff as well as many donor representatives. Through this, we believe awareness about EBRM and the problems rats cause is higher among decision makers in Bangladesh than it ever has been, particularly due to the rat floods occurring in the Chittagong Hill Tracts.	None	

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

Output 1: Improved institutional knowledge and capacity to deliver EBRM to rural farming community end users. Activities for Output 1:

- 1.1 Training materials developed and produced
- Project Brochure (English), 4 colour, 10,000 copy
- Rodent CD (reprint) English, 1,000 copy
- Rodent CD (reprint) Bangla , 1,000 copy
- Festoon, 4 colour (Bangla), 3x 2 feet, 500 pc
- Farmers Dairy (Bangla), 15,000 copy
- Leaflet on Modified Rice Storage System (Bangla), 4 colours, 8.5 x 11.5 inch, both side laminating, 20,000 copies
- Leaflet on Nature of Damage (Bangla), 4 colour, 8.5 x 11.5 inch, both sides laminating 20,000 copies
- Leaflet on summary of project (Bangla), 4 colour, 8.5 x 11.5 inch, both sides laminating 20,000 copies
- Leaflet on general description of Rat (Bangla), 4 colour, 8.5 x 11.5 inch, both sides laminating 20,000 copies
- Leaflet on general description of Rat species (Bangla), 4 colour, 8.5 x 11.5 inch, both sides laminating 20,000 copies
- Leaflet on health issue due to Rat (Bangla), 4 colour, 8.5 x 11.5 inch, both sides laminating 20,000 copies
- Poster on Rodent (Bangla), 4 colour, 22 x 14 inch, 15,000 copy
- Trainer Manual, (Bangla) 56 pages, 4 colours, 600 copies
- Trainer Manual, (Bangla) 28 pages, 4 colours, 600 copies

1.2 Training course delivered to senior institutional staff

Training has been provided to all senior staff members (Regional Director, Deputy Director, Subject Matter Specialist, Upazila Agriculture Officer, Agriculture Officer etc.) of Department of Agriculture Extension (DAE) in the targeted District and Upazila level by NRI, BARI and AID-COMILLA. This is one day training. The DAE Officials who received the training they act as resource person during the farmers training at field level.

1.3 Training course delivered to implementing staff

Training has been provided to all staff members of the project at the beginning on project where experts from NRI, BARI and AID-COMILLA facilitated the training. Issue based training such as trapping, modified rice storage, storage loss assessment, haystack, facilitation technique, maintaining farmers training, FGD etc. also provided. All the staff members of the project are capable to explain use of qualitative tools to measure the delivery and impact of EBRM over time.

1.4 M&E of training uptake

All project staff received training on PRA technique for conducting FGD at farmer's level. The training conducted by PromPT. Assessment was take place during and after training courses using PRA

Output 2: Improved knowledge and capacity of end users to implement sustainable and cost-beneficial EBRM Activities for Output 2:

2.1 Defining community cohesion level

Although baseline data exist from previous RNRRS work, it has necessary to carry out PRAs in each project area at the very outset (collecting socio-economic and knowledge, attitude practice information) as the basis of measuring potential changes in people's livelihoods over time, including how people's attitudes and behaviour change as well as the effects of these changes on rodent management activities and overall livelihood improvements. These surveys establish the level of community recognition of rodent pests, current rodent management activities and the communities' willingness to participate in the RIU action. In this regard our baseline M&E has participatory, encouraging project staff and end users to jointly take responsibility to analyse, prioritise, evaluate and discuss the impact of the project actions.

2.2 Trainee selection

Each training group has limited to 25 people, where each group consists of people drawn from the same community. The project team work together with the community to identify the most appropriate and interested people wishing to receive training. Participation has stratified by gender, religion and wealth but also ensuring that teachers, Union-level political leaders and respected/influential community members are included. The objective is to create a representative group comprising the main social groups found in the community, but also recognising that particular sectors of the community has more proactively involved, e.g. women in the delivery of EBRM and teachers/leaders in the awareness creating/knowledge dissemination.

2.3 Delivery of Ecologically Based Rodent Management training to end users

During the project period we were able to train 15,000 farmers from 154 community (village) in different locations of Bangladesh. Out of 15,000 participants only 19 were male, the remaining 14,981 are women. Technical support has been provided by Natural Resources Institute (NRI), Department of Agriculture Extension (DAE) and Bangladesh Agricultural Research Institute (BARI). Training delivery at the farmer's level in different locations of Bangladesh has focused specifically on design and implementation of effective rodent management systems at the local level. Training materials and curricula were designed and delivered to the trainees in Bangla dialects.

Training delivery mechanism

Considering the knowledge-base of the participants, an interactive training approach emphasizing participatory learning was applied. The training delivery methodology included (but was NOT limited to) the following:

- Interactive Information Sharing
- Integration and Reflection
- Complex Interactive Exercise

- Group Exercise
- Multi Media Presentation
- Species Collection and Demonstration
- Use of Rat Kill Traps
- Demonstration on Modified Storage System
- Demonstration on Modified Hay Stack
- Video show on 'Rat Management'

All those contributed to make the training interactive, effective and increasing understanding of the training recipients on Ecological Rodent Management techniques and technologies.

Training Topics

The training curricula included the following topics:

- Rodent Species
- Rodent Behaviours and Biology
- Nature of Damages (how rodents damage/ symptoms)
- Rodent Disease
- Rodent Control / Management Techniques
- Rat Floods Associated with and Flood/Heavy Rainfall and Rodent Migration

The training methodology and training format aims at transferring the content taught in a way that participants will be able to practically use in their own settings. Therefore, the methodology of the training is based on Adult Learning Principles, which allow the transfer of information not only in a cognitive manner, but also in an experiential way.

2.4 Community-level knowledge dissemination

Trained community members disseminate their acquired knowledge to other community members. This has facilitated by NGO staff who revisited communities regularly. Initial follow-up was happen within a few days, followed by regular monitoring and evaluation visits at 2-4 week intervals whereby coalition staff visit the village to answer questions and check on progress of any management actions taken forward in the village. These follow-up visits are an important part of the training programme to ensure that knowledge given has been understood, giving an opportunity to ask questions after the knowledge has been thought over and put into practice. Regular follow-up every few weeks will take place over a relatively long period of time (6-12 months) in order to collect appropriate monitoring and evaluation data. This has followed by less frequent monitoring visits (every 3-4 months) to assess sustainability and impact.

2.5 Environmental management demonstration

In conjunction with follow-up visits carried out under activity 1.4, NGO staff was engage with communities through group meetings which

involve the locally trained staff to explain hygiene and sanitation issues and rodent transmitted disease issues to increase overall awareness. The concept of environmental management has introduced, and partners hasgin a process of demonstration on different activities that can be employed. This is likely to involve actions developed in RNRRS work on improved food storage methods to prevent rodent access and changing the way livestock fodder haystacks are made to reduce rodent harbourage near human habitation. Demonstration will necessarily be flexible and based on perceived needs in conjunction with increased awareness raising within the community.

2.6 Community decision making and EBRM implementation

Through the training and discussion activities undertaken by the NGOs and trained community members, the village has supported in a decision making process on how to tackle rat problems. The need to act as a unit has understood, and a process of intensive trapping has agreed. Consortium partners will have explained the various financial and organisational costs as well as the different EBRM trapping models that could be adopted, e.g. 25% rotational, 50% individual fixed but dispersed, or even 100% of all households. Generally communities has advised to adopt a 25% rotation scheme as it has financially cheaper, albeit with higher organisational costs. Ultimately, this has an informed community decision. Communities will need to understand that they will eventually be asked to find a way to fund their community EBRM programme. This may rely on all households contributing, emphasising that wealthier members can pay more. Previous RNRRS action suggests there has a high uptake of trap purchase that has sufficient to ensure the rodent population can be effectively reduced.

2.7 M&E of training uptake

Quantitative and qualitative assessment has carried out during the delivery of the training. Further qualitative assessment occur during the follow-up visits planned as described in activity 2.4. Documentation of M&E data, e.g. quantitative quizzes, tests and feedback forms and qualitative assessments by NGO implementing partners, has collated on a quarterly basis and handed up to the Data Manager at PromPT/AID-COMILLA. The qualitative assessment criteria includes surveys of knowledge awareness among community members that have not been trained (paying heed to different social groups) and ultimately in the decision making processes at the community level. Result level qualitative monitoring has done using interactive PRA groups in each community, with information collected by NGO implementing staff. Outcomes and impact level qualitative monitoring has done with PRA group sessions. Qualitative indicators will involve measuring changes in knowledge against the baseline PRA survey. Development of qualitative indicators used in the programme will occur in the first three months of the project in discussion with a subset of target communities (5-10%).

2.8 M&E of EBRM implementation and impact

There have been no negative external impacts affecting the project within Bangladesh. As indicated below under Assumptions, the changes in financial rules after contracting and a major decline in the strength of Sterling exchange rates were not originally anticipated have led to some external impact on delivery of on-the-ground activities. So far, these impacts have been managed effectively, but the project team is concerned the current financial payment systems is unsustainable and may even be illegal under Bangladesh government rules governing NGO activities. The EBRM approach has been widely recognized by different donors, particularly the UNDP, EU and AusAID which have subsequently funded actions in the Chittagong Hill Tracts (CHT). The large rat outbreaks occurring in the CHT are related to a 50-year cycle of bamboo flowering that leads to very large rodent population expansion. This event can cause large-scale famine and human population migration. It can also foment

civil unrest, and for this reason, the UNDP has been taking the rat flood outbreak in the CHT very seriously. This has been a positive external impact on our RIU project, helping to raise the profile and awareness of rodent pest problems throughout the country, in general, and would not have been possible without the previous capacity building that has occurred within AID-COMILLA and partner organizations to be able to deal with externalized problems such as the bamboo flowering event affecting the livelihoods of everyone in the CHT. Staff at Dhaka University and the DAE are now more aware of the EBRM approach and its effectiveness. The Vice Chancellor of Dhaka University suggested it was important to raise awareness about rats and subsequently hosted an international seminar for lecturers and students on rat management. The DAE is now using EBRM technology for their own rat management programme, with the RIU team providing technical support to the DAE.

Output 3: Improved availability of rodent management tools that are cost effective for rural farming communities Activities for Output 3:

3.1 Infrastructure investment, production design, materials sourcing

Trap design has done by MAWTS in their Dhaka central workshop located at Mirpur, Dhaka . All the raw materials were purchased from the local market. First MAWTS supplied 300 traps for field testing. Up on one month field test at village level we find some defective and informed MAWTS. Then the modified their design and produced 20,000 kill trap as per specification.

3.2 Staff recruitment

MAWTS employed one production engineer and one marketing officer for the job and they performed efficiently. BRMA employed one marketing officer for the purpose.

3.3 Market assessment

A baseline assessment of the market in rodent management tools has carried out by MAWTS and BRMA.

3.4 Distribution

BRMA was responsible for the marketing of the new design kill trap. During the project period they marketed 10,444 trap across the country through their 22 retailer using their existing distribution networks and retailers selling rodenticides and through hardware shops. This has coordinated by the BRMA who monitor availability and marketing of the traps at different points along the distribution chain.

3.5 Advertising, creating demand

MAWTS and BRMA invested their own marketing strategies and advertising. More over from the project 500 fastoon and 20,000 hand bills was supplied to BRMA to use through their marketing channels.

3.6 Outcome M&E Process and progress monitoring of trap manufacturing and distribution has done by AID-COMILLA .

Output 4: Improved knowledge dissemination pathways for EBRM

Activities for Output 4 :

4.1 International dissemination

The rodent web site was set up in September after the official launch ceremony in August and linked with the main RIU and grapevine websites. Since the rodent website was established, 60-160 unique visitors per month have visited the website, hailing from 43 different countries around the world. Most website hits are from Bangladesh, UK, USA, and India. Searches on Google remain, by far, the main way people access the site by people entering key word searches such as rats, rodents, EBRM, rat control, rat management, etc. However a significant number of visits occur through links made to our site on other websites, including the RIU site, IRRI, PBS and NRI sites.

The following link also discriminated our activities in international communities:

BBC World Service (2010) Rat Attack Science in Action. November 19th, 2010. <u>http://www.bbc.co.uk/programmes/p00bwg89</u>

BBC Earth News (2010) Attack of the Rats. November 19th, 2010. <u>http://news.bbc.co.uk/earth/hi/earth_news/newsid_9198000/9198744.stm</u>

CBCRadio (2010) Falling Flowers Rising Rats. Quirks and Quarks. December 11th, 2010. http://www.cbc.ca/quirks/episode/2010/12/11/december-11-2010/

Belmain, S.R. (2010) Battling rodents in Bangladesh. Pest. 11: 23-25. <u>http://www.pestmagazine.co.uk/DocFrame/DocView.asp?id=324&sec=-1</u>

Normile D. 2010. Holding back a torrent of rats. Science 327, 806-807. http://www.sciencemag.org/cgi/content/summary/327/5967/806

Belmain, S.R. (2009) Rat Race. Developments. 45: 33-35.

http://webarchive.nationalarchives.gov.uk/20100423085026/http://www.developments.org.uk/downloads/Developments%2045.pdf

Singleton, G.R. Belmain, S.R. and Brown, P.R. (eds.) (2010) Rodent Outbreaks: Ecology and Impacts. International Rice Research Institute Press, Los Banos, Philippines. 289 pages. <u>http://snipurl.com/27vrix</u> - contains two chapters from Bangladesh

Singleton, G.R. Belmain, S.R., Brown, P.R., Aplin, K. and Htwe, N.M. (2010) Impacts of rodent outbreaks on food security in Asia. *Wildlife Research*. 37:355-359. http://dx.doi.org/10.1071/WR10084

lo9 Blog http://io9.com/5694107/massive-plagues-of-rats-swarm-across-india-every-fifty-years

For general information and awareness raising about rodent outbreaks, a documentary film was produced by Oxford Scientific Films Ltd. This 45 minute documentary film has been broadcast on the Discovery Channel, Animal Planet in mid-January 2011 in the United States, and thereafter has been broadcast in parts of continental Europe (Belgium, Netherlands, Germany, Poland, Sweden, Finland, Russia, Ukraine) South Africa and Latin America. As of yet, no dates have been confirmed for its release in South Asia, the UK or other parts of Europe. This documentary can be downloaded via http://www.nri.org/projects/bandicoot/docs/swarmchasers%20rats.wmv

Seven Bangladeshi nationals attended an international conference at the International Rice Research Institute entitled: Impacts of rodent outbreaks on food security in Asia. IRRI, Los Baños, Philippines from 26-28 October 2009. Three oral presentations were made on rodent research carried out in Bangladesh, including research carried out by the FAO, the World Bank and the RIU. Dr. Steven Belmain of NRI, University of Greenwich was the co-organiser and a principal speaker at the conference.

Three Bangladeshi nationals attended the 4th International Conference on Rodent Biology and Management, University of Free State, Bloemfontein, South Africa from 12-19 April, 2010. Preliminary results from The Rat Management for Rural Communities project were presented in an oral presentation.

4.2 National dissemination

Television stations that telecast the project launch event

- Bangladesh Television (Government Owned)
- Channel I
- Boishaki Television
- ATN Bangla
- Ekusha Television

Print Media which published news about the launch ceremony and the project in response to a press conference held the day before the launch ceremony.

- Daily Ittafaq (Bangla), published August 1st , 2008
- The New Age (English), published August 2nd , 2008
- Daily Prothom Alo (Bangla), published August 3rd, 2008
- Daily Ruposhi Bangla (Bangla), published May 15th , 2008
- The Comillar Kagog (Bangla), published May 15th, 2008
- Daily Janakhonta (Bangla), published August 3rd , 2008
- The Independent (English), published August 2nd, 2008
- Weekly Comilla (Bangla), published August 10th , 2008
- Daily Shakti (Bangla), published August 2nd , 2008

Print media that published a rodent article about the project

- The New Nation (English), published August 4th, 2008
- The Independent (English), published August 13th , 2008
- The Financial Express (English), published August 1st , 2008

• The News Today (English), published July 31st, 2008

Print media that published an article on Rat Flood at CHTs and international seminar

- The Daily Star (English), published February 18, 2009
- The New Age (English), published February 18, 2009
- The Financial Express (English), published February 17, 2009
- The Independent (English), published February 20, 2009
- The Bangladesh Today (English) published February 17, 2009
- The New Nation (English) published February 16, 2009
- The Daily Ittafaq (Bangla) published February 19 & 21, 2009
- The Daily Janokhanto (Bangla) published February 16, 2009
- The Daily Amar Desh (Bangla) published February 16, 2009
- The Daily Jai Jai Din (Bangla) published February 18, 2009
- The Daily Noya Deganto (Bangla) published February 18, 2009
- The Daily Prothom Alo (Bangla) published February 18, 2009
- The Daily Ruposhi Bangla (Bangla) published February 16, 17, 18, 2009
- About 50 web-based news articles based on AFP news agency release

Television stations that telecast the international seminar

- Channel I
- Bangladesh Television
- ATN Bangla

Project activities telecasted by Bangladesh Television (a government owned television owned). Two-member team from Bangladesh Television (A Government owned Television) visited our Rat Management for Rural Communities Project on June 02, 2010 and the prepare a 20 minutes documentary on the Project, On June 09, June 10 and June 21, 2010 at 08:30 PM the telecast the documentary. Millions of viewers viewed the documentary with high interest

4.3 Local dissemination

Local discrimination done following tools:

- Drama on rodent issue
- Participation in District, Upazila level Agriculture Fair every year sponsored by DAE
- Poster distribution
- Fixation of Bill Board

Distribution and fixation of Festoon in different important place of the working area as well as outside working area.

4.4 M&E of dissemination uptake

Copies of all material outputs produced by the project and via other media efforts has kept centrally by the Data Manager. Where possible, electronic copies of all written, video and audio materials has uploaded to the EBRM website. Materials produced with project funds has quality controlled by the training manager, M&E manager and project leader. Where possible other media outputs has similarly quality controlled before publication. Feedback mechanisms has built in to many of the materials, giving contact details of partners and where to find further information, and enquiries from the public has monitored and documented. The EBRM website will use widely available software (e.g. www.statcounter.com) to monitor knowledge dissemination through the website.

Output 5: Improved policies and recommendations on rodent pest management

Activities for Output 5 :

5.1 Union/Upazila mobilisation

The project has specifically targeting policy makers at the local Union and Upazilla levels, ensuring that local leaders receive appropriate knowledge and awareness about rodents and EBRM. In this way policies at this level can be set through the initiative of local leaders. We will also encourage target communities to lobby their local leaders with regards to priority setting and tapping into the use of local development assistance funds that are managed at the Union and Upazilla levels. Communities has given the confidence to do this through the training and support systems of the project. This could lead to reprioritisation and long-term use of local funds for rodent management actions which can be particularly important in the context of rodents which may be living in "no man's land" such as in the foundations of roads, dikes, railroads or bush land.

5.2 National Regulatory Authorities

Although many anticoagulant poisons are registered for use in Bangladesh, the large bulk of rodenticide produced and sold is the acute poison Zinc Phosphide. As described elsewhere in this proposal (e.g. section 3.6), acute poisons should generally be discouraged as they are not that effective and have considerable mortality risks for children and livestock (fast acting with no antidote). Current regulatory frameworks in Bangladesh do little to change the emphasis of rodenticides imported from India, following basic supply and demand economics. However, improved and more informed regulation could help rebalance poison use towards the more effective and safer anticoagulants, increase the affordability of anticoagulants, and improve packaging information on all rodenticides that can help encourage a public shift in the types of poison used. For example, people simply don't understand the different modes of action of acute and chronic poisons, and the packaging information could explain the expected results in a more practical way, i.e. bodies will not be found when using anticoagulants. The project will, therefore, target members of the national Pesticide Registration Authority and Pesticide Technical Advisory Committee to influence and inform regulations related to rodenticides. Regular meetings of the Pesticide Technical Advisory Committee, which is comprised of scientists from BRRI, BARI, DAE and experts from Ministries of Agriculture, Environment and Health, has used as an opportunity to create awareness about the EBRM initiative and how government can play a role in encouraging more pro-active regulation.

5.3 Department of Agriculture Extension

The DAE plays a significant role in setting national priorities and policies related to rodent control and staff training. Currently, rodent management recommendations revolve around an annual rodent bounty campaign during one month of the year where people are encouraged to collect rat tails, winning prizes for the most tails collected. Although the bounty campaign will raise awareness, it does little to promote sustainable management through encouraging tail collection that can only be reliably done with acute poisons. Indeed to collecting the most rat tails will actively discourage sustainable long term management of rodents so that the rat population remains high at the time of the bounty campaign. Awareness of these issues and alternative national strategies such as EBRM has created among staff at the DAE, particularly in the Plant Protection Wing, with a view to abolishing the bounty and replacing it with a policy that advocates EBRM and community rat management. The DAE is also involved in setting the curriculum for extension staff training delivered through agricultural colleges, and EBRM project staff will work together with DAE staff to revise the curriculum, giving more emphasis to rodents than is currently the case.

5.4 NGOs

We expect one of the main exit strategies employed for encouraging further dissemination of EBRM after the project completes to be the use of NGO-operated revolving fund schemes and credit programmes whereby NGOs purchase traps in bulk, bringing these to communities within a knowledge transfer programme. Once the community sees the value, its purchase of the traps allows the NGO to buy more traps and repeat with a new community. This sort of scheme is widely used by NGOs in Bangladesh for many different activities, and we believe this is a feasible plan for continuing after the RIU programme ends. Using the results of the EBRM initiative, we expect to create awareness across the NGO sector, giving details of the economic sustainability of operating such schemes and the benefits which accrue to people's livelihoods. This has done by targeting NGO conferences and journals in Bangladesh, providing information on the costs and benefits of EBRM.

Activities other than Planned: Community Trapping

k.	Communities may choose 25% rotation every week,
l.	50% rotation every two weeks
m.	individual trapping as long as general EBRM principles are upheld
n.	Entire community involved (or nearly so)
0.	Daily trapping
р.	Rotation must cycle monthly in order to link with rodent breeding rates
q.	Environmental management

Media Coverage:

In Bangladesh:

Print Media: All the Bangladeshi English and Bangla news paper published article on the issue as well as project which created significant impact. **Electronic Media**: Bangladesh Television (Government) produced a documentary on the project and telecast in June 2010 for 3 days **International Media**: See section 4.1 above for mention of media outputs produced by Canadian, British and American journalists

Dramas, Songs

Coalition partner SHUSHILAN has developed two pot songs and 1 drama about the rodent project and has been performing the songs and drama in the field. All other partners will use this during future training sessions and we will record these songs to video for uploading to the project website in the near future.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project?Kindly describe your experiences in this regard.

i). Yes all the partners contributed as expected except PromPT. Trip Report by MIL Advisor: Bangladesh, 9th-24 January 2009 stated that . PrompT (Said Rukanuddin and Amir Hossain) has trained partner NGOs in village mapping, but apart from this it was not clear what specific backstopping in participatory or qualitative methods PrompT will contribute to the project. After that we drop PromPT from our partnership.

As per project documents the role of PromPT was: PromPT is the leading NGO in Bangladesh specialising in training and capacity building of other NGOs as well as many government institutions in the field of monitoring and evaluation, assessment methodologies and participatory M&E strategies. The project Data Manager will be supplied through PromPT which will have overall responsibility for monitoring and evaluation of the project action. PromPT is a professional organisation dedicated to promoting and instituting participatory approaches in development projects through playing a catalytic role.

After the dropping of PromPT , AID-COMILLA itself performed the responsibility of PromPT.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

1) We have developed a strong relationship with the DAE, and particularly with the new Director General who was formerly in charge of Plant Protection. The current DG is very familiar with our project, the problems and solutions we are advocating for rodent pest management and the need to increase resources and awareness to deal with rodent management. We believe the DG will provide us with a good opportunity to improve policies within the DAE over the next year and we have been planning to meet together with the Minister of Agriculture to discuss rodent management issues and implementing sustainable changes within the DAE. Although it has not yet been possible to schedule the meeting, this Ministry-level will be pursued even after the RIU project has completed. Project team members have met with the FAO country coordinator, WFP and UN staff as well as many donor representatives. Through this, we believe awareness about EBRM and the problems rats cause is higher among decision makers in Bangladesh than it ever has been, particularly due to the rat floods occurring in the Chittagong Hill Tracts. At the beginning of the project we organize a Inauguration workshop on August 2, 2008 at Dhaka where policy makers from Ministry of Agriculture, DAE, BARI, BARC participated.

- 2) The Parliament Members of our project area as well as DAE Officials are the policy makers /policy influencing groups for up-scaling our interventions. At District level the DAE officials are joining the project activities and during District Agriculture Fair we established our stall and most of the time the parliament member inaugurate the district agriculture fair and gather knowledge from our stall which will be used in future for any policy.
- 3) There have been no negative external impacts affecting the project within Bangladesh. The EBRM approach has been widely recognized by different donors, particularly the UNDP, EU and AusAID which have subsequently funded actions in the Chittagong Hill Tracts (CHT). The large rat outbreaks occurring in the CHT are related to a 50-year cycle of bamboo flowering that leads to very large rodent population expansion. This event can cause large-scale famine and human population migration. It can also foment civil unrest, and for this reason, the UNDP has been taking the rat flood outbreak in the CHT very seriously. This has been a positive external impact on our RIU project, helping to raise the profile and awareness of rodent pest problems throughout the country. AID-COMILLA was contracted by UNDP to develop training module and to train 2,500 local leaders, school teachers, religious leader, students, NGO staff, UNDP staff, DAE staff etc. on EMRM by which rat management can be done if there is any rodent out breaks.
- 4) The World Bank/Krishi Gobeshana Foundation of Bangladesh Agricultural Research Council awarded us to conduct a research project titled Ecological Determinants of Bamboo Flowering and Rodent Population Outbreaks in the Chittagong Hill Tracts. This is also recognition of our interventions.
- 5) UNDP hired Rodent team led by Dr. Steven Belmain of NRI in Bangladesh for a Scientific Assessment On Bamboo Flowering, Rodent Outbreaks and Food Security: Rodent ecology, pest management, and socio-economic impact in the Chittagong Hill Tracts, Bangladesh in November 2008.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes? ii). Have there been any unintended changes / consequences?

AID-COMILLA's initiative, partnership with other organization aims at building good working relationship as well as capacity building with local NGOs, Civil Society Organizations and educational institutions to achieve the greater goal of establishing a poverty-free, environmentally sound and a gender-just society. Neither poverty eradication nor the fight against the forces of under-development is possible by a single organization or authority alone. There are many local NGOs, CBOs, etc. experienced enough and working in the field of development with a strong commitment, but

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

cannot accomplish their objectives due to required support. AID-COMILLA helps these local NGOs, CBOs and educational institutions build their capacity by providing them with technical expertise and financial assistance.

AID-COMILLA's vision of a successful partnership is a relationship where each side is prepared to give up some self objectives in order to achieve communal/joint objectives; where there is a division of roles and responsibilities, a sharing of risks and a pursuit of joint objectives. Whereas donors work directly with organisations which already have the capacity for project delivery, working in partnership involves the transfer of skills which will build the capacity of one of the partners to eventually implement project activities.

The project partnerships also:

- build the capacity of a wide range of organizations (NGOs to village need-based groups) to effectively deliver extension of the methods after withdrawal of support from AID-COMILLA
- build the capacity of NGOs/CBOs to use participatory approaches in EBRM
- build and strengthen NGOs/CBOs capacity to identify and address social and gender issues in field activities
- work with NGOs/CBOs to establish a gender balanced staff from management to field level
- build the capacity of NGOs/CBOs to accurately monitor and evaluate their work
- facilitate networking and skills/information sharing between NGOs/CBOs, the GOB and other stakeholders
- strengthen NGOs/CBOs ability to work with local structures of GOB and apply for funding from donors to implement projects in their own right
- identify partners with whom AID-COMILLA can work in the future
- identify partnership strategies and principles of best practice which can be used by AID-COMILLA and other development agencies in the future
- work with academic institutions and research bodies to investigate topics that farmers identify as being important

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?

v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved? We have recently discovered that some communities are ceasing to trap once NGO support pulls out. The reasons are complex and range from general attitudes that the rodent problem has now been solved, at least temporarily, or difficulties in continued organisation of the communities once the NGO no longer actively visits a community. Follow-up meetings are ongoing with all communities to establish how pervasive such failures are and the underlying causes and potential solutions. It is likely that the training programme will need to give more emphasis on community organisation and leadership structures as opposed to simply discussing rodent management. Flexibility of implementation is feasible, but possibly not fully appreciated by communities and implementing staff.

Emerging impacts

The biggest change observed has come through a greater community awareness about rats, the damage they cause and how they can be successfully controlled. This awareness has been directly provided by the training and is being monitored by the farmer dairies which are issued to all trainees. Through this awareness comes a greater appreciation of the scale of the problem, changing people's incentives to do something about the rats. Community members now realise that they must act together and are realising the implications of what that means for organising themselves to overcome one of the main obstacles related to sustainably managing their rat problems. However, as mentioned under Lessons Learnt, there is an emerging issue related to a lack of sustainable community organisation structures which are affecting some community's abilities to maintain long term actions, with many communities reliant on outside help to provide leadership. Project staff are trying to address this impact.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Number & Type of Indirect Beneficiaries	Jumber &Number & TypeN'ype ofof DirectEndirectBeneficiaries(Beneficiaries(FemaleBenefi ciaries (indirect and direct)	Total	Evidence Index*
Output number 1 : Improved institutional knowledge and capacity to deliver EBRM to rural farming community end users	2,000	75	1,000	1,075	2,075	Please see annex #1 Agreement copy with DAE and BARI
Output number 2 : Improved knowledge and capacity of end users to implement sustainable and cost-	500,000	15,000	200,000	315,000	515,000	Please see annex #2 Attendance sheet for direct beneficiaries (We have 600 attendant sheets. For example we enclosed only 07

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beneficial EBRM						sheets.
Output number 3 :						
Improved availability						
of rodent	100,000	20,000	40,000	80,000	120,000	Please see annex #3 Agreement
management tools						copy with MAWTS and BRMA
that are cost effective						
for rural farming						
communities						
Output number 4:						
Improved knowledge	800,000	40,000,000	25,000,000	15,800,000	40,800,000	Please see annex #4 website link
dissemination						of publication, tv, newspaper,
pathways for EBRM						journal, article etc.
Output number 5 :						Please see annex #5 Attendance
Improved policies and	13,500	850	800	50	850	sheet of Department of
recommendations on						Agriculture Extension those who
rodent pest						participated in workshops / rodent
management						training etc. as direct beneficiaries
						from the Policy level of
						Government of Bangladesh(We
						have about 80 pages attendant
						sheets. For example we enclosed
						only 06 sheets.

*Please provide evidence for the figures included here as a separate attachment, use this column in the table to indicate where this evidence can be found.

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

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i). 15,000 farmers across five regions of Bangladesh have received training on EBRM, with the training provided by the staff of five different NGOs working in partnership with the DAE. Moulds and templates for locally producing high quality, sensitive and easy-to-use rat traps are now available in Bangladesh. Rat trap manufacture in Bangladesh was possible at one third of the price of buying and importing a similar trap design from the USA and the great majority of farmers and householders felt the trap was excellent value for money and affordable with many willing to pay significantly more than the production cost. These traps were successfully distributed and sold by NGOs involved in the project as well as by the Bangladesh Rodenticide Manufacturers Association of small businesses. The BRMA network extends across the country and was able to quickly sell traps provided by the manufacturer. Rat trap production bottlenecks remain and are related to institutional changes that have occurred at MAWTS – an agricultural training and manufacturing institution which has found it difficult to pre-finance trap manufacturing and stockpiling. This bottleneck can probably be easily resolved by working with a different manufacturing company. Awareness of rodent problems and the use of EBRM methods to tackle them is much higher at the policy level in the government of Bangladesh, particularly within the DAE. This increased awareness has yet to translate into concrete policy changes, but we believe that continued interaction with policy makers will eventually result in positive changes in how knowledge and technology for rodent management are delivered through extension services.

ii). Baseline data have been analysed in conjunction with the impact assessment data. However, this is not yet in report format. Impact data were collected over the last two months and have only recently been through the first stage of analysis. The data are unlikely to be prepared in the form of a report, and instead, will be used to develop a manuscript for submission to a peer-reviewed journal. This is likely to take several months of effort beyond the timeframe of the RIU project.

iii). We have conducted an impact assessment study. This has yet to be developed into a full report and the effort involved is more likely to take shape as a manuscript for submission to a peer-reviewed journal. A zipped file of the raw data analysis can be provided on request, but this is yet in a form that is easily digested and will take several months of further analysis to prepare into a manuscript. The main findings from this report are: 1) Education, gender, age and occupation significantly influence outcomes and attitudes towards EBRM. For example, even before involvement in the RIU project, women are more likely to use trapping for rodent control, whereas men are more likely to use poisons. Higher education levels were clearly associated with lower rates of poison use, more awareness about disease problems, etc. 2) Attitudes have progressively changed over each year of the project. For example, those understanding that rodents transmit disease has risen from about 40% at the beginning to more than 95% at the end. And those believing that rodents can be successfully controlled and that their control actions are effective have risen from about 30% to 100% by the end of the project. 3) EBRM has reduced people's problems with rodents and can have expected and unexpected consequences. For example, at the outset approximately 70% of people stated they would cover leftover food at night, but by the end, less than 50% of people stated they covered their food at night. This is unexpected and presumably because there was less of a problem with rodent contamination. More positively, rodenticide use crashed to nearly 0% from approximately 75% at the outset.

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.
ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions? Social exclusion summary related to the Project:

- Physically disabled : Involved in EBRM, dependent on extent of disability, they help the women for trap setting in houses those who have hands.
- Mentally disabled: Was difficult to engage in EBRM but they were benefited in their livelihoods through saving money by using the EBRM
- Socially disabled disinterested: Was difficult to engage in EBRM but they were benefited in their livelihoods through saving money by using the EBRM
- Albinos : Was engage in village area activities, but not in field activities.
- Very old : They participated gaining respect and support at the community level.
- Homeless: Was difficult to engage in EBRM but they were benefited in their livelihoods through saving money by using the EBRM
- Beggars : Was difficult to engage in EBRM but they were benefited in their livelihoods through saving money by using the EBRM

Gender: Out of 15,000 participating beneficiaries only 19 are men, the remaining 14,981 are women. From our previous RNRRS research it was shown that women play a significant role in project implementation in terms of trapping in houses and data collection on rats killed. Men are generally concerned with rodent management in a field context, where problems are perceived to be lower. Women are sometimes dependent on men for rodent pest management as it was men who went to the market to purchase poisons; so women are partly constrained in their ability to manage rodent pests around the household as they potentially had no access to rodent management tools. Women felt strongly empowered by the EBRM intervention, particularly the use of intensive trapping, as this allowed them to do something about their rodent pest problems without repeatedly seeking money to buy poison which their husbands would have to buy. Women also gained considerably more than men in the amount of work saved through EBRM. This is because many household chores that are traditionally female activities became easier, e.g. repairing damaged walls and floors, cleaning the house and repairing clothes and blankets, and were significantly reduced by the EBRM intervention.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

Starting in 2007-2008 there were rodent outbreaks in the Chittagong Hill Tracts which have caused severe damage (>80%) to crops and households. UNDP and AusAid assigned Dr. Steven Belmain for a scientific assessment of the Rodent Outbreaks. Dr. Steve, AID-COMILLA, BARI, Dhaka University,

BSMAU jointly carried out the study which was published by the UN and it was highly recognized by the government of Bangladesh.

UNDP contracted AID-COMILLA to disseminate the EBRM technology throughout the hill districts including training 2500 stakeholders (indigenous community leaders, school teacher, health worker, UNDP staff, NGO staff, DAE staff, elected representative, local administration etc.). The AID-COMILLA rodent team efficiently carried out the job and it was highly recognized that EBRM technology is the most able to manage the rodent problem during such outbreaks.

FAO engaged our Training Manager Dr. Sontosh Kumar Sarker for a further scientific study on rodent impact during outbreaks in the CHT.

Annex 6 Research Into Use Programme – final reports from Asia Innovation Challenge Fund

Innovation Challenge Fund

For scaling out natural resource research outputs in Asia



Final Report

Start Date : January 2008

Duration : 42 months













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ProSCAB Activities





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1. Executive Summary

Through DFID funded projects, technologies for crab fattening, molluscs culture, seaweed culture, improved fish icing and drying – and associated value chain analysis, storage and transportation – were developed with community partners. RNRRS outputs described those technologies as simple and inexpensive. Since then the technologies have been used in some areas of coastal regions, providing additional income for poor households. Non-conventional aquaculture involving small scale producers and low input processes can enter and add significant value to local, national and international market chains. Several DFID funded projects have been conducted on these five aspects: crab fattening, mollusc culture, seaweed culture, fish icing and improved fish drying and their value chain analysis in the coastal areas of Bangladesh. The RNRRS outputs stated these five technologies as easily manageable and affordable by poor coastal communities and there are potentials for upscaling. Using these simple methods of mud crab, three molluscs and two seaweeds can be produced in khas (government owned) natural water bodies and open access coastal areas with small additional production costs and limited risk periods. Value can be added to and the 'shelf life' prolonged of fresh fish through low-tech approaches to fish icing. Premium quality dried fish can be produced without significant increase in production cost for local, national and international markets.

The livelihoods of coastal low-caste Hindu Jaladas (fishers), poor Muslim fishers and ethnic tribal (*Rakhaing*) communities, depended mainly on fishing and fish related activities, have long been threatened due to serious depletion of aquatic systems and organisms. As DFID funded small scale projects successfully generated these five technologies through partnership between researchers, NGOs and communities, coastal poor fishers and landless households can easily produce non-conventional, high value commodities using minimum assets and modest skills for both local and overseas markets. The high demand for the wider dissemination of these technologies along the coast has been vocalised by the coastal poor fishers and landless, NGOs working in the coast, policy makers and the government of Bangladesh. It was a prime target that through elimination of existing social and market barriers, the RIU initiative would reach those poorest beneficiaries for proper distribution of benefits.

There are five partners in the coalition, four from Bangladesh - lead partner and data manager - Bangladesh Fisheries Research Forum (BFRF); key innovators and initiative drivers - the community partners; innovation network facilitators - the NGOs Shushilan and COAST; local service network linkages - the Department of Fisheries (DoF); and one international partner for technical backstopping - University of Stirling, UK. The partners under the proposed initiative were the key actors involved in past innovations. The policy environment was also in favour of technology generation as national and

international development partners and donors were keen to find ways to generate alternative income for the resource poor coastal communities often subjected to natural calamities. The opportunities created by those interventions were highly appreciated by different sections at national and international policy level. Legal and advocacy support was provided by the BFRF through connections to bodies like DoF and other NGOs. BFRF played the key management role for overall implementation, monitoring and evaluation of the initiative, including data management. BFRF with particular strengths in dealing with both qualitative and quantitative data from community focused initiatives was engaged to manage data collection, collation and analysis to ensure that lesson learning was achieved without the need for unnecessary data gathering.

During the ProSCAB initiative of three years from July 2008 to June 2011, more than 5000 community partners from four agro-ecological zones along the coast were addressed. An initial core of 1000 households were trained and equipped with technical, and business skills. Initial selection of preferred production of aquaculture organisms or post-harvest value addition allowed community partners to validate the technology in their own circumstances and enabled horizontal scaling-up to more households with a relevant resource base. All partners tested and improved five technologies in 34 villages of 11 Upazilas under 5 coastal districts within the first 2 years. The constraints were identified and possible remedies discussed by all partners in the innovation network, including community-tocommunity discussions facilitated by the NGO partners. Thus the production and marketing practices were extended to an additional more than 4000 households by the initial community partners through exposure visits and training facilitated by NGOs, DOF and technical back-stoppers. Because these products have local markets and they offered opportunities of auto- extension where their value was advertised and recognised through the marketing and linkages into international markets provided drivers for quality processes innovations in order to remain competitive.

The purpose of the RIU-Innovation Challenge Fund was to provide financial support to take promising research, funded by DFID (and other agencies where appropriate), to the next stage of use. The ProSCAB initiatives contributed to RIU's purpose by delivering significant use of Renewable Natural Resources Research Strategy (RNRRS). The major objectives of the proposed initiative are to provide alternative income generation for an improved socio-economic conditions of the poor and disadvantaged coastal fishers like low-caste Hindu *Jaladas*, poor Muslim fishers and ethnic tribal (*Rakhaing*) communities in Cox's Bazar, Chittagong (southeast) and Khulna-Bagherhat-Satkhira (southwest) areas of Bangladesh using participatory innovation approaches.

Performance of five technologies have been evaluated with full neutrality and found that not all have got the similar success, rather some are adopted by the people and some are not. Some concerns over limitation of some technologies have been identified and may need different approach for scaling up.

The mud crab *Scylla serrata* are common in mud flats of the littoral, parts of the supra littoral and the inter-tidal muddy zones of the Bay of Bengal. In recent years, live mud crab has become one of the most important exported commodities due to high price and demand in the international market. The mud crab is leading the supreme position h in the view of market demand and making economic profit, due to high food quality, larger size of Bangladeshi crab than the other countries. Production as a whole for, crab fattening - are quite healthy and scaling up of technologies has already reached the target number of HHs. Crab culture has been spreading rapidly among the farmers day by day in the Southwest region. Through the efforts of the ProSCAB research team crab culture was introduced into the Southeast Cox's Bazar region and expanding there rapidly. Crab cages with large multi compartments have been giving better results compared to small multi compartments.

ProSCAB has long been supporting crab fattening in the project areas at southeast and southwest coast of Bangladesh. Hundreds of HHs people, particularly women have taken up the technology and have been getting benefits from crab fattening. In most of the cases, the juveniles and adults for crab fattening are the by catches of fishermen's catch. However, collection of seeds for crab culture is becoming risky for nature and the natural stock may suffer overexploitation. It is now the peak time to establish crab hatchery in the areas of crab fattening. With the direct assistance from ProSCAB team, two private entrepreneurs have formed two joint stock companies – Sundarban Crab Hatchery and Culture Limited, Satkhira (South – West Bangladesh), and Five Star Fishery Limited, Cox's Bazar (South – East Bangladesh) and have submitted their EOI (expression of interest) application to the EEF (Equity and Entrepreneurship Fund) of ICB (Investment Corporation of Bangladesh). The fund is expected to be released to the entrepreneurs soon.

While three most popular mollusc species are available in this country and technologies of their culture are available, there are risks of poaching of mollusc rafts in the coastal pockets that inhibited further expansion. Under the ProSCAB, production of seaweed is initiated. The partner NGO – COAST and a few others - PKSP, CWE, COAST successfully promoted seaweed in the Cox's Bazar and Teknaf areas through panel test and exhibition. Through the initiatives of ProSCAB, a number of programmes and

articles on different aspects of seaweed have been broadcasted in the national dailies, TVs and Radios.

The ice box designed and promoted by ProSCAB received wider appreciation among the fish retailers, depot holders and other intermediaries because of its durability and cheaper value. The retailers outside OGs are using ProSCAB-designed ice box for fish preservation and transportation. Local manufacturer are producing the ice box according to the design of ProsCAB

Pesticide-free dry fish production has reached to a new dimension due to increased awareness of consumers. The drying technology using solar dryer have been taken up by a number of private entrepreneur in both regions. The product produced through ProSCAB OGs has received greater acceptance by the consumers in Dhaka and Chittagong. Several linkages have been developed with affluent outlets of local and city based exporters to market the products. The community people modified the solar dryer themselves by introducing more durable materials (like use of iron rod ring instead of bamboo made one, and thin meshed nets to cover the tunnels).

Steady-state availability of crab seeds to be ensured through establishment of hatcheries. In order to sustain crab fattening and to ensure more expansion DFID may help the hardcore poor in the both regions with additional supports over the next three years. Increased consumer awareness through motivation by ProSCAB partners for pesticide-free dry fish and premium quality of both dry iced fish will increase the growth and sustain the dry fish production and wet fish business in this country.

A comprehensive GoB policy on coastal production issues is very much essential for the development of this sector. A strong multi-sectoral coordination within the GoB departments like Ministry of Fisheries and Livestock, Ministry of Environment, Ministry of Agriculture, Ministry of Land, Ministry of Water Resources, different private bodies like ice factory, power supply company, stakeholder-based groups, etc should be needed. Beside these, natural disasters like cyclone, tidal boar, land erosion, etc should be given due consideration during the planning process, as these can seriously hamper coastal production and livelihood of the people. Farmer-farmer, trader-trader and farmer-trader linkages are required for smooth marketing, ensuring fair price and market promotion. Regular monitoring and farmer's field visit by the DoF personnel and NGOs will also help resolve field problems instantly.

Largely through the three and half years activities of ProSCAB, coastal people of Bangladesh are now highly motivated towards crab fattening, pesticide-free fish drying and fish transportation with icing with cheaply made baskets. Now, in order to continue the activities and take forward the ProSCAB initiative to a much wider community in the days to come, the present mental make up of the coastal people and zeal to be self-reliant should be directed using a coordinated approach with enough backstopping and ensuring the real value of the product at the farm-gate level and above all maintaining a peaceful sociopolitical environment. BFRF will remain ready to support a large scale expansion of at least three technologies (crab fattening, fish drying, and fish transportation in cheaply made iced baskets) had there been support offered from the DFID in the near future.

2. Introduction

BFRF (Bangladesh Fisheries Research Forum), a professional organisation established in 2002 and made up of university teachers, development professionals and commercial partners involved in education, research and extension in the field of aquaculture, fisheries and aquatic resource development, has coordinated the project "Promotion of sustainable coastal aquaculture in Bangladesh (ProSCAB)" with Professor MA Wahab as the Project Leader, and with NGO partners, Shushilan and Coast Trust, backstopping supports from 3 national and 1 international Backstoppers and GOB supports from the Department of Fisheries (DoF). A Data Manager and later, a Market Consultant involved I the programmes. In partnership with the various coastal communities, partner NGOs and the DoF, BFRF was responsible for fine-tuning the technologies to address the needs of all partners, matching training approaches with the varied training needs of partners and ensuring effective participatory monitoring of the impact of the initiative and multiplier effects. BFRF also drew on the skills of recognised researchers of excellence within its membership to ensure effective management and use of data collected in this initiative.

The major objectives of the ProSCAB were to provide alternative income generation for an improved socio-economic conditions of the poor and disadvantaged coastal fishers like low-caste Hindu *Jaladas*, poor Muslim fishers and ethnic Tribal (*Rakhaing*) communities in Cox's Bazar, Chittagong and Khulna-Bagherhat-Satkhira areas of Bangladesh using participatory innovation approaches.

Non-conventional aquaculture involving small scale producers and low input processes can enter and add significant value to local, national and international market chains. Through DFID funded projects, technologies for crab fattening, molluscs culture, seaweed culture, improved fish icing and improved fish drying – and associated value chain analysis, storage and transportation – were developed with community partners (RNRRS Numbers: R6011, R7969, R8094, R8288, and AFGRP strategic projects A05, D07, D11, T02 and T04). The RNRRS outputs described those technologies as simple and inexpensive, easily manageable and affordable by poor coastal communities. Since then the technologies have been used in some areas of coastal regions, providing additional income for poor households.

Mud crab fattening systems, appropriate to Bangladesh, were developed in earthen ponds and bamboo cages during a DFID-funded research project in three coastal districts during 2000-2004. Mud crab fattening technology brought about tremendous positive impacts to lowcaste Hindu communities in very short period of time in Satkhira region (Shah, 2007). Declining catches of mud crab, molluscs and sea weed from open waters for domestic consumption and local sale have threatened the livelihoods of the very poor fishers in the coastal area. Broad awareness through general media of the potential for solutions developed in previous research carried out collaboratively by NGOs, coastal communities and researchers have driven demand for access to the technologies from ethnic minority, poor Muslim fishers and Tribal communities along the coast. The partner NGOs have been approached by various communities within their operational areas for support in scaling up of these technologies, but have not been able to deliver a value-added response to date. The ProSCAB funding supported their initiatives in this direction.

During another DFID-funded project in 2004, coastal landless poor - who typically collect shrimp post larvae – from villages in the Cox's Bazar area successfully, undertook mollusc spat collection and culture. Local markets were available among the tribal community at Cox's Bazar and in Hill Tract districts for the products, which were only desired by poorer groups of the community. This option provided a livelihood for poor producers and improved availability of food for poor consumers. Mollusc culture was proved to be economically viable in Moheshkhali, Chafuldandi and Saint Martin's Island (Hossain et al, 2004 and Hossain et al, 2007), but opportunities existed for scaling up to more communities and to new markets. Culture of seaweeds *Caulerpa* and *Hypnea* using rope line and bamboo pole in the intertidal zone was practiced to observe its impact on generating alternative livelihood. A few coastal communities were given hands-on training on seaweed culture and continued production in the coastal belt. Large scale production of seaweed generated alternative livelihood for the coastal communities, reduced the nutritional deficiency and enhanced national export to markets already emerging in China. Seaweed culture technology was validated in Saint Martin's, Chakaria and Halishahar as one of the successful livelihood options for poor coastal communities (Zafar, 2007a, 2007b).

A 25-30% of the artisanal catch in the coastal region is spoiled every year due to lack of adequate handling and icing practices and devices. In order to reduce such huge post harvest loss and to improve the quality of wet fish supplied to domestic markets a 'low cost ice box', a 'community ice box' and improved practice for fish handling and icing were developed by the SUFER project in 2000- 2006. Their further dissemination within this initiative will continue to strengthen fish quality in order to maintain incomes for small-scale traders and safe, quality food for consumers.

A key post-harvest processing option in Bangladesh is the drying of fish, which regularly fetch high prices if quality can be assured as demand is high. In order to improve the drying process and remove the need for the use of pesticide as a preservative, low-cost solar dryers and ring and box tunnels were developed in partnership with poor members of the *Jaladas* community in Cox's Bazar, Kuliarchar and Daudkandi areas in order to minimise investment cost and maximise efficiency (Nowsad, 2005, 2007; Nowsad and Islam, 2008a & b).

Therefore, using these simple methods, mud crab, three molluscs and two seaweeds were thought to be produced in *khas* (government owned) natural water bodies and open access coastal areas with small additional production costs and limited risk periods through ProSCAB initiatives. Value could be added to and the 'shelf life' of fresh fish could be prolonged through low-tech approaches to fish icing. Premium quality dried fish could be produced without significant increase of production cost for local, national and international markets using solar dryer.

The livelihoods of coastal communities, depended mainly on fishing and fish related activities, have long been threatened due to serious depletion of aquatic systems and organisms. As DFID funded small scale project successfully generated these five technologies through a partnership between researchers, NGOs and communities, coastal poor fishers and landless households could easily be able to produce non- conventional, high value commodities using minimum assets and modest skills for both local and overseas markets. The high demand for the wider dissemination of these technologies along the coast had been vocalised by the coastal poor fishers and landless, NGOs working in the coast, policy makers and the government of Bangladesh (Muir 2004, Shah 2007). Eliminating existing social and market barriers, thus the RIU initiative reached those poorest beneficiaries for proper distribution of benefits.

Women and men of low-caste Hindu Jaladas, poor Muslim fishers and ethnic Adivasi (Rakhaing) community groups within the working areas of NGOs COAST and Shushilan were targeted through this initiative. In the past, these people were involved in collection, trade and consumption of marine resources like - mud crab, mollusc and in a few cases seaweed and in the post harvest processing of fishery products. Due to biodiversity degradation and stock depletion, it was increasingly difficult for them to access those resources from open waters. That made them more vulnerable and nutritionally insecure within an unsustainable livelihood, excluding them further from mainstream society. Including these coastal ethnic poor groups in the further development and management of the initiative and working with them and relevant institutions to provide an enabling environment for them to produce and trade aquatic products had huge impact on their livelihoods - improving income generation, poverty alleviation, nutritional security, confidence and esteem.

During the ProSCAB initiative of three years from July 2008 to June 2011, more than 5000 community partners from four agro-ecological zones along the coast were addressed. An initial core of 1000 households were trained and equipped with technical, life and business skills. Initial selection of preferred production of aquaculture organisms or post-harvest value addition allowed community partners to validate the technology in their own circumstances and enabled horizontal scaling-up to more households with a relevant resource base. All partners tested and improved five technologies in 34 villages of 11 Upazilas under 5 districts within the first 2 years. The constraints were identified and possible remedies discussed by all partners in the innovation network, including community-to-community discussions facilitated by the NGO partners. Thus the production and marketing practices were extended to an additional more than 4000 households by the initial community partners through exposure visits and training facilitated by NGOs, DOF and technical backstoppers. Because these products had active local markets they offered opportunities of autoextension where their value was advertised and recognised through the marketing process and linkages into international markets provided drivers for quality innovations in order to remain competitive.

The partner NGOs in the initiative, COAST and Shushilon,have long working experience with the marginalised coastal fishing communities. Following active promotion as part of previous projects, many communities became aware of the NGOs involvement in the development of new and improved production and processing opportunities for coastal aquatic products and approached the NGOs for more technical information and support. While a piecemeal support was provided to a few, but there was a clear demand for a more co-ordinated approach to scaling up of these technologies. The NGOs engaged their original project partners to ensure the scaling up also widened opportunities for innovation. The BFRF coordinated all such activities, but the communities themselves continued to drive the innovation process in line with the production and marketing needs. Both NGOs supported wider business training to bolster credit provision through revolving funds.

It was not difficult to work with those community people as those were known to the implementing partners during previous RNNRS intervention for technology development. These households were usually engaged in artisanal forms of fishing and related activities, with many now being female-headed as a result of widowing from fishing deaths, tiger predation or cyclone. The Rakhaing community has maternal heredity as a result of this recognised risk from husbands being lost at sea. They were benefited from an increased portfolio of livelihood options, enabling greater resilience to natural shocks through diversification of risk. Additional income gained from these comparatively low labour demand technologies supplemented household incomes; with some technologies like mud crab fattening providing a rapid turnover of just 10 days. The network linkages developed with government line agencies, NGOs and with each other added further social capital to increase resilience.

The two NGOs engaged in the initiative were benefitted through having a greater range of proven technologies to disseminate to the existing households and from more people seeking credit to support new businesses from initiative partner households and other coastal communities. They were also able to offer existing services to the households of partner communities in this initiative.

The Department of Fisheries staffs were trained for longer-term institutional support to community partners. Wider dissemination of innovation outputs to other communities also benefited them because of the added value they brought to their target communities. Over 50 DOF and NGO staffs were trained and those got first hand experience of the technologies as adopted by community partners within their areas.

BFRF and related researchers were able to promote a further success in their work to help alleviate poverty in the country through the partnership of researchers, NGOs, Govt Departments and the community. The promotion of this process took place both nationally and internationally, to highlight the BFRF model as an effective institutional mechanism to support development.

3. Objectives

The major objectives of the ProSCAB initiative were to provide alternative income generation for an improved socio-economic conditions of the poor and disadvantaged coastal fishers and ethnic tribal communities in Cox's Bazar, Chittagong and Khulna- Bagherhat-Satkhira areas of Bangladesh using participatory innovation approaches. The specific objectives were:

- i. Organizing coastal poor communities for entrepreneuring five coastal productions, viz., crab fattening, pesticide-free safe dry fish production, seaweed culture, mollusc culture and wet fish trading through improved icing;
- ii. Developing individual HH level entrepreneurship on five coastal productions through skill development;
- iii. Refining coastal production options with the stakeholders;
- iv. Developing backward and forward linkage for commercial coastal productions;
- v. Up-scaling coastal production technologies with and beyond study areas; vi.

Innovating network linkage for market and export of coastal productions; vii.

Empowering coastal women and socially excluded people; and

viii. Policy adoption based on coastal productions

4. Role of BFRF in coordinating the project

BFRF is a professional organisation established in 2002 made up of university teachers, development professionals and commercial partners involved in education, research and extension in the field of aquaculture, fisheries and aquatic resource development. The main aim of BFRF is to develop and exchange knowledge and experience gained through needs-based education, poverty focused research, extension and developmental field activities in order to achieve the millennium development goals. Major activities include conducting action research to further evolve appropriate technologies, organizing communication events, developing extension materials, managing projects and providing expert opinions. It also acts as a think tank for shaping the country's fisheries research and extension strategies for immediate and long-term benefit in the development of the country - from grassroots to policy level.

In the proposed RIU initiative, BFRF has acted as coordinator and data manager. In partnership with the various coastal communities, partner NGOs and government departments BFRF was responsible for fine-tuning technologies to the needs of all partners, matching training approaches with the varied training needs of partners and ensuring effective participatory monitoring of the impact of the initiative and multiplier effects. By brigning the research scientists and academics from the Bangladesh Agricultural University (BAU) and Chittagong University (CU), BFRF has drawn on the skills of recognised researchers of excellence within its membership to ensure effective management and use of data collected in this initiative.

A separate bank account in the name of the initiative was opened and financial statements and supporting documents of initiative expenses were submitted to RIU at regular (agreed) intervals and at end of the work. BFRF accounts are audited annually by a reputed and registered firm of chartered accountants.

5. Roles of the other partners in ProSCAB

There were five partners in the coalition, four from Bangladesh - lead partner and data manager - Bangladesh Fisheries Research Forum (BFRF); key innovators and initiative drivers - the community partners; innovation network facilitators - the NGOs Shushilan and COAST; local service network linkages - the Department of Fisheries (DOF); and one international partner for technical backstopping - University of Stirling.

The partners under the completed initiative were the key actors involved in past RNRRS innovations. The policy environment was also in favour of technology generation as national and international development partners and donors were keen to find ways to generate alternative income for the resource poor coastal communities. The opportunities created by those interventions were highly appreciated by different sections at national and international policy level.

The community partners led the innovation process, with facilitation from NGOs, BFRF, Stirling University, and some community members were involved in the original research funded by both RNRRS and DFID-Bangladesh. Community partners chose their preferred production and processing options from a suite of five technologies: culture of mud-crab, seaweeds or molluscs and post-harvest value-addition of fish products through icing or drying (or both). Central involvement of new community partners in the proposed innovation process facilitated wider uptake of the production options, with initial community partners worked with NGOs to inform new communities about the improved production opportunities. Technical back-stopping was provided by researchers from BFRF and Stirling University who were involved in the original RNRRS research in this field. Linkages into local service networks to support innovation were facilitated by both NGOs and the local DOF office, the latter provided linkages to wider government services in the long term.

The initiative placed all partners at the same level, with the aim of improving the livelihoods of poor coastal fish farmers, fishermen, fisher-women and their families coming from a range of disadvantaged local communities.



The figure above shows how various partners worked together. The 'initiative working centre' (IWC) was a virtual, mobile entity, that represented the point at which all partners came together to discuss relevant issues. Depending on the issue, that was in Dhaka where community partners were facilitated to engage directly with policy makers, and also in programme areas, where it was more convenient to discuss innovation in the local context. The example below shows how the IWC was shifted to community areas during the horizontal scaling up process. The various occupational groupings (OG) were C=crab fattening, S=seaweed culture, M=mollusc culture and P=fish processing (icing or drying). Community partners shared learning through local networks co-ordinated by the NGO partners.



Shushilan (a Bengali word, literally meaning devoted to do good for the community) was an established coastal NGO working in different aspects of socio-cultural development of socially underprivileged community (coastal tribal, low caste Hindu, poor Muslim fishers etc). The organization created opportunities and enabled the socially underprivileged community to engage in sustainable resource management, livelihood security, gender equity and human rights pertinent to coastal fishers, fisheries, fishing rights, forestry, livestock and agriculture.

COAST (Coastal Association for Social Transformation Trust) is a relatively large NGO that organized strategically important activities related to development in the coastal areas of Bangladesh. In all the areas of its development work, COAST implemented a concept of core programs, including fisheries and aquaculture, with the objectives of sustaining livelihood, knowledge and skill development, and to make communities self- reliant through income generation. DOF (Department of Fisheries) had been under the administrative control of the Ministry of Fisheries and Livestock and had the largest network infrastructure and manpower reaching the grass root level. It has administrative set-up at national, divisional, district and Upa-zila levels. There were three fish inspection and quality control stations, a Marine Fisheries Station, six Fisheries Training Centres, and more than 100 farms and hatcheries all over the country. From its birth in early 70s, DOF has been involved in training, demonstration and extension advisory services at the community level, enhancing fisheries resources through implementing conservation and management measures, conducting fisheries resources survey and stock assessment, facilitating arrangement for institutional credit for fish and shrimp farmers, fishers and fish traders and creating opportunities for alternative income generating activities for rural poor and unemployed people towards poverty alleviation.

Coastal communities have been innovating forever, but had not been able to keep pace with the rapid changes observed recently. The prospect to market niche products offered particular opportunities to the usually marginalised groups including the poor and socially excluded poorest people- schedule caste, ethnic and tribal people, within coastal communities. Having been involved in earlier, small-scale research efforts under RNRRS these communities were keen to continue with the development of technologies that enabled them to increase production to meet emerging market demands. The RIU initiative ensured the easy access to those known beneficiaries for sustainable distribution of benefits among them.

University of Stirling through its Institute of Aquaculture has been involved in research and development of the fisheries sector of Bangladesh for almost 30 years. It has significant experience on working with universities, NGOs and DoF on both freshwater and coastal fisheries and contributed significantly to the generation of fisheries management knowledge, aquaculture technologies, nutritional security, poverty alleviation and sustainable livelihoods of the poor.

BFRF was developed as a forum to bring together all actors involved in innovation in the fisheries sector of Bangladesh. Sustained personal engagement by researchers (not just academics, but communities, NGO and DOF staff too) opened up inter-academic and cross-sectoral academic-community-NGO-policy networks to enable stronger, more applied, more effective and more relevant development research to take place in the sector. BFRF members now came together biennially to openly share innovation progress and compete for limited research funds for projects most relevant to the development needs of the country. Continued support of the work of BFRF partners not only sustained unique working model, but enabled the continuation of innovation in the aquatic production and marketing fields.

Shushilan and COAST worked with communities directly on implementation, communication and field level training networks. New and existing relationships of Shushilan and Coast with communities were developed and greater linkage with DOF line agency improved access of communities to government support once the initiative was completed. Each team identified training needs that will be addressed through a blend of approaches involving researchers, NGOs staff and the coastal community partners. These teams identified suitable candidates from the communities to offer training to other households. Along with training, the other main works of partner NGOs were day to day working with coastal community partners to set up systems and report technical difficulties or technical advances to others, especially Technical Backstoppers in the initiative teams, collecting data and monitoring and evaluation.

A participatory result-oriented monitoring and evaluation (PROME) was developed by one of the Technical Backstopper Prof. Dr. Nowsad Alam, with support from community partners, to monitor and evaluate the activities, outputs, outcomes and impacts. A PROME not only monitored and evaluated the initiative activities and achievements, but also the performance of the partners in the process from the view point of the community partners. Relevant external stakeholders were engaged by BFRF to evaluate progress of the initiative, providing guidance to the initiative and also a chance to disseminate both process and production outcomes.

Legal and advocacy supports were provided by the BFRF through connections to bodies like DOF and other NGOs. BFRF played the key management role for overall implementation, monitoring and evaluation of the initiative, including data management.

6. Technology validation

Through DFID funded projects, technologies for crab fattening, molluscs culture, seaweed culture, improved fish icing and drying – and associated value chain analysis, storage and transportation – were developed with community partners. RNRRS outputs described those technologies as simple and inexpensive. Since then the technologies have been used in some areas of coastal regions in a smaller scale, providing additional income for poor households.

Mud crab fattening systems, appropriate to Bangladesh, were developed in earthen ponds and bamboo cages during a DFID-funded research project in three coastal districts during 2000-2004. Mud crab fattening technology brought about tremendous positive impacts to lowcaste Hindu communities in very short period of time in Satkhira region (Shah, 2007).

During another DFID-funded project in 2004, coastal landless poor - who typically collect shrimp post larvae – from villages in the Cox's Bazar area successfully undertook mollusc spat collection and culture. Local markets are available among the tribal community at Cox's Bazar and in Hill Tract districts for the products, which are only desired by poorer groups of the community. This option provides a livelihood for poor producers and improved availability of food for poor consumers. Mollusc culture has proved economically viable in Moheshkhali, Chafuldandi and Saint Martin's Island (Hossain *et al*, 2004 and Hossain *et al*, 2007), but opportunities existed for scaling up to more communities and to new markets.

Culture of seaweeds *Caulerpa* and *Hypnea* using rope line and bamboo pole in the intertidal zone was practiced to observe its impact on generating alternative livelihood. A few coastal communities have been given hands-on training on seaweed culture and continued production in the coastal belt. Large scale production of seaweed generated alternative livelihood for the coastal communities, reduced the nutritional deficiency and has potential to enhance national export to markets already emerging in China. Seaweed culture technology has been validated in Saint Martin's, Chakaria and Halishahar as one of the successful livelihood options for poor coastal communities (Zafar, 2007a, 2007b).

25-30% of the artisanal catch in the coastal region is spoiled every year due to lack of adequate handling and icing practices and devices. In order to reduce such huge post harvest loss and to improve the quality of wet fish supplied to domestic markets a 'low cost ice box', a 'community ice box' and improved practice for fish handling and icing were developed by the SUFER project in 2000- 2006. Their further dissemination within

this initiative will continue to strengthen fish quality in order to maintain incomes for small-scale traders and safe, quality food for consumers.

A key post-harvest processing option in Bangladesh is the drying of fish, which regularly fetch high prices if quality can be assured as demand is high. In order to improve the drying process and remove the need for the use of pesticide as a preservative, low-cost solar dryers and ring and box tunnels were developed in partnership with poor members of the *Jaladas* community in Cox's Bazar, Kuliarchar and Daudkandi areas in order to minimise investment cost and maximise efficiency (Nowsad, 2005, 2007; Nowsad and Islam, 2008a & b).

7. Implementation Methodology

The mud crab *Scylla serrata* are common in mud flats of the littoral, parts of the supra littoral and the inter-tidal muddy zones of the Bay of Bengal. In recent years, live mud crab has become one of the most important exported commodities due to high price and demand in the international market. The mud crab is leading the supreme position h in the view of market demand, economic profit, due to high food quality, and larger size of Bangladeshi crab than the other countries. Production as a whole for, crab fattening - are quite healthy and scaling up of technologies has already reached the target. Crab culture has been spreading rapidly among the farmers day by day. Crab cages with large multi compartments have been giving better results compared to small multi compartments. Therefore, designs of cage design have been modified from small multi compartment to big multi compartments.

ProSCAB has long been supporting crab fattening in the project areas at southeast and southwest coasts of Bangladesh. Hundreds of HHs people, particularly women have taken up the technology and have been getting benefits from crab fattening. In most of the cases, the juveniles and adults for crab fattening are the by catches of fishermen's catch. However, collection of seeds for crab culture is risky for nature and the natural stock may be hampered from over-exploitation. It is now the peak time to establish crab hatchery in the areas of crab fattening. Necessary supports to the private entrepreneurs have been provided from ProsCAB to establish two hatcheries one in the Southwest and the other in the Southeast.

Under the ProSCAB, production of seaweed has been initiated. The partner NGO – COAST and a few others - PKSP, CWE, COAST successfully promoted seaweed in the Cox's Bazar and Teknaf area through panel test and exhibition. Through the initiatives of ProSCAB, a number of programs and article on different aspects of seaweed have been broadcasted in the national dailies, TV and Radio. There has been a tendency among the communities to diversify the value added products to sell in the shops and restaurants, principally as human food items.

The ice box designed and promoted by ProSCAB received wider appreciation among the fish retailers, depot holders and other intermediaries because of its durability and cheaper value. The retailers outside OGs are using ProSCAB-designed ice box for fish preservation and transportation. Local manufacturer are producing the ice box according to the design of ProSCAB

Pesticide-free dry fish production has reached to a new dimension due to increased awareness of consumer. The drying technology using solar dryer have been taken up by a number of private entrepreneur in both regions. The product produced through

ProSCAB OGs has received greater acceptance by the consumers Dhaka and Chittagong. Several linkages have been developed with affluent outlets of local and city based exporters to market the products. The community people modified the solar dryer themselves by introducing more durable materials (like use of iron rod ring instead of bamboo made one, and thin meshed nets to cover the tunnels)

Output 1. Formation of Occupational Group (OG)

Activity 1.1. Selection of working area and focal points

The study area covered 34 fisher villages under 18 unions of 11 Upazilas in 5 coastal districts-Cox's Bazar, Chittagong, Bagerhat, Khulna and Satkhira. Exclusive poor and disadvantaged coastal fishing villages were selected on the basis of set criteria. The list of the possible villages along with approximate number of households has been given in Table 1.

District	Upazila	Union	Village	нн
	Teknaf	St.	Uttarpara	200
		Martin's	Madyampara	160
		Island	Purbapara	300
			Dakkhinpara	150
		Subrang	Shahparirdwip	170
			Jelepara	
			Shahparierdwip	220
Cox'sBazar			Pashchimpara	
	Cox's Bazar adar	Sadar	Paurashava	120
			Jaladaspara	
		Khuruskul	Khuruskul	80
			Rakhaingpara	
		Islampur	Chawfalldandi	350
			Rakhaingpara	
	Moheshkhali	Gorakghata	Gorakghata	250
			Jaladaspara	
		Gotibhanga	Gotibhanga	450
			Maddypara	
	Chakaria	Badarkhali	Satdalia	520
			Debdebi	430
	Pekua/Kutubdia	Mognama	Mognama Ghat	290
			Uzantia	270
			Baragoaf	1050

Table 1. Villages under the study area of the project

	Banshkhali	Chanua	Barumchhara	480
			Khatkhali	520
Chittagong	Anowara	Rangadia	Rangadia	880
			Parki	430
Bagerhat	Mongla	Sundarban	Rangabali	660
			Dublarchar	780
	Rampal	Rampa	Perikhali	910
			Rampal	1330
Khulna	Paickgacha	Loskar	Loskar	450
			Laskikhali	720
		Soladana	Paickgacha Bazar	630
			Soladana	980
Satkhira	Shamnagar	Munshiganj	Horinagar	1220
			Munshigonj	840
		Burigoalini	Porakatla	590
			Burigoalini	1150
		Gabura	Chakbara	890
			Nildomur	620

Initially, a total of 1000 households (HH) were selected from these 34 fishing villages and they were organized into business groups depending on the occupations of the inhabitants of the villages within a Ward (Local Gov. lowest administrative unit). Focal points (male and female) for each of the Ward were selected by the community partners as representatives. Initiative goals and purposes were introduced to the focal points so that they could explain the detail to others during initial activities.

Activity 1.2. Organizing inception workshops

Inception workshops were organized – 1 in project level in Dhaka; 2 at regional levels- in Cox's Bazar and Satkhira and 15 in local levels in 15 Upazilas with policy makers, administrations, GO/NGO service providers, implementers, local government bodies, local leaders and community partners as participants. The objectives of the inception workshop were to acquaint participants with goals and objectives and with the target communities. Roles of each stakeholder group were discussed. The timing and location of the local level inception workshops were targeted to ensure maximum opportunity for the poorest partner HHs to attend, e.g. in a community space during leisure time.

Activity 1.3. Collating baseline data

A primary baseline survey was conducted on current socio-economic status and livelihood practices of the 1000 HHs. At group formation/organization stage, as shown

in Activity 1.4 and Table 2, a total of 66 occupational groups (OGs), each having 15 to 20 HH members, were organized. During baseline study, all 66 OGs were covered, but the total HHs covered was 300 (50 HHs from both male and female OGs of each of three major community groups: Hindu Jaladas, poor Muslim Fishers and Adivashi fishers: 50 x 2 x 3). A simple database was developed using collected primary data, incorporating with the secondary information already held by the NGOs and other agencies. This information formed the basis for later measures of improvement in livelihoods. If any pertinent information was missing, NGO field staff collected this, but this was an absolute minimum and only where deemed essential by the majority of partners, for example to ensure groups were representative of poorest sectors of these marginalised communities.

Activity 1.4. Participatory selection of community partners and group formation

The primary partners came from the 1000 HHs of the coastal low-cast Hindu Jaladas, poor Muslim Fishers and Adivasi (Rakhaing) communities. The secondary partners were another cohort of >4000 coastal poor fisher HH of same community groups. The stakeholders involved in different value chain of the commodities, whose livelihood opportunities were monitored using focus group discussions formed the tertiary partners. The NGOs and GO extension personnel involved were the quaternary partners.

About 1000 community partners formed groups of 15-20 people (1 from each of 1000 HHs) based on occupational themes (mud crab culture, seaweed culture, mollusc culture, fish icing and fish drying), wherever applicable separately for men and women occupational groups (OGs) covering three targeted communities: Hindus Jaladas, poor Muslim fishers and Adivashi Rakhaings. Initially a total of 66 OGs were formed each having 15-20 HHs. The distribution of groups according to occupational themes is given in Table 2.

Occupational	Southeast coast	Southwest coast	Total
theme	(NGO: COAST)	(NGO: Shushilan)	
Mud crab	12	24	36
Molluscs	6	2	8
Seaweeds	6	1	7
Fish icing	5	2	7
Fish drying	5	3	8
Total	34	32	66

Table 2: Distribution of OGs

However, local community demands dictated different group structures and provided that these were not socially exclusive of the most vulnerable sectors they supported. In some locations and communities mainly women were involved because men were away at sea or have died at sea (or in cyclone, or by tiger in the forest). In the Rakhaing community a matriarchal system existed as a coping strategy as a result of generations of widows. All awareness creation and skill development programmes were launched through these OGs. For building strong cohesion and maintaining close contact among the members of the OGs, both men and women, OGs had a democratically elected group leader to lead the group activities. The OGs organized regular meetings, discussed their problems, found solution options and addressed the problems based on collective participatory approach. NGOs facilitated and supported the group formation and mobilization including regular group meeting, along with supporting group leaders to maintain accounts keeping, business management, group records to access credit, etc. Networking of OGs occurred at cluster level with the facilitation of NGOs.

Activity 1.6 Detailed sampling plan

1.6.1 Approach of sampling

The livelihoods of coastal, disadvantaged low-cast Hindu Jaladas, Muslim poor fishers and Adibashi Rakhaings, depended mainly on fishing and related activities, have long been threatened due to serious depletion of aquatic systems and organisms. The previous RNRRS outputs on five technologies, viz., crab fattening, mollusc culture, seaweed culture, improved fish icing and fish drying have opened the possibilities of improving the livelihood of such disadvantaged coastal people through scaling up of these effective technologies. Therefore, the major objectives of the present initiative were to provide alternative income generation for an improved socio-economic conditions of the poor and disadvantaged coastal fishers and ethnic Adivasi communities in Cox's Bazar, Chittagong and Khulna-Bagherhat-Satkhira areas of Bangladesh using participatory innovation approaches.

The target population were the coastal, disadvantaged low-cast Hindu Jaladas, Muslim poor fishers and Adibashi Rakhaings of the southeast and southwest coastal areas who are depended mainly on fishing and fish related activities. Both women and men of such vulnerable coastal people were targeted in the sampling plan.

1.6.2. Sampling area

The sampling area covered 34 fisher villages under 18 unions of 11 Upazilas in 5 coastal districts-Cox's Bazar, Chittagong, Bagerhat,



Khulna and Satkhira. Exclusive poor and disadvantaged coastal fishing villages were selected on the basis of set criteria. The list of the villages along with approximate number of households have been given in Table 3 and also shown in Fig. 1.

A total of 1000 households (HH) were selected from these 34 fishing villages and they were organized into business groups depending on the occupations of the inhabitants of the villages within a Ward (Local Gov. lowest administrative unit). Focal points (male and female) for each of the Ward were selected by the community partners as representatives. Initiative's goals and purposes were introduced to the focal points so that they could explain the detail to others during initial activities.

1.6.3. Sampling units

Household

Sampling units were the 1000 coastal disadvantaged fisher households, who had been depended on fishing and related activities.

Occupational group

One thousand community partners formed 66 groups, each of 15-20 HH heads as members (1 from each of 1000 HHs) based on occupational themes (mud crab culture, seaweed culture, mollusc culture, fish icing and fish drying), wherever applicable separately for men and women occupational groups (OGs) covering three targeted communities: Hindus Jaladas, poor Muslim fishers and Adivashi Rakhaings. Initially a total of 66 OGs were formed each having 15-20 HHs. Distribution of OGs according to occupational themes is presented in Table 2 above.

Market

Four local markets (Saint Martin's Island, Moheshkhali, Kutubdia and Dublarchar) and 4 super markets, one from each of Cox's Bazar, Chittagong, Dhaka and Khulna, were the sampling units for market assessment.

1.6.4. Sample selection Selection for project participation

Considering the resources and facilities of the project, initially 1000 HHs under 66 OGs of 5 technologies were targeted during the first phase. Another cohort of 50-60 groups were trained by the NGOs during the start of 3rd year.

HH selection for baseline survey

As stated, a primary baseline survey was conducted on current socio-economic status and livelihood practices of the 1000 HHs. All 66 OGs were covered for baseline study, but the total HHs covered were 300 (50 HHs from both male and female OGs of each of three major community groups: Hindu Jaladas, poor Muslim Fishers and Adivashi fishers: 50 x 2 x 3).

Data were segregated gender-wise for three social groups to ensure proper representation (Table 3). Ideally a total of 50 HHs from each of 6 segregated groups were covered that needed 300 HH samples. But the initial sample size was 10% more to compensate possible dropout during the project period.

Gender	Social groups	Desired	10% drop out	Initial sample
		sample		size
		size		
Female	Hindu Jaladas	50	5	55
	Muslim	50	5	55
	Adivasi	50	5	55
Male	Hindu Jaladas	50	5	55
	Muslim	50	5	55
	Adivasi	50	5	55
Total		300		330

Table 3. Gender and social group wise sample units

To cover possible drop out, extra 5 HHs from each OG were selected on the basis of ethnicity, previous experience in indigenous practice and/or previous training in chosen technologies in order to ensure representation. Information mentioned in Table 4 was recorded. Emphasis was given to those households who did not have previous experience and training in chosen technologies. However, 1 or 2 HH with previous experience and/or training were selected during group formation for each OG (Table 4).

Selection of samples within OGs was representative of gender and ethnic totals. In this example, overall 25, 9 and 16 percent were the women of Hindu Jaladas, Muslim poor fisher and Adivasi Rakhaings respectively. On the other hand, 26, 18 and 6 percent were the men of Hindu Jaladas, Muslim and Adivasi, respectively. The HH without

previous experience/training were about 90 percent, where the remaining 10 percent had previous experience/training in chosen technologies.

Table 4. Information collected for each OG, showing possible composition of members by the chosen criteria.

No. of	Female			Male			Exp/	Exp/	Total
OG							Tra	Tra	нн
	Jaladas	Muslim	Adivashi	Jaladas	Muslim	Adivashi	No	Yes	
0G 1	2	0	1	7	4	2	14	2	16
OG 2	1	1	3	6	3	1	14	1	15
OG 66	0	2	2	8	5	0	17	0	17
Total HH	250	90	160	260	180	60	898	102	100
									0
Percent	25	9	16	26	18	6	90	10	

Exp/Tra = Previous Experience/Training

There was no sampling for PROME exercise. PROMEs were conducted at each OG in every 3 months, starting 3 months after completion of all training.

Activity 1.6. Participatory planning

Following group formation, with facilitation by the NGOs, a participatory planning workshop was organised by each OG to determine the innovation process, schedule and partners to be involved in each technology.

Output 2. Skill development of initiative partners

Activity 2.1. NGO and DOF partner training in suite of coastal technologies

Technical capacity building of 50 NGO and DOF staffs on improved mud crab fattening, seaweed and mollusc culture and appropriate post-harvest processing (fish icing and fish drying) for value addition of fisheries commodities was done by the technical back stoppers through adequate training approaches (participatory community-based training of trainers, method and result demonstrations, distribution of training manuals, leaflets, booklets, etc.) and visits to communities with existing production sites from earlier RNRRS research (Table 6). This ensured those supporting the partner communities in their innovation had the strongest understanding of existing systems – and personal contacts to provide additional information as required. Training manuals and other

training materials like booklets, leaflets, etc. were prepared and distributed by the technical back-stoppers before the training.

Activity 2.2. Community training in preferred technologies

All 1000 HHs, through 66 OGs, were trained in chosen technologies (Table 5) by the NGOs within the first 6 months of project start. Additional 1000 HHs were trained at the 2nd year of the project and this 2nd cohort of training was completed by the end of 2nd year. Regular guidance was given to the OG members by the NGOs and technical back-stoppers on a schedule that suited OG needs. Additional support from DOF, potential service providers and marketing actors was facilitated by the NGOs as requested by the OGs. Monthly meeting at each OG was held by NGO facilitation.

Hundreds of training sessions of farmers on crab fattening, mollusk culture, fish icing and fish drying, demonstration on the construction of cages, pens and rafts, ice box and setup of clutches (Table 6). Technical discussion and awareness building with new entrepreneurs, field monitoring and market survey are carried out by market consultant with the help of the technical backstoppers. Based on Mid-term evaluation mission report and the suggestion came in through the review workshop in December 2009, business plans for three products were prepared. The market consultant made in-depth studies on the production process with the producers, input suppliers, middlemen and the consumer and suggested possible linkage for marketing of three products – crab, mollusc and dry fish. Thus the partners have continued the productions using the adapted systems developed themselves as a result of innovation in the last year and with continued supports from the NGOs. Crab fattening process has been refined in both cage and pen systems. Local market for mollusc has been identified and product diversification has been suggested. Production for all three products- crab, dry fish & molluscs - are quite healthy and scaling up.

Output 3. Refinement of five coastal production options

Activity 3.1. Initial production period

The OG members were actively supported through an initial production period by technical back-stoppers and NGOs. Some of the technologies had production cycles of just 4 weeks (crabs and seaweeds) and potential improved marketing opportunities was also evident for fish undergoing improved icing and drying in the same period. Only molluscs required a longer production cycle, so innovation here was less evident in the early stages. Community partners brought their own knowledge to the innovation process. All partners assisted in the identification of local, sustainable input supplies.

Activities	Partners		Number of Participants			
	Coast	Shushilan	Coast		Shushilan	
			Male	Female	Male	Female
OG meetings	656	768	5560	2968	3316	5900
OG leader meeting	51	48	24	10	12	20
Staff coordination meeting	24	26	-	-	-	-
Technical discussion &	98	90	1050	340	310	1120
orientation						
Techno. settings in OGs	468	410	280	188	130	280
Demonstration set up	112	93	71	41	31	62
Entrepreneurs sessions	215	192	2150	860	808	1880
Meeting with depot holder	6	6	28	2	22	8
Field monitoring	192	160	-	-	-	-
visits/PROME Exercise						
Market survey	6	5	-	-	-	

Table 5. Different training, demonstration and survey carried out under ProSCAB

Activity 3.2. Refinement according to learning and local materials/inputs

All implementing partners tested and improved 5 technologies in 11 Upa-zilas by July 2010. The technologies required fine tuning and field acclimation to enable effective scaling up in a range of environmental and social contexts. Although this took place through the initial production period, a review of innovation took place to guide further production by community partners. Understanding the early innovation process in the various local contexts enabled more effective development during the second year.

Activity 3.3. Production using adapted systems

In the second year community partners continued with production using the adapted systems developed as a result of innovation in year one.

Activity 3.4. Horizontal scaling up of refined technologies by community partners

Refined technologies have been disseminated to >4000 HHs by January 2011. These additional HHs from coastal disadvantaged Hindus *Jaladas*, poor Muslim fishers and Adivashi Rakhaing communities were provided with information on the range of five technologies through exposure visits by community partners, technical back-stoppers and NGOs. Leaflets, pamphlets, posters and booklets highlighting the use of technologies were prepared and distributed. Additional HHs was identified by the
initiative partners and the final selection agreed during a meeting towards the end of year 2.

Five technologies were introduced in 60 coastal villages of 12 Upazila under 5 districts of Southeast and Southwest coastal regions of Bangladesh. Initial number of villages from crab, seaweeds, molluscs, dry fish and wet fish were 28, 13, 8, 8 and 3, respectively. BY the end of the project, all the 5 technologies have extended to a total of

111 villages (Figure 1) indication huge impacts on the livelihoods of coastal people.



Figure 1. Expansion of 5 technologies in 111 coastal villages under 5 districts

Output 4. Rural entrepreneurships developed

Activity 4.1. Small business training to the OG members to become active in promoted technology

The NGOs provided small business training to the 66 OG members to enable them to become active in promoted technologies. The existing business actors within the OG members were the main beneficiaries of training. Having been trained some of the most innovative actors successfully operated their business at profitable level and took lead role in successive exposure visits, experience and information sharing and community training programs facilitated by the NGOs. This training was part of the services offered by the NGO partners in their normal operation and provided community partners with the tools required to make effective use of the improved skills developed through the initiative. Through this process 70% of the OG members were active in promoted technologies by January 2011.

Activity 4.2. Supports to the trained OG members for rural entrepreneurship development

The NGOs, DoF and technical backstoppers provided various business supports to the trained OG members to develop successful entrepreneurship (Table 6). Supports were extended in the form of further training, counselling, field visit, business linkage and network development, access to credit, etc. Through these supports 20 rural entrepreneurship groups were formed and sustained in 11 Upa-zilas by January 2011.

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Table 0.	Achievements	III terms	or entre	preneursnip	uevelu	Jinent

Location	Crab fatt	ening	Dry fi	sh	Mollusc c	ulture	Wet fish tr	ading
	Baseline	Sept.	Baseline	Sept.	Baseline	Sept.	Baseline,	Sept.
	'08	'10	'08	'10	'08	'10	08	'10
Southea	180	360	75	180	90	210	150	180
st								
Southwe	360	920	30	45	15	15	45	90
st								

Activity 4.3. Network creation among community partners

Communities were encouraged to maintain the OGs in order to support their shared innovation in the future. NGOs offering credit as their routine activity required that future borrowers were members of these groups and DOF and other line agencies engaged with these groups in order to highlight their benefit and provide a platform for innovation. Participatory monitoring informed all partners as to how these groups could be maintained in various formats in the local context.

Output 5. Livelihoods of coastal households improved

Activity 5.1. Collating baseline data

An initial understanding of livelihood issues informed the monitoring process

Activity 5.2. Conduct regular PROME

Participatory Result Oriented Monitoring and Evaluation (PROME) system introduced in the ProSCAB were quarterly basis. A total of 352 PROME exercise have been conducted in two regions on four technologies. In addition, NGOs and the DoF are monitoring field activities through their own monitoring systems.

PROME was used as the basis for judging initiative success. Such an approach had been used by initiative partners before to track activities, outputs, outcomes and impacts as the initiative proceeds. Community partners led the PROME exercise on quarterly basis to assess how effectively their goals for the innovations were being met. Indicators of success for PROME, as selected by the technical back-stoppers and implementing partners were field-tested, reviewed and made acceptable by OGs, with facilitation from NGOs. Quarterly PROME meetings involving all implementing and community partners provided feedback and discussion opportunities in relation to monitoring and evaluating progress. PROME meeting were started 3 months after the completion of all initial skill development training to 66 OGs, i.e. 6 months after the project start. These meetings were conducted in time and located at each OG to suit the maximum number of community partners. PROME further strengthened the innovation network.

The PROME approach centred on community partners developing their own suitable mechanisms (along the lines of checklists for each output) to follow implementation at every stage from their own perspectives. PROME provided for an assessment of the innovation process as well as outputs, providing a learning tool to improve the activities and aims of the initiative as it progresses. This process learning also enabled community partners to ensure their future scaling up activities were effective. Other partners received on-going feedback about how well received their engagements had been either directly in quarterly meetings or indirectly through initiative management channels, depending on how vocal each OG is.

Activity 5.3. Collate and analyse data

A data manager was appointed to collate and analyse data gathered as part of the initiative. This role was critical so that only necessary information was collected to reduce pressure on both providers (primarily community partners) and collectors (NGOs, DoF and technical back-stoppers) and avoid unnecessary use of time. All analysis were shared amongst all partners at the quarterly meetings in various locations and on-going analysis provided all partners with information to inform the innovation process and the PROME activities to guide the initiative towards its goal (50% of OG members perceived an improvement of livelihood and reported 20% increase in income by January 2011).

Output 6. Women empowerment

Activity 6.1. Targeted wider livelihood training for women – as identified by community partners

Women were actively targeted throughout the initiative. The NGO partners had female field staffs to support this process. The technologies being scaled up and developed had already proven themselves of particular interest to women in coastal communities. A total of 1900 women were trained in 5 technologies by September 2010. Additional supports in the form of wellbeing training were provided by the NGOs on request by women OGs. This additional, non-technical support provided additional incentive for women to remain engaged in the initiative and the added value in terms of livelihood improvement.

Women OG members are mainly involved in crab fattening and fish drying. Women-led entrepreneur groups producing and marketing crab and improved dry fish through ProSCAB and these have been gradually increasing. Many women, in particular, have been practicing cage crab fattening in the tidal canal adjacent to their households. Women in group have also been practicing crab pen culture in the coastal gher (shrimp/prawn enclosure).

Activity 6.2. Business support specifically suited to women

Small-scale logistic and technical supports were provided particularly to women OGs in order to support them further. These business supports were made available in the second year in order to develop the improved production processes into small business entrepreneurships. The NGOs were conscious not to burden women further, but realised that in order to fully benefit from any improvements in production the women must also be in control of the financial returns from these businesses and this training was targeted to support that aim. Through this process a bout 23 women led local entrepreneurship groups produced and marketed improved coastal aquatic products by January 2011.

Output 7. Linkages among communities, NGOs, marketing agents, policy makers and donors established

Activity 7.1 Assist community partners to develop marketing links for products

A critical linkage in the business cycle was with marketing agents. All partners identified potential marketing opportunities in the local, national and international areas. Crucially, community partners were facilitated in developing their market linkages rather than linkages being developed between e.g. crab trader and NGO staff. This approach enabled network linkages to develop that place the community partners at the centre of the network. Whilst NGOs, back-stoppers and DOF continued to play a role in the innovation network, the demands of the market played the central role in innovation.

DoF produced and distributed extension materials covering coastal aquaculture and post harvest technologies. However, NGOs and DOF stepped into market negotiations where producers were being disadvantaged by unscrupulous middle men, for example wholesale buyers driving prices in the village down or excluding producers from selling directly in the local markets. Where producers (or processors) were tied into contracts with wholesalers NGOs and DOF (as government representative) attempted to negotiate releases, although it was recognised that this was very difficult where no written evidence was available. Many of the poorest within the community did act as petty traders and support to them further up the marketing chain was also necessary. However, many tribal communities were aware that they had legal rights against discrimination and actively pursued anyone preventing them from living freely. Through such innovation network linkage, materials for local coastal production systems were more widely available in local markets. Local and city markets were linked with 4 new products. DOF also promoted coastal aquaculture production in local and national Fish Week Fairs.

Activity 7.2 Quarterly meetings to support network development

The decentralised quarterly meetings at OG level served the multiple purpose of assessing progress through PROME, planning activities and developing networks. This latter purpose was largely informal, but was a critical output of these meetings.

Activity 7.3 Innovation agreements between all partners

In order to strengthen the idea of joint engagement in the innovation process, all partners were asked to sign up to innovation agreements highlighting their role in the future of innovation in the local context. The idea was that the DOF officer looked to support innovation through favourable policy environment, the NGO through credit, the input supplier by seeking improved products for use in production, the community member through seeking to remain competitive, technical back-stoppers to publish relevant new technologies – perhaps from other areas, and marketing agents to continuously seek new markets and provide a price that enabled the producer to invest in new technologies. The partners supported their own development, but also the wider improvement in the business environment and greater community.

Output 8. Export of target commodities increased

Activity 8.1 Assist community partners to develop niche markets for export

Assistances were provided to the selected communities to explore the potential of their coastal products in the niche markets outside Bangladesh, through channels that were often hard to identify from a local community level. The implementing partners assisted OGs so that 24% of the OGs sold new products to export channels.

Output 9. Dissemination materials produced and promoted

Activity 9.1 Developed training materials

Training materials like manuals, pamphlets, etc. were developed by the technical backstoppers by October 2008 to support training of NGO staffs. These materials were developed further by NGOs and reviewed and edited by technical back-stoppers for use in exposure visits and training with community partners on the basis of assessment of specific learning methods from literature reviews, direct discussions and experience. For scaling up of the technologies about 5000 information leaflets (1000 for each of the technologies) on technologies were produced and distributed by August 2010.







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Activity 9.2 Exhibit products and process at Fish Weeks

Coastal aquaculture products produced by the community partners were exhibited at local, regional and national fish fortnight events. DOF facilitated exhibitions of products at 2 Fish Week events from August 2009 to August 2010.

Activity 9.3 Engage radio, newspaper, television and internet journalists (e.g. agricultural programmes/ columns)

All institutional partners had good connections with the media and had ensured coverage of events and previous initiatives in all national media formats. Researchers published in international journals and on development websites, for example Livelihoods.org.

Activity 9.4 Developed and delivered local drama

A drama was developed and delivered by a local drama group to inform community partners about the various productions, processing and marketing opportunities available to them. This format provided general information about the options available. In the second and third years the drama was used in scaling up to promote the benefits of coastal production to potential new communities. Drama was a conventional entertainment format in the coastal area. The players in the drama were the young youths of both men and women from the beneficiary HHs.

Activity 9.5 Prepared and published webpage materials

A website promoting "Coastal Aquatic Products of Bangladesh" was developed by March 2009. Technical Back-stopper assisted in preparation and management of website. Partners, products and potentials along with technical information were posted for others to use.

Activity 9.6 Participatory refinement of training materials

The materials were adapted and improved by the technical back-stoppers as training progresses on particular technologies. Specific training materials that community partners feel appropriate for the scaled up training of new community members or exposure visits in year three were developed further.

Activity 9.7. Prepared policy brief

Lesson learnt through the innovation process were captured and transformed into policy brief by the technical backstoppers to disseminate through both hard and software for necessary policy reform.

Activity 9.8 Supported community extension of technologies

The technologies were refined and field validated by 1000 initial HHs. These partners were supported to demonstrate the technologies to adjacent areas in the year 3. Direct dissemination along with a spread through product marketing approaches enabled more than 5,000 additional community members to be aware of the f the technology by the end of 3-year period in June 2011. These new users were invited to become new community partners in the initiative process and to further refine the products and identify further areas for cost savings, increased profits and production efficiencies.

8. Outcomes and Impacts

Specific outcomes and impacts of 5 technologies on livelihood development of coastal people have been discussed under 5 different banners related to up-scaled technologies in the last part of this Section (8.2). A case study revealed the impact of each technology also follows 8.2. Overall achievements and impacts viewed statistically are described under general outcomes and impacts in 8.1.

8.1. General Outcomes and Impacts

8.1.1. Income of the stakeholders increased

The activities and budget maximised the use of all partner's time, focusing on the development of local networks without the excessive use of national meetings. The particular desire to shift the ProSCAB working centre as required throughout the initiative meant that various levels of meetings were not required and clearly placed the community members as the heart of the development. The majority of the partners already developed a working relationship and the NGOs particularly were familiar with the local communities, therefore an initial settling-in period was avoided.

The training of long-term formal institutional members, like DOF and NGOs, at the start of the initiative enabled them to support the innovation process effectively throughout the lifetime

of the initiative and beyond. Community partners were also trained in extension techniques to enable them to continue 'spreading the word' beyond the ProSCAB initiative. The inclusion of other business and well-being training also supported wider livelihood development in support of independence and sustainability.

Calculation revealed that each crab culturing household earned a net profit amounting to Tk 30,000/= per year. Similarly each sea weed culturing household and a fish drying household earned the annual net profit of Tk 20,000/= and Tk 25,000/=, respectively. As one cycle of mollusc culture lasted for 15-18 months, a household involved in mollusc production earned Tk 20,000/= to 30,000/= in the second year. Generally, one household adopted one technology, but some adopted two or more. Therefore, the average earning was around Tk 20,000/= per annum. For the initial 1000 households this represented a return of Tk 35,000,000/= within the initiative production period of 2 years and an additional one year of production from a further 5000 households (Tk

95,000,000/=), giving a total of Tk. 127,000,000/=, equivalent to £934,000. This did not take into account any benefit from improved fish processing.

Due to the lucrative nature of the commodities, with a high market demand, easy operation technology, environment-friendly nature and good profit margin, it was estimated that an additional 15,000-18,000 households adopted these new technologies. Therefore, if considered all, the monetary value of the whole initiative increased many folds beyond ProSCAB tenure. If the social values of the initiative are considered, it definitely reduced social tension, improved nutritional security, and enhanced community education and literacy rate, resulting in a harmonious society with peace and sanctity. This has obviously increased the value for money employed for this initiative.

All partners are providing working space and access to their current innovation networks. BFRF has many partner researchers, policy makers and NGOs who will attend a biennial conference in January 2012 and will share the results of this innovation process.

8.1.2. Rights of coastal poor uphold

Declining catches of mud crab, molluscs and sea weed from open waters for domestic consumption and local sale have threatened the livelihoods of the very poor fishers in the coastal area. Broad awareness through general media of the potential for solutions developed in previous research and ProSCAB initiatives carried out collaboratively by NGOs, coastal communities and researchers has driven demand for access to the technologies from ethnic minority, poor Muslim fishers and Adivasi communities along the coast. The GOs, NGOs and other bodies have been approached by such communities within their operational

areas for support with scaling up of these technologies, but these entities, either GO or NGO, have not been able to deliver a value-added response to date. The ProsCAB supported their long desired initiatives in this direction.

There are general recommendations from the government to disseminate such technologies to generate income for the poorest coastal communities, enhance production and ensure nutritional food security in order to achieve the millennium development goals. The end of project assessments, carried out by the IDL group and DFID review team, of the original research recommended further dissemination of technologies in wider coastal area with necessary fine tuning. A great deal of media coverage was paid on the success of ProSCAB initiatives. In the mass media (newspaper, radio and TV) the ProACAB technologies were identified as easy to apply, low cost, environment-friendly and profitable. The GO is now thinking launch programmes for them. Funding for establishing two crab hatcheries in coastal areas by the Bangladesh Bank is one of such example. All these helped in upholding the genuine rights of coastal poor people.

8.1.3. Benefit for user groups

The community user groups were the poorest and marginalized coastal fisher households of the Hindu Jaladas, Muslim fishers and tribal (Rakhaing) communities living in rural coastal areas in Cox's Bazar-Chittagong and Bagerhat-Khulna-Satkhira belt of Bangladesh. It was difficult to work with those community people as those were already known to the implementing partners during previous RNNRS intervention for technology development. These households were usually engaged in artisanal forms of fishing and related activities, with many now being female-headed as a result of widowing from fishing deaths, tiger predation or cyclone. The Rakhaing community has maternal heredity as a result of this recognised risk from husbands being lost at sea. They were benefited from an increased portfolio of livelihood options, enabling greater resilience to natural shocks through diversification of risk. Additional income gained from these comparatively low labour demand technologies supplemented household incomes; with some (i.e. mud crab fattening) providing a rapid turnover of just 10 days. The network linkages developed with government line agencies, NGOs and with each other added further social capital to increase resilience. A total of about 5000 HHs from three major communities (Hindu Jaladas, Muslim poor fishers and tribal (Rakhaings) of

5 districts were engaged in the core technology adoption and adaptation phase (years 1 and 2). With the assistance of the NGOs, the trained households promoted the approaches to many households during or beyond the project period.

The two NGOs engaged in the initiative were benefited through having a greater range of proven technologies to disseminate to existing households and from more people seeking credit to support new businesses from initiative partner households and other coastal communities. They were also able to offer existing services to the households of partner communities in this initiative.

The Department of Fisheries staffs were trained for longer-term institutional support to community partners. Wider dissemination of innovation outputs to other communities was of great benefit because of the added value they brought to their target communities. Over 50 DOF and NGO staffs were trained and had first hand experience of the technologies as adopted by community partners within their areas.

BFRF and related researchers were able to promote a further success in their work to help alleviate poverty in the country through the partnership of researchers, NGOs, Govt Departments and the community. The promotion of this process took place both nationally and internationally, to highlight the BFRF model as an effective institutional mechanism to support development.

8.1.4. Resilience against disasters

Coastal communities live with recurrent disasters. The 5 coastal technologies promoted by ProSCAB were appropriate livelihood options for the poorest, most vulnerable groups in the coastal belt because they required no formal land ownership, had a low level of investment and were of main interest to women. Improved socio-economic status of these community partners enabled them to save income and supplies for periods of climatic stress. Dried fish were stored and transported relatively easily and sold during extreme events to provide additional income. Increased trading generated cash income, thus cash at hand is the best coping mechanism against any adversity. Increased business offered improved employment opportunities for other poor members of coastal communities.

Production systems of the ProSCAB technologies were short-cycled and the organisms had the ability to tolerate a wide range of physico-chemical parameters including temperature, dissolved oxygen, pH, salinity, turbidity, water level, current and wave actions, and suspended solids. Since the organisms were indigenous they were adapted to the current climate and average annual fluctuations. In addition, as the culture systems were short cycled (crab fattening – one cycle 20-25 days, seaweed –

30-35 days), community members could be able to avoid the seasons of extreme climate (cyclone, flood, water surge etc. - April-May, September-October). Mollusc culture cycle was 12-18 months, but the culture system was placed in sheltered bay or inlet to avoid annual

fluctuations. There was still a risk during extreme events, but investment costs were relatively low.

The improved fish driers could easily be moved to shelter in case of sudden rain or storm, which was often not possible in case of traditional fish drying laid out on the ground. Fish icing boxes were very portable and adaptable to other uses as needed during extreme events.

8.1.5. Gender and social exclusion addressed

The women

A total of 453 male and 407 female stakeholder started crab fattening in 2008 and reached to 1377 and 808, respectively in 2011.

In sea weed culture, the number of male beneficiaries has increased from 105 to 195, where the number of female beneficiaries increased from zero to 80 during the project period. A female entrepreneur has taken up initiative to produce diversified products from seaweeds for marketing and women's employment generation.

The number of female beneficiaries of molluscs farming showed increasing trend. The raft, rope and pole were installed in the nearby canal and creeks mostly by the male members of the family, where mainly the women easily looked after the molluscs clutches even from their home-yard.

Number of female beneficiaries became more than double for drying fish in the coastal regions. They collected fish from their male partners from the artisanal fishing boats and took care of the drying process, packaging and marketing. In after catching the fish and aquatic products male fishermen leave on the women for the post harvest processing, value addition and marketing.

The women also participated in wet fish preservation and the number increased from 105 to 129 during the project period.

Socially excluded group

ProSCAB specially targeted the livelihoods of coastal low-caste Hindu Jaladas, poor Muslim fishers and ethnic tribal (Rakhaing) communities and many ways the initiatives became successful to bring positive changes in their livelihood through involving them in alternative livelihood strategies, other related activities and income generation. The livelihood of these socially excluded people depended mainly on fishing and fish related activities and was threatened due to serious depletion of aquatic systems and organisms.

All way through different stages of the ProSACB participatory planning was employed. The ProSCAB partners successfully used the data the project has collected on gender and social inclusion in deciding the project interventions.

8.1.6. Linkage and communication developed

Internal communication was based on horizontal communication between all partners. Communication was maintained through more formal workshops at the start of the initiative, informal meetings between different groups of partners during the initiative and semiformal workshops at the end of the initiative. There were monthly community meetings and quarterly PROME meetings at each OGs that formed the basis of extended communication that was bolstered with appropriate extension materials to support training, including leaflets, booklets, posters and audio-visual clips. Local drama formats were used as a means of wider awareness raising and possibly to aid local fishery product marketing efforts. In all cases the low literacy level of many core partners were taken into consideration, providing them with more spoken and visual resources. The monthly community meetings and the PROME meetings provided the opportunity for community partners from various locations to share learning and perhaps arrange cross-visits to observe good practice.

External linkages to other government line agencies and NGOs were achieved through inviting them to meetings (from month 6), particularly in the field, thereby encouraging them to develop direct linkages with the community partners of the initiative. Linkages to policy actors at the national level were achieved through inviting them to appropriate meetings (from month 13) and providing them with specifically written and tested materials highlighting issues raised from the PROME meetings that enabled more effective and sustained uptake of the technologies (from month 28). Promotion of the technologies to potential external producers were advertised by drama, radio, local newspaper and word of mouth, but practical training days were organised (from month 24) by the partner NGOs and community partners who jointly provided direct experiences.

Promotion to potential customers of the products was achieved by the use of drama, radio, television and newspaper articles and updates on the web pages of the partners (from month 12). Radio has been a crucial information source for coastal communities in Bangladesh. Development of webpage and engagement of some community partners in the development of a website explored along the lines of 'fair trade', where anyone could be able to connect personally with the producer. The initiative produced posters, leaflets, manuals, pamphlets and newsletters detailing the technologies and local adaptation. These were distributed to other NGOs working with coastal communities and to information points in markets and government offices.

8.1.7. Effective monitoring and evaluation tool developed

Three areas of lesson learning were targeted, viz., i. what was required for sustained successful adaptation and horizontal scaling-up of research outputs? ii. How could poor end users be supported to continue innovation beyond the initiative?; and iii. What was the role of a forum organisation like BFRF in bringing research into use?

Existing initiatives to develop mud crab fattening, seaweed culture, mollusc culture and improved post-harvest handling were limited by the research project budgets that supported them. Uptake of various approaches by poor coastal tribal and Hindu communities sustained in various parts of the country (Shah 2007, Zafar 2007a and b). The technologies were promoted in mass media with subsequent requests for detailed information from various sectors, but the applicants were not been able to provide a coherent response to ensure more widespread adoption of the technologies. The impact of previous work was assessed at the end of the projects supported by AFGRP highlighting livelihood improvements from diversified incomes and risks. The partner NGOs possessed household data on the potential partner communities that will were at the start of this initiative and provided a baseline for evaluation of the project activities during preparation of EOP.

The central PROME approach to monitoring placed the community partners at the heart of monitoring. During early occupational group (OG) formation the community partners were asked to identify what they hoped to gain from involvement in the initiative. BFRF and the partner NGOs also stated what they had hoped to achieve, both for themselves and for the communities. From these lists, shared and specific learning outcomes were developed along with indicators for each one that the community partners identify demonstrated success to them. This process fostered greater understanding of shared aims, but also highlighted important outcomes that were not initially considered. Actually the ProSCAB initiative did not just look for assessment of final outcomes, but also of the processes involved in reaching them.

Quarterly PROME assessments aimed to highlight lessons learnt in the previous three months in order to check progress towards goals and solved any arising problems. Quarterly session was frequent enough for discussion, without being too burdensome. Monthly meetings were found to be too frequent, however, there were *ad hoc* meetings as and when the community required. All partners were invited to these events, which were taken place in community locations. The meetings engaged representatives from various OGs in the community and any external parties in the community at the time (for example staff from other line agencies and individuals within marketing channels) if invited by the community. Staff from the NGO presented and from time to time a researcher also presented. Easy handy formalised checklists were prepared and records were kept, and any actions required were shared to appropriate partners. NGO staff had the chance to share experiences of meetings and if particular issues were raised during meetings that were affecting several communities then cross visits were arranged where learning were shared.

Within BFRF the data manager was the key monitor of the day to day operations, reporting to community partners, NGOs, BFRF co-ordinator and the Project Leader about overall progress. The information maintained by the data manager were more informal indicators of progress and this information guided field visits by the Project Leader, Technical back-stoppers and international technical back-stopper.

A mid-term review of progress aimed at assessing the innovation process rather than technical outcomes. This was conducted by the international partner who had a detailed understanding of the initiative, but not involved in the detailed development day to day. IRIU also evaluated the progress several times and guided the initiative at timely intervals.

During the first two years community partners were linked with DOF and other external service providers to support their continued innovation. In the third year the PROME assessments focused on how effectively the community partners were able to access any required support. The two NGOs continued their engagement with the communities as part of the initiative progress, direct support s were scaled back to provide a clearer picture of whether background services were providing the support that producers required.

Towards the end of the initiative all project partners came together to share learning. Two workshops, one in the eastern coastal area and one in the western, took place and summaries of best practice were produced, in English and Bengali. Some initiative partners from the communities and from DOF and NGOs presented these summaries at the biennial fisheries forum to promote outputs and outcomes of the initiative to policy makers and international organisations.

Beyond the life of the initiative NGOs has been continuing to support community partners through the provision of credit and other services. The use of innovation agreements as a means of engaging institutional service providers in the long term ensured such support.

BFRF is a member forum that brings together individuals from all aquatic institutions in Bangladesh. This model is a unique output of RNRRS and DFID-B funding and is clearly demonstrating benefits to date. Ten years back, it would not have been conceivable that researchers from several universities, the Department of Fisheries and NGOs would come together, let alone work directly with community partners. The blend of individual personalities and a gradual shift in institutional mentalities has already led to innovation in the research and development processes of the country. From this successful ProSCAB initiative of BFRF, this lessons learnt, like effective innovative network linkage, can be highlighted and be adopted to other countries and, indeed to other sectors in Bangladesh.

8.1.8. Benefit for Environment

The initiative fell under category C based on environmental impact descriptions in attachments 5. The technologies proposed under the initiative were mostly extensive in nature and required no agro-chemicals, fertilisers or pesticides. Moreover, no alien or exotic species was targeted. The coastal waters of Bangladesh were largely unpolluted and in the proposed locations provided a suitable production environment for the systems in question with no adverse risk to human health. Mud crab fattening and mollusc and seaweed culture were carried out in coastal open waters and ponds with very low-input and low cost supplies of locally available materials and aquatic animals. In the mollusc and seaweed culture no supplementary feed was required. For mud crab fattening locally available low cost small marine fishes were used as feed – these were often difficult to process for human food and therefore discarded. Mollusc and seaweed culture was depended on natural spat fall and the mud crabs were those rejected by the current market for being below size and quality requirements and therefore normally discarded and die.

Minimum environmental impact on coastal water was very much expected because the technologies were extensive. There was no impact on tourism or conflict with other users. The culture technologies did not deplete fisheries resources because of the reliance on natural spat fall rather than gathering. Mollusc and seaweed culture also served as nutrient removal elements in the ecosystem. Providing a range of options also means that biodiversity was adequately maintained, with no focus on one particular technology at the exclusion of all others.

Traditional fish drying techniques utilised insecticide, which was very harmful for human health. Environment-friendly, safe alternatives of organic pesticides were used in dry fish production. Value addition through icing of wet fish and improved solar drying technology reduced the risk of post-harvest loss and substantially improved food safety through better shelf life for the fresh product and no use of pesticides in the dried product.

8.1.9. Organizational and Institutional attitude change

In Bangladesh, eleven public universities and a number of private universities have Fisheries departments/disciplines. Three of the public universities are partners of ProSCAB – Bangladesh Agricultural University, Chittagong University and Khulna University. Now, the

knowledge and technologies generated by the ProSCAB are included in the course curricula of these universities. Many of the Professors, BSc, MS and PhD students are now doing researches and aqua-internships in the coastal areas under the project. Along with Department of Fisheries of MoFL, Bangladesh Fisheries Research Institute (BFRI) through its three sub-stations in Chandpur, Bagerhat and Paikgachha took special interest in the technologies generated by ProSACB and employed its manpower to explore the possibilities of further extension of the sustainable technologies.

8.1.10. Policy Implications

The Department of Fisheries (DoF) under the Ministry of Fisheries and Livestock (MoFL) is one of the partners in the project is the policy makers in all aspects of the fisheries sector of Bangladesh. DoF is the largest umbrella organization has offices and manpower at all the upazilla (sub-district) levels all over the country. Having closely seen the success through actively participating in the ProSCAB, DoF now included these interventions in their core activities and directed its coastal officers to promote and disseminate the outcomes to the entire coastal districts.

With the help of other back-stoppers, the market consultant - Dr. Harunur Rashid, Associate Professor of BAU and also one of the project reviewers of the Equity and Entrepreneurship Fund Project (EEF) of Bangladesh Bank, successfully convinced the Bangladesh Bank to change their policy of funding not only agriculture and livestock projects but to include funding in Fisheries especially in the coastal aquaculture projects. Bangladesh Bank has agreed to fund the fisheries projects and agreed to allocate funds for establishing two crab hatcheries in Southeast and Southwest coasts of Bangladesh and shown kin interest to provide increased funding to the potential and viable fisheries projects.

A number of meetings, visits, and seminars have been arranged involving DoF, NGOs, Bank officials, academics and all level policy makers. Several programs on the success stories of ProSCAB were broadcasted in multiple television channels and several articles and case studies have been published in the national dailies. These also generated the attention of the policy makers.

Not only DoF and Bangladesh Bank became interested in the technologies generated by the ProSCAB, but a number of NGOs and international donors have included the crab fattening, seaweed culture in their programs all over the coast.

8.1.11. Sustainability Impact

The demand for innovation in the selected technologies came from community partners, through NGOs, who wished to learn more about the technologies to enable them to utilise current

knowledge as the basis for future innovations. The ProSCAB initiative was' completed to more than 5000 households who were trained on the new technologies (chosen from a range of options) and linked with local service providers, marketing and knowledge agents, and had direct experience of adapting the technologies themselves.

During the ProSCAB initiative community partners were supported to develop their own linkages with government offices, service providers and market operators. These linkages were bolstered with action during the initiative that provided confidence in all parties as to the value of engagement in the innovation of these technologies; specifically through the use of information provided, purchasing of supplies and the production of goods for sale. Inter-community linkages were strengthened as the initial community partners were engaged in training potential adopters from other communities.

There were intensive engagements between all initiative partners for the first two years in order to develop linkages and refinement of technologies. At the end of year 2 this engagement process were actively facilitated, side by side monitoring of progress was done in order to observe and report on the effectiveness of the process.

The technical back-stoppers involved in the initiative developed the techniques originally with poor coastal communities and remained involved informally ever since. They will continue to engage beyond the through their own interest, stimulated by a desire to see the technologies live, but also to enable them to keep reporting to the academic community about developments in these emerging sectors. DOF and the partner NGOs (Shushilan and COAST) have long been working in the coastal areas and have permanent infrastructure and manpower set up. Over the three years of the initiative, a strong linkage, trust and working relationship were built up among these partners and the community that partners have agreed to continue these beyond the life of ProSCAB, through provision of advice, inputs or credit.

Implementing partners organized regular workshops and meetings at local level involving target HHs, local administration, financial institutes (Bank and NGOs), wholesalers, feed suppliers, ice factory owners, transporters, local leaders, regulatory

/law enforcing agencies, policy makers and exporters. Therefore, after the end of the initiative, the beneficiaries will know for sure about how and where to sell their products, in a problem scenario where to go and whom to talk to for a solution, and when affordable credit is needed, which organizations to approach to. Moreover, during the initiative period a direct linkage was established with the local marketing agents, transporters, affluent city outlets and exporters so that the beneficiaries are now able to continue their business without facing much difficulty. The development of these networks may require breaking existing bonds in current market chains, but as many of these opportunities are new it is hoped that the availability of credit through reputable NGOs will provide a feasible alternative to bonds

with marketing agents. Breaking existing bonds will be facilitated by initiative partners as far as possible.

Extension materials e.g., leaflets, posters, booklets, video clips, developed by the initiative will left with communities for further use and dissemination. Whilst some will be left in community spaces many will be left with input and service providers who would have vested interested in further dissemination of this information to increase sales.

8.2. Specific outcomes and Impacts of 5 adopted Technologies

8.2.1 Crab Fattening

Mud crab *Scylla serrata* (locally called "Jati, Kara or Haba Kakra") is widely distributed in the coastal water of Bangladesh with annual production of 10,000 MT. Sixteen crabs were recorded from the Chakaria Sundarban area and *S. serrata* was the second dominant species among the crab populations. As popular seafood, crab has been farmed on a commercial scale in many tropical countries using different culture systems (earthen pond, pen and cages). This study under ProSCAB funded by RIU was carried out to introduce mud crab fattening culture using bamboo cages and also in pen. It also compared crab fattening in bamboo cage and earthen pond. The higher growth rate (1.08g/crab/day) and less mortality (3-7%) of fattened crab (Scylla serrata) were recorded in the cage than that of the earthen pond (growth 0.49g/crab/day and mortality

7-15%). Higher growth was always found for male crab than female. Mud crab fattening in the bamboo cages required low investment (Tk.670/crop/cage) than that of earthen pond (Tk.2350/crop/pond), and was more profitable (Tk.350 for cage, Tk. 224 for pond). The growth and mortality rate of crab was influenced by seasons. The present results indicate bamboo cage is sustainable and economically viable to the poor and landless people.

Cage preparation and placement

Bamboo was used for cage preparation because of its availability and cheapest price at the study area. Cages are constructed with the bamboo strips (*Bambusa tulda* and *Bambusa vulgaris*) with a dimension of 7' x 3' x 1'. In the ProSCAB project, a cage was divided into 60 compartments or chambers or cells (Fig. 1). Each cell size was to be 7" x 7" x 10". The cage was placed in tidal estuarine water so as to that it could not touch the bottom of the river during the neap tide. The cage was provided with floats and rings at four corners and tied with wooden poles, so that the cage could remain afloat at least

1-1.5 inch above water. The cage was covered with coconut fronds to prevent the crabs from direct sun. In both southeast and southwest, each of the crab farmers under OGs made by

ProSCAB supplied with one cage.

Earthen pond preparation

The mud crab fattening in pond was conducted in the tidal water ponds of in the coastal areas in Cox's bazaar and Satkhira by the OG members. After construction of dykes and gates, the ponds were allowed for sun drying for seven days. The total area of each of the ponds was 480 m² and this area was equally divided into four small ponds. All the ponds were fenced by bamboo slits at about 6" deep in the soil to prevent crab from escaping and burrowing (Fig. 2). CaCO₃ was applied at a rate of 100 kg/ha to increase the pH value.



Fig.1: Cell cage for mud crab culture



Fig.2: An ideal pond for mud crab culture

Stocking

Male and female crabs having soft shell were collected from natural source by the contact farmers. They stocked one female or male crab in each compartment of cage (60 crabs/cage). Stocking was done during early morning or late in the afternoon to minimize stress. 30 male (ranging from 160-400g) and 30 female (ranging from 140-

250g) crab were stocked with one individual per cell at different times of the year. Different sizes of crabs were stocked in different experimental period (Table 1).

Stoc	king	Stocki	ng size	Rearing	Mean		Mean growth ±		Percentage	
num	nber	(gm)		period	growth		SD in total		of mortality	
				(days)	(g/in	idiv./da	rearing	period	(9	%)
						y)				
Male	Female	Male	Female		Male	Female	Male	Female	Male	Female
30	30	160-181	140-164	15	1.64	1.06	24.66±	16.00±	3.33	0.00
							5.99	4.68		
30	30	300-348	200-250	14	1.50	0.61	21.03±	8.51±	3.33	0.00
							6.55	4.78		
30	30	250-400	170-235	15	1.37	1.00	20.52±	15.03±	3.33	3.33
							4.72	4.04		
30	30	250-395	170-250	15	0.94	0.92	14.14±	13.79±	3.33	3.33
							5.85	4.51		
60	60	250-300	178-247	15	1.21	0.99	18.21±	14.98±	3.33	0.00
							5.87	4.80		
30	30	250-300	180-230	14	0.92	0.77	12.82±	10.71±	6.66	6.66
							6.78	6.19		

Table 1. Growth rate, mortality rate of fattened crab in the cage culture

Feeds and Feeding

Farmers were advised to feed low-cost fresh eel (*Anguilla spp.*) fish, and when fresh eel was not available salted eel was given. Small sized tilapia grown in gher was also fed to the crab. The feed was supplied twice a day at 5% of body weight up to harvesting.

Physico-chemical parameters of water

Salinity, water temperature and pH ranged from 0.50‰ to 30‰, 22-29°C and 7.4 – 9.6 respectively at the investigated area (Table 2). Salinity and water temperature showed the seasonality in the study area and lowest salinity was recorded during monsoon months (July-October) when maximum rainfall occurred. Minimum temperature was recorded during winter months in December and January.

Parameters	June '09	Aug '09	Oct '09	Nov '09	Dec '09	Mar' 10
Salinity ‰	0.5-3	1.05-1	0.5-1	2-9	17-22	29-30
Temp (°C)	25-29	25-29	27-29	25-29	22-23	26-27
рН	8.0	8.0	7.6-9.6	7.4-8.1	7.5-8.1	8.2-8.3

 Table 2. Physico-chemical parameters of the crab cage

Physico-chemical parameters in earthen pond

Salinity, water temperature, water pH, soil pH and dissolved oxygen (DO) were recorded as 2-8‰ and 3-8‰, 28-30°C and 22-25°C, 5.5-7 and 6-7, 6 and 6.2 and 8.85ml/L and 8.50ml/L in the first and second phase respectively

Growth and mortality rate

Growth rate (0.92 to 1.64 g/indiv./day for male and 0.61 to 1.06 g/indiv./day for female) and mortality rate (3-6% for both male and female crab) were observed in cages. Growth rate of male crabs was found higher than female crabs in cages/pond (Fig. 3.).



Fig.3: Growth rate of male and female mud crab in cages in the Mathamuhuri river confluence

Average growth rate was found 0.66 g/indiv./day for male and 0.36 g/indiv./day for female and mortality ranged from 7-12% in monosex pond culture. Whereas in mixed culture, average growth rate was found 0.60 g/indiv./day for male and 0.33 g/indiv./day for female, and mortality ranged from 14-15%.

In the first experiment, growth rate was found higher due to the stocking of small crabs in cage and pond. In winter season, lower growth rate of male crab was observed probably due to low temperature. In the second experiment, lower growth rate of female crab was observed in cages, when low salinity prevailed. Higher mortality was observed in mixed culture pond due to cannibalism. One factor ANOVA showed the difference between six experimental results in cages (P=0.0001, F=11.338, DF=5). The growth and mortality of fattened crab showed the seasonality in the present work.

Comparative financial analysis

It was found that the cell type of cage culture was more profitable than other culture systems (Fig. 4 & Table 3).



Fig.4: Net profit from cell type of cage culture than other culture system

Table 3. Comparative financial analysis between crab fattening in cages (cell and open), earthen ponds and pot culture systems

Particulars	Particulars Cage Culture		Earthen Pond	Pot Culture
	(cell type) one	(Open) (in	Culture one	10 pots/crop
	crop/cage (in	Taka)	Taka) crop/pond	
	Taka)		(in Taka)	
Investment	670	620	2350	106
Income	1019	910	2574	157.23
Net Profit	349	290	224	51.23

(Average selling rate: Tk. 64.25/kg, average purchasing rate: Tk. 25/kg,

feeding cost: Tk.10/kg, cage cost (cell type)-Tk. 3000 /cage, 20crops/cage/year.)

Comparison among different crab fattening systems

In the cell type of cage culture, it was observed that lower mortality and higher growth rate of crab occurred than that of earthen pond. It was also more profitable and easy to operate in respect of feeding and management. Therefore, the cell type of crab culture system was more sustainable for the marginal poor coastal people of Bangladesh.

Farming expansion through ProSCAB initiative

The ProSCAB contact farmers voiced to promote further intensive training on crab fry/juvenile collection from natural water to reduce handling and transport mortality. They also mentioned that fry/juvenile is not available in desired size and quantity in natural ecosystem. Thus, hatchery establishment is the burning issue to produce crab fry for smoother production of crab in environment friendly way. It is recognized that crab fry production technology is well developed in Thailand and Vietnam and thus required adaptive research or training from these countries can enhance crab production as the income generating option to the coastal poor community of Bangladesh.

A total of 453 male and 407 female stakeholder started crab fattening in 2008 and reached to 1377 and 808 respectively in 2011 (Fig 1a). Considering the social class, the number of Jaladas tremendously increased from 316 to 1353 within the project duration, the Muslim showed increasing trend from 414 to 767 (Fig 1b).



Fig. 1a. Involvement of community HHs in crab fattening in terms of gender



Fig. 1b. Involvement of community HHs in crab fattening in terms of ethnicity

Average crab production per household increased 159% within the project duration. The continuous production has established live crab marketing channel and increased average price 167%, which doubled annual household income (Table 1).

Table 1. Average production, market price and household income of crab farmers
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		Increase (%)				
	2008	2009	2010	2011		
Avg production	1780	1079	2612	2824	150	
Kg/HH	1780	1920	2012	2024	135	
Average price	700	825	1112	1220	167	
TK/Kg	790	825	1115	1320	107	
Annual income	110 200	12/ 990	10/ 500	220 060	100	
тк/нн	119,200	134,000	194,500	229,000	199	

Conclusion

As the outcomes of the ProSCAB project – mud crab culture in Bangladesh has great prospect. It is second important cultivable fishery items in the coastal areas of the country. Crab juvenile availability, mass cultivable area, suitable environment, local consumption, foreign market demand, pollution free areas and other facilities are present in Bangladesh. Cage culture of crab is an important extension issue in Bangladesh. Through this process the landless people or poor coastal community will be benefited and thus their socio-economic status will be upgraded. This may be further expanded among wider coastal districts as an adaptation option against climate change impacts on the coastal livelihoods.

Case studies on crab fattening under ProSCAB

Jashim Uddin - Resource poor or Technology Poor?

Jashim Uddin from Saddalia village of Chakaria in Cox's Bazar district has long depended on fishing and crab catching from coastal water to live on hands to mouth with

5 family members. The family has neither crop land nor fish pond. Tremendous pressure of ever increasing population has promoted overexploitation of coastal fisheries, resulting declined catch. Jashim could not effectively engage himself in fishing and trading because of poor catch from coastal water. He was looking for more alternate opportunities to earn money and improve livelihoods.

Jashim joined crab fattening component of RIU funded ProSCAB project and received hands-on training on crab fry/juvenile collection, cage preparation, crab rearing with locally available feeds and one bamboo made cage. He started fattening of undersized and non-marketed crabs in the chambered bamboo cage with locally lowvalue eel fish as crab feed and got bumper production of marketable crab within 14-15



days. The cash income within short period of time inspired him to increase cage number with his own investment. Moreover, he has modified the cage structure to make the single-chambered cage, and also started crab fattening in earthen pond with bamboo pen. Within a year, Jashim became the owner of eight cages and two earthen ponds of 200 m² and his production reached to 150 kg/month having farm gate price of Tk 400/kg and thus earning Tk.60,000/= per month. It has changed his living

standard and livelihood pattern. He is now a role model for others in the village.

Sirajul gets self employment through crab fattening

Shirajul Islam lives in a village named Vamia of Shayamnagar, Satkhira. He has a family of three members with his father and mother. Sirajul could not maintain his family with his daily income. He could not be educated because his father died in his childhood and he took the responsibility of his family. He had a needy family. He



was a member of Bain gach group of ProSCAB project of Shushilan in the month of October in 2008. After being a member of ProSCAB he got training from Shushilan on Crab Fattening in December and started Crab Fattening in cage. One cage contained

60 shelves. He gathered crab in each shelf. In one month there were two crab fattening cycles. Side by side he was a daily labourer also. But he could be able to earn more than Tk. 2000/= per month, in addition to his earning daily wage. With that money, he bought 10 ducks and 1 goat and raised them. Now he has made his own wealth well enough to run his family. At leisure time he learnt under Shushilan literacy program.

Now he can calculate his daily income and expenditure and is able to write the Resolution khata. Due to livelihood development his social acceptability has been increased. He has expanded his crab production business by setting more cages with his ownl income. He has two cages with 120 shelves now. Seeing Shirajul's success in crab fattening business many people of Vamia village started the crab culture. Listening the success of livelihood improvement and to allow more poor people, the Deputy Commissioner of Cox's Bazar district opened the Vamia canal for Crab Fattening on last November 2010. Now Sirajul's crab fattening has been scaled up throughout the village. Sirajul is a happy man now as can provide nutritious meals for his family thrice a day, which was impossible for him before crab business. Poverty ran out of his window and he paid back all sorts of loans. Villagers are now coming to Sirajul to take advice on crab fattening. Shirajul dreams to lease a large farm to make that a crab center to both both raise and sell premium sized high quality crab in premium price. He wish Sirajul to transform his dream into a reality.

Sujata is now earning most......

Sujata (32) lives in Horinagarj Village of Shayamnaga, Satkhira. Shujata was a illiterate young lady, did not know how to read and write. She got married at the age of 14-15.After married he has a family of 2 sons and 1 daughter, husband, father in law and mother. Her husband could not maintain her 6 members family with his own income. She lived with poverty. She was a member of Nim gach group of



ProSCAB of Shushilan as an interested farmer in the month of November in 2008 and got training on Crab Fattening in January 2009. She got 80 ft net, pata, bamboo, thin Crab from Shushilan for fattening the crab. Her husband went outside for daily income and Suajata only one started to fat the crab. She earned monthly Tk.3000/= in her crab point of 1 kata land. She bought one cow, cloth for her children and for all by her income. Her acceptability increased day by day for her extra income for her family. In any decision Sujata's decision has been counted. Every member of her group listen the advantages and disadvantages of Sujata about crab fattening.

Now Sujata has done her duty as a chairperson. She is communicating with Local Union Parisod and Upajila Fisheries officer for different advantages. Other member of her group gets suggestion from Sujata. She is starting a new crab fattening point in last December and started to fatten the crab. In his family, solvency and peace has come back. Now Sujata is a self employed woman. She dreamed a dream that she will start a crab fattening point of 1 Bigha land. She is a role model for self sufficient in earning and women empowerment for many other women in her village.

Case study – mud crab hatchery -Inevitability of mud crab hatchery in the coastal region of Bangladesh

Under the ProSCAB initiative, in one of the five technologies – the crab fattening, the involvement of male and female stakeholders has increased tremendously. Under the project, a total of 453 male and 407 female stakeholder started crab fattening in 2008 and reached to 1377 and 808 respectively in 2011. Considering the social class, the number of Jaladas tremendously increased from 316 to 1353 within the project duration, the Muslim showed increasing trend from 414 to 767. Average crab production per household increased 159% within the project duration. The continuous production has established live crab marketing channel and increased average price 167%, which doubled annual household income.

Due to exceptionally higher tendency of the new entrepreneurs to come forward in the business and high rate of adoption of new technologies for more profit generation, natural crab seeds have been gradually declining. This burning issue should be mitigated by establishing crab seed hatcheries. Initiatives have been made to establish two crab hatcheries in two coastal regions, one in Southwest region, Shamnagar of Satkhira district and the other in Southeast region, Chakaria of Cox's Bazar district through the support of Bangladesh Bank, Government of Bangladesh. The necessary steps have been taken by the Government of Bangladesh and we are hopeful for final approval of funding for two hatcheries.



Crab Culture in Cage

Crab Culture in Pen

8.2.2. Mollusc farming

The mollusc fishery remains under-utilized in Bangladesh. There are three commercially important edible mollusks available in the coastal water of Bangladesh - green mussel (*Perna viridis*), clam (*Meritrix meritrix*) and oyster (*Crassostrea mandralences*). The second component of ProSCAB initiate was to promote mollusk farming in Bangladesh involving coastal poor muslim and tribal fishermen and women. The objectives were - to mobilize the local community for mollusc culture, to select suitable cultch materials for spat collection of oyster and green mussel, to observe the growth rate of oyster and green mussel during culture period, to assess risks of mollusc culture and identify measures to reduce their impact and to explore the market potential of mollusc meat.

The Farming

Poor, vulnerable and disadvantaged section of the society (Shrimp PL collectors, fishermen, salt producers, land less people) carried out the farming activities after getting training from the ProSCAB backstoppers. Plastic sheet, pottery, kortal and bamboo were used as cultch materials (Figs. 1-3). Floating rafts were made with bamboo, rope, floats and anchor. Initial and final body weight of the shells was measured. Health condition was observed during data collection period. The cost benefit analyses of mollusk farming are shown in Tables 2-3.



Fig. 1. Cultch installation & monitoring

Cultch	types	Windo	wpane	Pottery		Plastic	sheet	Bamboo	
		shell							
Cultur	ed	Oyster N	ussel	Oyster	Mussel	Oyster	Mussel	Oyster	Muss
Specie	es								el
Jan.	Total spat	6	13	12	21	6	14	7	19
	Spat/cm ²	0.08	0.17	0.05	0.10	0.03	0.07	0.005	0.01
	Spat size	2.3	1.7	2.1	1.7	2.0	1.6	1.8	1.6
	(cm)								
Feb.	Total spat	10	18	14	29	9	17	6	11
	Spat/cm ²	0.13	0.23	0.06	0.13	0.04	0.08	0.006	0.007
	Spat size	2.9	2.1	2.8	2.3	2.6	2.2	2.7	2.1
	(cm)								
Mar.	Total spat	21	38	27	47	25	42	14	22
	Spat/cm ²	0.27	0.48	0.11	0.21	0.12	0.20	0.01	0.02
	Spat size	3.8	2.9	3.5	2.8	3.2	2.7	3.6	2.7
	(cm)								
Apr.	Total spat	23	51	33	69	31	58	19	37
	Spat/cm ²	0.30	0.65	0.15	0.30	0.15	0.28	0.01	0.03
	Spat size	4.7	3.3	4.2	3.1	4.1	3.0	4.4	3.2
	(cm)								
May	Total spat	49	94	51	103	38	81	36	61
	Spat/cm ²	0.62	1.20	0.22	0.45	0.18	0.39	0.03	0.04
	Spat size	5.6	4.2	5.0	3.5	4.8	3.4	5.2	3.5
	(cm)								

Table 1 . Monthly spat density and growth rate in different types of cultch



Fig. 2. Raft preparation



Fig. 3. Raft installation

Table 2	Cost	of different	cultch	matorials	(framo	and rafts	۱
I able Z	. Cost	orumerent	cuitcii	materials	(manne	anu raits)

Cultch	Cultch	Unit price (Tk)	Sub-total price	Cost
	materials			/frame
Plastic	Plastic sheet	1 Plastic sheet	10 sheets X 5.50 =	72.00
frame	Size 12 X 15	5.50	55.00	
	cm2	5 m rope 10.00	5 m rope X 2.00 =	
	Rope 12 mm	Brick/stone	10.00	
	dia	piece 2.00	Brick/stone = 2.00	
	Brick/stone		CI cost = 5.00	
	pieces			
Pottery	Burned clay	1 pottery plate	10 plates X 4.00 =	57.00
frame	soil, radius	4.00	40.00	
	about 10 cm	5 m rope 10.00	5 m X 2.00 = 10.00	
	Rope 12 mm	Brick/stone	Brick/stone = 2.00	
	dia	piece 2.00	CI cost = 5.00	
	Brick/stone			
	pieces			
Kartal	Window pan	1 Window pan	10 shell X 0.00 =	17.00
frame	shell, radius	shell 0.00	0.00	
	8-10 cm Rope	5 m rope 10.00	5 m X 2.00 = 10.00	
	12 mm dia	Brick/stone	Brick/stone = 2.00	
	Brick/stone	piece 2.00	Cl cost = 5.00	
	pieces			
Bamboo	Bamboo 100	1 bamboo pole	10 pole X 5.00 =	55.00
pole	cm	=5.00	50.00	
	Size: radius		CI cost = 5.00	
	6-8 cm			

Expenditure for Raft	Amount (Tk)	Total (Tk)
Material cost	1,065	1,485
Making and installation	420	

Table 3. Production & Economic Return

Species	Production	Meat	Shell	Meat	Shell	Total
	(Kg)	weight	weight	price	price	income
		(Kg)	(Kg)	(Tk)	(Tk)	(Tk)
Oyster	115	18 (16%)	97	100	5	2,285
Mussel	92	38 (41%)	54	60	8	2,712
	Total income	from oyster a	nd green n	nussel		4,997
Total cost of 1 Raft						
	Profit	from 1 Raft ir	n 8 months			3,512

Species	Production	Meat	Shell	Meat	Shell	Total
	(Kg)	weight	weight	price	price	income
		(Kg)	(Kg)	(Tk)	(Tk)	(Tk)
Clam	203	21 (11%)	182	60	8	2,716

The outcomes of ProSCAB approach

The female beneficiaries of molluscs farming showed increasing trend in the coastal water. The raft, rope and pole have been installed in the nearby canal and creeks, where the women can easily look after even from their home-yard. Male beneficiaries also increased slightly. Limited consumers of molluscs meat (only the indigenous tribal people) is the constraint for expansion of mollusc farming (Figure 1b). The tribal *Rakhaine* community in Southeast coast mainly engaged, where involvement of *Jaladas* is completely absent and few Muslim beneficiaries participated in molluscs farming (Figure 1b).

Average molluscs production per household increased 112% within the project duration. Price in the local market increased 127%, which increased the annual household income (Table 1).



Fig. 1a. Involvement of community HHs in mollusc farming in terms of gender



Fig. 1b. Involvement of community HHs in mollusc farming in terms of gender

		Increased (%)			
	2008	2009	2010	2011	
Avg production Kg/HH	900	1420	930	1010	122
Average price TK/Kg	175	229	206	223	127
Annual income TK/HH	41200	47200	53600	28435	169

Table 1. Production, unit price and income in mollusc farming

Conclusion

The ProSCAB study provides the evidence that external cultch materials deployed coastal water of Bangladesh is economically and environmentally viable for mollusk faming. This can be a new horizon for the coastal landless poor to go for mollusc culture as an important alternative income generating options. The prospects for coastal mollusc culture in Bangladesh depends on the integrated management approach of the farmers, researchers, supporting institutions, development agencies, private entrepreneurs and the end-users. Through through market development and government's policy intervention and social security issues will bring about change in the adaptation of these important and proven technologies.
8.2.3. Seaweed farming

Two commercially important species; *Hypnea sp.* and *Caulerpa racemosa* were selected for promotion of farming under ProSCAB initiative. Three different types of culture system (line, net and suspended rope methods) were adopted. Seedlings were collected from natural sources and growth rate was found 1.06 cm/day for *Hypnea sp.*

and 1 cm/day for Caulerpa racemosa. Water temperature (28-31°C), salinity (24-36‰),

pH (7.3-7.5), dissolve oxygen (3.5-5.5 ml/l), alkalinity (108-120 ppm) and transparency (35.0-53.5 cm) were recorded in the coastal water where seaweeds were farmed. The low salinity (less than 24 ‰) decreased the growth rate of seaweed. Better growth was observed for *Hypnea sp.* in net and suspended rope method and for *C. racemosa* in line and net method. The levels of protein, lipid, moisture and ash content were estimated

11%, 5%, 76% and 8% accordingly in wet samples of *C. racemosa*. From the dry samples in *Hypnea sp.*, the levels of protein, lipid, moisture and ash were 13%, 4%, 22% and 18%, respectively.

ProSCAB targeted the promotion and expansion of seaweed, because it has become one of the important species for cultivation globally regarding demand for healthy food world-wide. Seaweeds, having protein, amino acids, vitamins and minerals are used as different purposes such as fodder, fertilizer, human food, industrial and pharmaceutical raw materials. They contain compounds that help reduce high blood pressure, cholesterol, and prevent strokes. They can also be used as remedy for rheumatism, diarrhea, and for controlling the growth of tumors. It has been estimated that world seaweed production is around 6.0 million tones per annum with a value of around USD

5 billion. Japan, Philippines, Taiwan, China, India and Korea have been producing the seaweeds commercially. But in Bangladesh still aquaculture practice of seaweeds is absent.

Growth of seaweed

In the ProSCAB study, the growth rate was found 1.06cm/day for *Hypnea sp.*, 1cm/day for *Caulerpa racemosa* (Table.1). Better growth was observed for *Hypnea sp.* in net and suspended rope method and for *C. racemosa* in line and net method (Fig. 1-4). The suitable culture period for seaweed was from October-April. During monsoon, the seedling of seaweed was not found in inter tidal zone due to fresh water discharge from river. The obvious effect of salinity on growth of seaweed was observed.. As salinity drops below 24‰, lower growth of seaweed was observed during the month of May. On the other hand, with increasing salinity (>30‰) during the months of February-March, better growth was found for both algal species. The water temperature, salinity, pH, DO, alkalinity and transparency ranged from 27.5 - 31° C, 24 - 36‰, 7.3-7.5, 3.47 - 5.46 ml/L, 108 -120 ppm and 35 - 53.5 cm in the culture period (Table. 2).

Table 1.	Growth	rate o	f Hypnea s	sp. and	Caulerpa	racemosa	in the	adjacent	coastal	water o	f
			St. Marti	n's Isla	nd, Bangla	adesh					

Name of the species	Length at	Length at	Growth rate	Culture period	
	seedling (cm)	harvesting (cm)	(cm/day)	(days)	
Hypnea spp.	12.7	76.2	1.06	60	
(whole species)					
Hypnea spp. (cut-piece)	18	75	0.95	60	
Caulerpa racemosa	10	40	1	30	



Fig. 1: Growth observation of Caulerpa racemosa on line method



Fig. 2: Close view of Caulerpa racemosa on line method



Fig. 3: Growth observation of Hypnea on net



Fig. 4: Growth observation of Hypnea on suspended rope

Table 2. Water parameters in the adjacent water of St. Martin's Island

Parameters	February	ruary March		May
Water Temp (°C)	27.5	28.1	31	31
Salinity (‰)	36	33.78	31.93	24
рН	7.5	7.5	7.3	7.4
DO (ml/L)	3.47	3.80	4.85	5.46
Alkalinity (ppm)	120	117	110	108
Transparency (cm)	53.5	48	39	35

The levels of protein, lipid, moisture and ash were estimated 10.75%, 5.17%, 76.26% and 7.37% for *Caulerpa racemosa* on wet weight basis, and from the dry sample of

Hypnea sp., the levels of protein, lipid, moisture and ash were estimated to be 13.35%, 3.59%, 21.76% and 17.78% (Table 3).

Table 3. Proximate composition (%) of *Hypnea sp.* and *Caulerpa racemosa* from the St. Martin's Island, Bangladesh

Name of the species	Protein	Lipid	Moisture	Ash
Hypnea sp.(dry)	13.35	3.59	21.76	17.78
Caulerpa racemosa (wet)	10.75	5.17	76.26	7.37

Comparative cost of different culture systems

The total cost for preparing the net culture system using bamboo and stone was 415.00 Tk. for design-1 and 750.00 Tk. for design-2 (Table. 4 & 5), and it was 280.00 Tk. for both line and suspended rope culture system (Table. 6 & 7). If the farmers used PVC pipe and anchor instead of bamboo and stone, the cost would be three times higher in all the culture systems (Table. 4-7).

Table 4. Comparison between cost of bamboo & PVC frame for net culture system (design 1, size: $1m^2$)

Materials	Quantity	Price (Tk.)	Materials	Quantity	Price (Tk.)
Bamboo	-	80.00	PVC pipe	4m	210.00
Float	3 pcs	85.00	PVC elbow	4 pcs	20.00
Net rope	-	100.00	Float	3 pcs	85.00
Stone rope	-	50.00	Anchor	1 pcs	200
Stone	-	00.00	Net rope	-	100.00
Labor charge		100.00	Labor charge		100.00
Total		415.00	Total		715.00

Table	5.	Comparison	between	cost	of	bamboo	&	PVC	frame	for	net	culture	system
(desig	n 2	, size: 5 x 2 m	1 ²)										

Materials	Quantity	Price (Tk.)	Materials	Quantity	Price (Tk.)
Bamboo		150.00	PVC pipe	16m	935.00
Float	10 pcs	100.00	PVC Tee	2 pcs	12.00
Net rope	-	150.00	PVC elbow	4 pcs	20.00
Stone rope		50.00	Float	6 pcs	450.00
Stone	-	00.00	Anchor	4 pcs	1400.00
Labor charge	•	300.00	Net rope	-	150.00
Total		750.00	Anchor rope	-	50.00
			Labor charge		300
Total					3317.00

Table 6. Comparison between cost of stone and anchor for line culture system (size: 10 m).

Materials	Quantity	Price (Tk.)	Materials	Quantity	Price (Tk.)	
Float (small)	4 pcs	40.00	Anchor	2 pcs	300.00	
Bamboo	4 pcs	40.00	Float 4 pcs		160.00	
			(small + large			
Rope	-	100.00	Bamboo 2 pcs		20.00	
Stone	-	00.00	Rope	-	100.00	
Labor charge	Labor charge		Labor charge		100.00	
То	tal	280.00	Total		680.00	

Table 7. Comparison between cost of stone and anchor for suspended rope culture system (length: 5m, depth: 1.5 m).

Materials	Quantity	Price (Tk.)	Materials Quantit		Price (Tk.)
Float (small)	4 pcs	40.00	Anchor	2 pcs	300.00
Bamboo	4 pcs	40.00	Float 4 pcs		160.00
			(small + large)		
Rope	-	100.00	Bamboo	2 pcs	20.00
Stone	-	00.00	Rope	ope -	
Labor charge		100.00	Labor charge		100.00
Tota	I	280.00	Total		680.00

Cost-benefit Analysis

The total production of *Caulerpa racemosa* and *Hypnea sp.* in the line culture system (10 m long) was about 1.0 kg and 1.5-2.0 kg for *Hypnea sp.* on wet weight basis. The

value of the production was estimated 5600 Tk. on the basis of international market. The net profit from the line culture method was 5320 Tk. by selling *Caulerpa racemosa*. The rate of *Caulerpa racemosa* is 2.99 USD (170 Tk.)/oz on wet weight basis in the international market [http://store.worldpetstore.com].

Present status and marketing process of seaweed in Bangladesh

In the St. Martin Island, the poor coastal people (about 100 families) have been collecting seaweed for their livelihood. Approximately, 1500-2000 tons of wet seaweed (*Hypnea*) is harvested manually or with the help of push net (Fig. 5) in every year during April-May and then sun dried on shore (Fig. 6 & 7). Dry seaweeds export to the Myanmar and then Singapore and also China. They sell them at the rate of 500-800 Tk. Per mound.



Fig.5: Seaweeds collected by push net



Fig.6: Collected Hypnea sun dried on the shore

Future possibility of seaweed marketing

The study under ProSCAB found that, seaweed has large international market in America, Japan, Europe and Singapore. These cpountries import seaweed from many different countries. If the farmers and other entrepreneurs begin mass culture of seaweed, they can easily export them at a high price in the international market. In this regard, the government of Bangladesh will have to take right measures to ensure placement of seaweed consignments in the exporting countries. Besides, raw seaweeds will have good market within country.

Seaweeds production technique disseminated by ProSCAB has widely accepted by the islanders and extended to coastal zone of Teknaf. As the non-conventional aquaculture items, seaweeds production is the first initiative in Bangladesh and created new horizon of utilizing neglected natural resources that was unheard and unpaid for. Thus, seaweeds production season became as the income generating ceremony among the coastal poor people. This is the way of integrating resource, society and economy to ensure sustainable and environment-friendly utilization. Some private entrepreneurs invested in preparing seaweeds products of food, medicine and cosmetics including soap, shampoo, cheep, noodle, soup, cookie and diabetic tablet and displayed in exhibitions to encourage people in enjoying the products. Seaweeds farming in coastal water have changed the livelihood scenario of coastal people.

The Saint Martin's Island in the Southeast coastal region has favourable ecosystem for seaweeds aquaculture. Thus, project beneficiaries for seaweeds farming has selected from this region though very limited number of beneficiaries included from the southwest part of Sunderban mangrove ecosystem. The number of male beneficiaries has increased from 105 to 195, where the number of female beneficiaries increased up to

80 during the project period (Figure 1a). Only Muslim beneficiaries involved with seaweeds farming, where Jaladas and Adivashi people showed no interest in seaweeds farming (Figure 1b). Seaweeds production, market price and household income have increased gradually (Table 1 & Figure 2).



Fig. 1a. Involvement of community HHs in seaweed farming in terms of gender





		Years						
	2008	2009	2010	2011	(%)			
Avg								
production								
Kg/HH	240	360	360	400	167			
Average price								
TK/Kg	20	20	22	25	125			
Annual								
income								
тк/нн	14,400	14,400	17,500	22,000	153			

Table 1. Average production, market price and household income of seaweeds farmers







Figure 3. Production, market price and household income of seaweed farmers

Conclusion

The present research work dealt mainly with 2 commercially important species. It is necessary to carry out further research works on other commercially important seaweeds. It is worth mentioning that policy makers have significant role in extending the culture of seaweeds in the coastal water of Bangladesh. They should come forward to setup seaweed processing industries that will create employment opportunities for the local youth, women and farmers. Concerned Government Departments and NGOs need to play comprehensive role in extending this new technology to the grass root level farmers. If proper steps are taken for seaweed culture, it will open a new avenue for the local farmers, creating an alternative livelihood option. Thus, phyco-aqua- industry will come as an indicative tool for national economic emancipation, poverty alleviation, mitigating unemployment problem and finally maintaining steady socio- economic and socio-cultural condition of the country, particularly at the coastal poor communities. A link with external market overseas may have increased the possibility of Seaweed culture extension in Bangladesh.

Case studies on seaweed culture under ProSCAB

Ismail Hossain - A seaweed farmer on the rise

Ismail Hossain from the offshore island of Saint Martin's under Teknaf of Cox's Bazar district has been relied on small scale fishing, seaweed collection and trading. Ismail is the head of the house with six family members including wife, two sons and two daughters.

Ismail could not effectively engage himself in fishing due to lack of fishing equipments. He was looking for more productive opportunities to earn money and improve livelihoods of his family.

Ismail joined seaweeds production component of RIU funded ProSCAB project and received hands- on training on culture systems, collection techniques from coastal water and culture materials i.e. rope, net, bamboo, float and anchor. He started seaweeds production with inoculation of seaweed branches from the natural stocks into the culture materials.









and learning approach. The harvested seaweeds were sun dried and kept for selling. Seaweed farming has changed the livelihood scenario of Ismail and many other coastal people

Now Ismail's seaweed farming has been expanded throughout the village. He is a man of secured livelihood now as can provide 3 times a day meal to his family. Ismail is planning to expand his sea weed culture area and also teaching the techniques to the neighbours.

8.2.4. Wet fish business in low cost ice boxes: An innovation with multiplier impacts on quality fish trade

During 2000-2006, several DFID funded projects were conducted on various aspects of nonconventional aquaculture development and their value-chain analysis in coastal areas in Bangladesh (RNRRS, 2006). A 25-30% of the artisanal catch in the coastal region is spoiled every year due to lack of adequate handling and icing practices and devices. In order to reduce such huge post harvest loss and to improve the quality of wet fish supplied to domestic markets a 'low cost ice box', a 'community ice box' and improved practice for fish handling and icing were developed by the SUFER project in

2000- 2006 (Nowsad, 2008). The RNRRS outputs mentioned these technologies as easily managed and affordable by the poor coastal communities. One of the technologies was trading of wet fish through improved icing. The value can be added and the 'shelf life' of fresh fish can be prolonged through low-tech approaches to fish icing. These RNRRS outputs on improved fish icing, along with other non-conventional aquaculture technologies, have opened the possibilities of improving the livelihood of such disadvantaged coastal people through scaling up of these effective technologies. Further dissemination of such successful technologies within the present ProSCAB initiative continued to strengthen the fish quality in order to maintain incomes for small- scale traders and safe and quality food for the consumers.

Target community for wet fish trading

The target population were the coastal, disadvantaged low-cast hindu *Jaladas,* muslim poor fishers and adibashi *Rakhaings* of the Southeast and Southwest coastal areas who were depended mainly on fishing and fish related activities. Both women and men of such vulnerable coastal people were targeted. A total of 1000 households (HH) were initially selected from these 34 fishing villages for five technology related entrepreneurship development, viz., fish trading through improved icing, improved sun- drying of fish, crab fattening, mollusk culture and seaweed culture. The HH were organized into fish trading business groups, along with other groups, depending on their occupations. Focal points (male and female) for each of the villages were selected by the community partners as representatives. Initiative's goals and purposes were introduced to the focal points so that they could be able to explain the detail to others during initial activities.

Initially 290 HH community partners were selected for ice fish trading, out of which 100 man and 80 women headed HH from the Southeast coastal region and 50 men and 30 women headed HH were taken from Southwestern region. The community partners were chosen wherever

applicable separately for men and women entrepreneur groups covering three targeted communities: hindus Jaladas, poor muslim fishers and adivashi

Rakhaings. In some areas, mainly women were involved because men were away at sea or died at sea (or in cyclone, or by tiger in the forest). In the Rakhaing community a matriarchal system exists as a coping strategy as a result of generations of widows.

Geographical location

The study area covered 34 fisher villages under 18 unions of 11 Upazilas in 5 coastal districts-Cox's Bazar, Chittagong, Bagerhat, Khulna and Satkhira. Exclusive poor and disadvantaged coastal fishing villages were selected on the basis of set criteria.

Activities and Results

The study area was divided into two regions: Southeast coast belongs to Chittagong- Cox's Bazar coast and Southwest coast belongs to Khulna, Satkhira and Bagerhat. Two NGOs were responsible for organizing the field programmes: COAST Trust for Southeast and SHUSHILAN for Southwest coastal regions. In order to organize the HH community partners and promote business entrepreneurship, a series of systematic participatory approaches were followed. These are:

Organizing inception workshops

A total of 14 Inception Workshops were organized with policy makers, administrations, GO/NGO service providers, implementers, local government bodies, local leaders and community partners as participants – 1 in project level in Dhaka; 2 at regional levels- in Cox's Bazar and Satkhira and 11 in local levels in 11 Upazilas. The objectives of the inception workshop were to acquaint participants with goals and objectives and with the target communities. Roles of each stakeholder group were discussed.

Baseline data

A primary baseline survey was conducted on current socio-economic status and livelihood practices of the HHs. A database was developed using collected primary data, incorporating with the secondary information already held by the NGOs and other agencies. Collected information formed the basis for measurement of improvement in livelihoods. *Participatory planning*

Following group formation, with facilitation by the NGOs, a participatory planning workshop was organised by each entrepreneur group to determine the innovation process, schedule and partners to be involved in each technology.

Skill development of NGO and DOF partners on icing of wet fish

Technical capacity building of 50 NGO and DOF staffs on fish icing was done by the technical back stopper involved in the discipline through adequate training approaches (participatory community-based training of trainers, method and result demonstrations, distribution of training manuals, leaflets, booklets, etc.) and through visits to communities with existing production sites of earlier RNRRS research. Training manuals and other training materials like booklets, leaflets, etc. were prepared and distributed by the technical back-stopper before the training.

Skill development of primary partners: Community training

All partner HHs were trained by the NGOs within the first 6 months of project start. Regular guidance was provided to the entrepreneur group members by the NGOs and technical back-stoppers on a schedule that suits entrepreneur group needs. Additional support from DOF, potential service providers and marketing actors were also facilitated by the NGOs as requested by the entrepreneur groups. Regular monthly meetings at each entrepreneur group were held by NGO facilitation.

Initiation of wet fish trading: Initial production period

The entrepreneur group members were actively supported for initiation of business through an initial production period by technical back-stoppers and NGOs. Wet fish trading had a production cycle of 2-3 days maximum, i.e., after purchase the fish were sold out within 2-3 days under adequate icing and handling. Potential improved marketing opportunities were evident for fish undergoing improved icing. Along with the Technical Backstopper's support, the community partners brought their own knowledge (ITK) to the innovation process. In addition to that, in order to expand and sustain the business, the community partners assisted in the identification of local, sustainable input supplies.

Refinement of icing technology

limplementing partners tested and improved the icing technology according to learning and local materials/inputs. The technology required fine tuning and field acclimation to enable effective scaling up in a range of environmental and social contexts. Side by side, a review of innovation was done to guide further production by community partners. Understanding the innovation process at early stages under different local contexts enabled effective development and scaling up of the icing technology during the successive years. The quality of fish in new ice box was tested and required

changes in the design and icing protocol were adopted based on field and laboratory experiments.

Development of leaflet on improved ice box and icing method

A leaflet was prepared by the Technical Backstopper in the field highlighting the importance of quality maintenance and loss reduction in wet fish trade, manufacture and use of new low-cost ice boxes for preservation and transportation of iced fish and good handling practices of wet fish. Five thousand copies of the leaflet, as shown in the above figure, were printed and distributed.

Horizontal scaling up of refined icing technology by community partners

In the second year community partners continued with production using the adapted systems developed as a result of innovation in the first year. Refined icing technology was disseminated to the most of fish traders of Cox's Bazar by December 2009. The easy adaptable ice box technology was spread to major fish landings, markets and routes of the country by January 2011. The additional HHs on wet fish trade were provided with most updated information on adequate icing and handling for awareness raising through exposure visits by community partners, technical back-stoppers and NGOs. Leaflets and booklets prepared highlighting the use of icing technology was distributed to the technology adopters beyond the study area.

It was found that the community partners profitably traded fish in the local retail markets and the left over sell was preserved in the ice box until next day or evening sell. In side the study area, by January 2011, the male beneficiaries (HHs) were increased from 180 to 330 for wet fish preservation. On the other hand, female HHs involved in wet fish business increased from 110 to 240 HHs (Fig. 1a). Muslim beneficiaries dominated with highest involvement from 170 to 321, Jaladas increased from 110 to 167 and the Adivashi Rakhaing from 17 to 42 within the project period (Fig. 1b). Besides, a total of

1400 HHs were engaged in wet fish trading using improved ice box beyond but adjacent the the project study area.



Fig. 1a. Involvement of community HHs in wet fish trading in terms of gender



Fig. 1b. Involvement of community HHs in wet fish trading in terms of ethnicity

Development of rural entrepreneurship through small business training

The NGOs, COAST and SHUSHILAN provided small business training to the to community HH members to enable them to become active in promoted technology. The existing business actors or primary initiators of 140 HHs were the main beneficiaries of training. Having been trained most of the most innovative community HH partners successfully operated their business at profitable level and took lead role in successive exposure visits, experience and information sharing and community training programs facilitated by the NGOs. Through this process many secondary adapters had come forward into the improved icing practice in wet fish trade, not only in the coastal region but also through out Bangladesh by May 2011. The NGOs, DoF and technical back- stoppers provided various business supports to the trained community partners to develop successful entrepreneurship. Supports were extended in the form of further training, counseling, field visit, business linkage and network development, access to credit, etc. Through these supports huge number rural entrepreneurship on improved fish trading were formed and sustained till date.

Participatory Result Oriented Monitoring and Evaluation (PROME)

A participatory result-oriented monitoring and evaluation (PROME) was used as the basis for judging initiative success. Community partners lead the PROME exercise on quarterly basis to assess how effectively their goals for the innovations are being met. Indicators of success for PROME, as selected by the technical back-stoppers and implementing partners were fieldtested, reviewed and made acceptable by the entrepreneur groups, with facilitation from NGOs. Quarterly PROME meetings involving all implementing and community partners provide feedback and discussion opportunities in relation to monitoring and evaluating progress.

The PROME approach centered in community partners developing their own suitable mechanisms (along the lines of checklists for each output) to follow implementation at every stage from their own perspectives. PROME provided for an assessment of the innovation process as well as outputs, providing a learning tool to improve the activities and aims of the initiative as it progresses. This process learning also enabled community partners to ensure their future scaling up activities were effective. Other partners received on-going feedback about how well received their engagements had been either directly in quarterly meetings or indirectly through initiative management channels, depending on how vocal each entrepreneur group was.

Wider livelihood training for women through improved wet fish trading

Women were actively targeted throughout the ice fish trading initiative. In the ethic coastal fishing villages, women have been frequently widowed as husbands are lost in the sea or killed by tigers in the forest. These women were targeted to become initial HH community partners. During the up scaling process, emphasis was given to attract more poor and disadvantaged women to come into this easy business. Earners of women-headed HHs were more interested and frequently joined the fish trading business country wide due to improved shelf life of left over fish, higher profit and less risk. A total of 240 women were trained by the two NGOs. In addition, more than 400 women entrepreneurs were trained by the skilled early adapters.

Achievements and Impacts

Quality of iced fish in new ice box

Ice box with the iced fish inside was kept in both the laboratory and entrepreneurs custody in fish market for 7 to 10 days. Iced fish were also transported on private vehicles in rural marketing to observe the changes of icebox and fish. Shape and physical appearance of the icebox was studied during icing, preservation and transportation. Quality of ice inside the icebox was evaluated in terms of changes in colour, rate of melting of ice (%) and draining rate of melted water (%). The temperature inside the box was measured with a centigrade thermometer twice in a day, first in the morning at 09:00 hour and the second, in the afternoon at 18:00 hour.

Melted water was drained out at regular intervals and the top layer of ice was replaced at a rate as that of melting of ice. At every 24 hours at 9:00 am, fresh ice was added to the top of the fish inside the icebox at the rate of 23% of the total ice used. However, on the second day, after passing the first 24 hours, a 30% of the total ice was added. Melted water was taken in a container and the rate of melting was calculated in percent.

Freshness of the iced fish in icebox was determined by evaluating organoleptic defect points as described by Howgate *et al.* (1992). This method was originally proposed for the European Commission (EC) freshness grading of fish and fish products. This test was performed by scoring 7 sensory characters of fish as shown in Table 4. Defect points were calculated from the average scores as shown in Table 1.

Wholesomeness of the iced fish was determined by a 5-person test panel by evaluating the physical appearance, colour and texture of fish on a scale of 0 to 5 with 5 being the best (Table 2).

Table 1. Grading of fish with defect points (DP)

Grade	DP	Comments
А	<2	Excellent/Acceptable
В	2 to <4	Good/Acceptable
С	4 to 5	Bad/Rejected

Proximate composition (crude protein, lipid, moisture and ash), non-protein nitrogen (NPN), peroxide value (PV) and total volatile base nitrogen (TVBN) of the iced fish were determined according to the methods of AMC (1979).

Total bacterial count expressed as the colony forming units per gram of fish muscle (cfu/g) was determined by standard plate count on plate count agar according to the dilution technique of Collins and Patricia (1976).

Physical conditions of the icebox and quality of preserved fish

Several trails were made in the laboratory as well as in the project site in Cox's Bazar with the beneficiaries to develop, improve and evaluate the efficacy of the icebox. In the laboratory, fish (*Labeo rohita, Puntias sophore and Cirrhinus mrigala*) were preserved for 7- 10 days in the new icebox and various quality parameters of the icebox and the iced fish were tested (Table 2, 3 and 4). Physical conditions of the ice box due to preservation of iced fish were also evaluated (Table 2). The appearance of the box was regular and stout with no sign of leakage for melted water was found. Temperature of

the ice box and the fish inside was found to vary within 0.4 – 3.1°C range, suggesting

that the low-cost icebox was able to keep the fish cool in acceptable cooling range. At every 24 hours at 09:00 am, fresh ice was added to the top of the fish at the rate of 23% of the total ice used. However, on the second day, after passing a first 24 hours, a 30% of the total ice was added. This was because of the higher temperature of the fish body that required more ice to cool fish. Except for the first 24 hours, the rate of ice melting was about 23±1.6% for the rest of the preservation period tested. This rate of melting, although seemed to be little higher than the ideal styrofoam icebox, was quite compatible with the insulation mechanism used in this icebox. Styrofoam icebox generally allows an ice-melting rate of 12-15% by 24 (Nowsad, 2005), because inbuilt insulation mechanism hours of given by polystyrene/polypropylene walls bridged with thick styrofoam sheet.

Day	Changes in	ice box		Changes	in ice		Wholesomeness of fis Top layer Middle layer 5.0±0.0 5.0±0.0 4.97±0.01 4.90±0.02 4.88±0.01 4.60±0.11 4.88±0.01 4.40±0.10 4.80±0.02 4.20±0.13 4.50±0.04 4.10±0.26		sh ^{*3}
	Appearance	Condn	Temp	Colour	RoM ^{*1}	DoMW ^{*2}	Top layer	Middle	Bottom
			$(^{\circ}C) \pm SE$					layer	layer
0	Regular/	Dry	-	Bright	0	0	5.0±0.0	5.0±0.0	5.0±0.0
	Stout		1.1±0.1	Glassy					
1	Regular/	Dry	2.0±0.1	Brown/	35±.6	90±.4	4.97±0.01	4.90±0.02	4.90±0.01
	Stout		1.2±0.2	Glassy					
2	Regular	Dry	1.0±0.2	Brown	22±1.4	98±.6	4.88±0.01	4.60±0.11	4.73±0.21
			2.1±0.3						
3	Regular	Dry	0.4±0.1	Brown	24±0.8	97±.8	4.88±0.01	4.40±0.10	4.30±0.22
			1.8±0.3						
4	Regular	Dry	1.1±0.05	Brown	22±1.5	98±.2	4.80±0.02	4.20±0.13	4.00±0.10
			2.3±0.2						
5	Regular	Dry	0.5±0.2	Brown	23±1.5	98±.8	4.50±0.04	4.10±0.26	4.22±0.12
			2.3±0.2						
6	Regular	Dry	1.0±0.4	Brown	22±.9	95±.7	4.43±0.15	4.00±0.23	4.01±0.14
			2.1±0.3						
7	Regular	Dry	1.7±0.2	Brown	25±.8	92±1.8	4.21±0.21	4.00±0.32	3.90±0.23
			3.1±0.4						

Table 2. Physical changes of low-cost icebox, ice and iced L. rohita

*1 RoM= Rate of melting (%), ± SE; *2 DoMW= Draining rate of melted water (%), ± SE.
*3 In a scale of 0 to 5 with 5 being the best, ± SE

Impact on livelihood

Due to lack of adequate low cost ice box and icing, fisheries in Bangladesh suffered serious post-harvest loss during the last decades. Lacking of ice box and ice not only deteriorate the quality of wet fish but also cause a serious economic loss for the rural fishers and processors. ProSCAB introduced low-cost ice

boxes among the poor entrepreneurs to ice fish during transportation and sale, to preserve the unsold leftover fish overnight for next day selling as premium quality fresh fish and to preserve ice block for several days in remote and inaccessible areas where ice is scarce have shown tremendous impacts on livelihood development of community partners and quality improvement of fishes. Introduction of low-cost ice box has been found very useful and profitable to the fishers, so that within the few years of its introduction





in Cox's Bazar, it has been spread throughout the major cities and fish markets of the country. Up-scaling of ice box technology is so extensive that now country's fish sellers are being found to have at least one low-cost ice box behind him to preserve his fish. This situation is quite natural in Bangladeshi fish markets now.

On the other hand, one very useful adaptation of the low-cost ice box is the use of large sized ice box in transportation of fish on truck from landing centres to secondary fish markets in metropolitan and other cities. In the past, fish were transported in split bamboo made baskets kept one-top-



another on the truck and suffered huge post-harvest loss due to inadequate icing in uninsulated fragile basket and also due to heavy pressure exerted from the top basket to the bottom. Now, this problem has been mostly solved since the steel-framed large ice box one top another on the truck can withstand the pressure from the top without damaging the fish and the fish can be kept in adequately iced condition in insulated box. The picture shows the transportation of fish in such large sized ice box. This is the fruit of ProSCAB low cost ice box technology that has been up-scaled throughout the country and be able to reduce post harvest loss of fish substantially.

Design and operation of low-cost ice box

Ice box for preservation of fish

This is comparatively a smaller ice box that contains 40-50 kg fish with ice. The inside and outside walls of the box ($30'' \times 24'' \times 18''$) are made of galvanized iron (GI) sheet. A one inch layer of cork-sheet (styrofoam plate) is placed in between the two walls to make the box insulated. The lid of the box is made in the same way. To drain out ice- melt water, a water beep cock is fixed at the bottom of a side wall.

Ice box for transportation of fish

Initial community ice box (6' x 3' x 3') was designed keeping 4 to 5 chambers inside of the box so as to be used by 4 to 5 community fish traders in the fish markets for preserving fish and ice blocks. Later, to transport fish on truck, the design was changed by reducing the size to 3' x 2.5' x 2' and fixing the GI sheet box within an iron angle and flat bar frame to make it abrasion and pressure resistant while loading and unloading on the truck. All edges and side corners of the box are fixed with angle bars to give such strength. The materials required for manufacturing this box are: GI sheet, cork sheet, iron angle bar, flat bar, rope, hook, lock, etc. Further changes in the design have been made by the fish traders of different regions as per requirements and necessity. For example: the traders of Mymensingh-Netrokona use a box of 36" x 24" x

22", while in Satkhira, it is 38" x 28" x 25" and in Vairab is 36" x 24" x 22" and 24" x 18" x 18". Large box contains 250 to 280 kg fish with ice during winter and 2200-220 kg fish during summer. Small box contains 120-150 kg fish with ice in winter while 80-120 kg in summer.

New entrepreneurship development

Most of the fishes from major landing and marketing centers of the country are being transported by this large ice box now. This can be easily recognized and understood in and around big auction markets in metropolitan cities like Kawran Bazar, Zatrabari, etc. Huge numbers of entrepreneurs have been developed to produce and market these ice boxes. A huge number of unemployed youths for example, from Enderson Road of Cox's Bazar, Shambhugonj and Mohongonj of Mymensingh, Vairab of Kishoregonj, Zatrabari and Rampura of Dhaka, Gopalgonj and Satkhira town, etc. have been engaged in this income generation activities. The cost of production of ice boxes are as follows:

Type of ice box	Size (inch)	Price (Tk)
For preservation of fish	30 x 24 x 18	2,500- 3,500
For transportation	38 x 28 x 25	6,500-7,000
	36 x 24 x 22	6,000-6,500
	36 x 24 x 20	6,000-6,500
	24 x 18 x 18	3,500-4,500

Conclusion

Because of easily available low priced material and easy to use hands on technique, the wet fish trading technology have become very much popular among the fish traders and transporters country wide. It was observed from the field study that the post harvest loss of wet fish has been reduced from 28% in 2003 to 12% in 2010. ProSCAB initiative has been a major party to such tremendous development in post harvest fisheries sector in Bangladesh.

Tremendous achievements and multiplier impacts have been recorded in the field of wet fish trading from this innovation, since the profit from the business, socio- economic status and livelihood of the community partners increased many folds. Up-scaling of wet fish trading through improved icing technology was so vigor and intense that it reached beyond the expectations and now thousands of independent entrepreneurs initiated such business using same technology throughout the country. Thousands of new employments created and new entrepreneurships developed on production of ice

box for both preservation and transport iced fish. The community people adopted the technology in their life-style and adapted in many forms and shapes to preserve and carry iced fish from a day to several days and from a few kilometers to several hundred kilometers, for eg. from Cox's Bazar or Khulna to Dinajpur or Shylhet. It has been proved to be a most successful technology for wet fish quality maintenance and ease of transportation ever introduced so far in this country.

A Case Study on Fish Icing under ProSCAB

"I love my iced fish, as it brings smile back in my family!"

Kalibashi Jaladas. The slave of the sea! The family title "Jaladas" implies so. As they are the slave of water, they must serve the water master by harnessing water resources for the benefit of mankind. This is the very belief they perceive in physic and mind and find the profession being decided by water-god to adopt for lifelong without

deviation. They are not to change the profession of harvesting fish or fish trading, otherwise god may be angry on to them. Due to serious decline of marine resource coupled with increased fishers and consuming population, fish have been very scarce nowadays. Whatever volume harvested or available in the landing center gone into bad before selling due to poor preservation facilities. High price of fish and scarcity of ice and ice box have driven the slimes out of the window in Kalibashi Jaladas's family for last couple of years. Kalibashi did not



know the icing of fish and strength of ice box in keeping the quality of fish to be sold at same premium price in subsequent days as the first day of harvest. So, he lost his capital in wet fish trading. Soon he was contacted by COST-Trust to get involved as one of the OG for wet fish trading in ProSCAB project. "I love my iced fish, as it brings back smiles in my family", Kalibashi murmured. "I was given an ice box and a training on icing fish in 2008- the way to keep my fish good for days". That was start of his changing lifestyles by earning more for improvement in food and other means of livelihood.

"Days were worst when temperature was high and the price of ice block was very high- as high as Tk. 250-350 for a 70 kg block. Now, we have no problem for whatever the ice price may be, because we have ice box to preserve fish and ice block as well", said Kalibashi, who has now no reason to change profession. Kalibashi purchases fish in Nagirertek landing center and BFDC ghat of Cox's Bazar and sells in Bara Bazar of Cox's Bazar. Now, he has 3 more ice box purchased by himself.

After training on appropriate icing of fish by Technical Backstopper and Coast-Trust staffs, Kalibashi and 11 others from the village were separately given an ice box and small capital for each from the ProSCAB for running wet fish trading. All of themm have become very successful in wet fish business. Kalibashi already earns reputation for selling premium quality fish in Bara Bazar of Cox's Bazar. He has invested Tk. 10,000 in operating business, from where his present daily income accounts Tk.500 to Tk.1000. With the earnings he has been able to run a family of 6 members with 3 kids and old mother. His 2 daughters and a boy are going to school. He can now provide them with good foods and cloths.

Kalibashi leased a permanent fish shop in Bara Bazar this year by Tk. 5,000. Seeing his success all most all fish traders in Bara Bazar and some fishers in baharchara Bazar purchased ice box. Kalibashi taught them how to ice fish to sell it in good price. Kalibashi is grateful to ProSCAB and Coast-Trust for brining him under bright light.

8.2.5 Pesticide-free dry fish: a safe product with premier quality and profit

As a value-added aquaculture product, dry fish is an important source of protein in Bangladesh. It is relished by many people of coastal, central and north-eastern districts. About 20% of the artisanal fish catch are sun-dried and consumed in the domestic market. A significant portion of the dried fish is exported that earns a good amount of foreign currency. Although fish drying is the biggest fish processing activity in both value and volume in coastal Bangladesh, the physical and organoleptic qualities of many traditional sun dried products are unsatisfactory for human consumption (Nowsad,

2005a). One of the major problems associated with the sun drying of fish is infestation of the product by the blow fly and bettle larvae. Other problems markedly evident with dried fish are contamination by various types of pesticides. Most of the dried fish produced in the country are applied with harmful pesticides like DDT, nogos, basudin etc to deter insect infestation that is considered to be unfit for human consumption (Nowsad, 2005a). Pesticide deposition rates in the body of dried fish eating people of Bangladesh were found to be 500 times higher than that of WHO/FDA allowable limit (Khan et al, 2002). Cases of serious illness have been noticed due to consumption of traditional dried fish (Voumic, 2002).

Many consumers are now very much conscious about the quality of dried fish. To get rid of such life slaying situation, a ring tunnel was developed with low cost local materials to produce pesticide free dried fish (Nowsad, 2005). The quality of dried fish produced by ring tunnel drier is good in terms of organoleptic characteristics, infestations and contaminant. This drier is very suitable for drying of both small and large fishes at normal ambient temperature without showing any infestation, oxidative rancidity, spoilage and contamination

This safe fish drying technology was an important choice to be disseminated through Research Into Use fund of the DFID. During 2000-2006, several DFID funded projects were conducted on various aspects of non-conventional aquaculture and fisheries development and their valuechain analysis in coastal areas in Bangladesh (RNRRS,

2006). One of which was the production of safe dry fish through solar dryer, ring and box tunnels.

Therefore, further dissemination of safe dry fish production technology within the ProSCAB initiative was thought to strengthen the quality fishery products in order to maintain incomes for small-scale traders and safe, quality food for consumers, since the RNRRS outputs mentioned this technology as easily managed and affordable by poor coastal communities.

Target community for wet fish trading

The target population were the coastal, disadvantaged low-cast Hindu Jaladas, Muslim poor fishers and Adibashi Rakhaings of the southeast and southwest coastal areas who were depended mainly on fishing and fish related activities. Both women and men of such vulnerable coastal people will be targeted.

Initially one hundred HH community partners were selected from the Southeast coastal region and 60 HH were taken from Southwestern region for improved dry fish production business. The community partners were chosen wherever applicable separately for men and women occupational groups (OGs) covering three targeted communities: Hindus Jaladas, poor Muslim fishers and Adivashi Rakhaings. In some areas, mainly women were involved because men were away at sea or died at sea (or in cyclone, or by tiger in the forest).

Geographical location

The study area covered 34 fisher villages under 18 unions of 11 Upazilas in 5 coastal districts-Cox's Bazar, Chittagong, Bagerhat, Khulna and Satkhira. Exclusive poor and disadvantaged coastal fishing villages were selected on the basis of set criteria.

Initially, a total of 1000 households (HH) were selected from these 34 fishing villages for five technology related entrepreneurship development, viz., fish trading through improved icing, improved sun-drying of fish, crab fattening, mollask culture and seaweed culture. Like all other technologies, the HHs for safe dry fish production were organized into improved fish drying groups depending on the occupations of the inhabitants of the villages within a Ward (Local Gov. lowest administrative unit). Focal points (male and female) for each of the Ward were selected by the community partners. Initiative's goals and purposes were introduced to the focal points so that they could be able to explain the detail to HH beneficiaries during initial activities.

Methodologies

The study area was divided into two regions: Southeast coast belongs to Chittagong- Cox's Bazar coast and Southwest coast belongs to Khulna, Satkhira and Bagerhat. Two NGOs were responsible for organizing the field programmes: COAST Trust for Southeast and SHUSHILAN for Southwest coastal regions.

As sated, initially one hundred HH community partners were selected from the Southeast coastal region and 60 HH were taken from South-western region for improved dry fish production business. The community partners were chosen wherever

applicable separately for men and women occupational groups (OGs) covering three targeted communities: Hindus Jaladas, poor Muslim fishers and Adivashi Rakhaings. In some areas, mainly women were involved because men were away at sea or died at sea (or in cyclone, or by tiger in the forest). In the Rakhaing community a matriarchal system exists as a coping strategy as a result of generations of widows.

In order to organize HH community partners and promote business entrepreneurship, a series of systematic participatory approaches were followed. These are:

Organizing inception workshops

A total of 18 Inception Workshops were organized with policy makers, administrations, GO/NGO service providers, implementers, local government bodies, local leaders and community partners as participants – 1 in project level in Dhaka; 2 at regional levels- in Cox's Bazar and Satkhira and 15 in local levels in 15 Upazilas. The objectives of the inception workshop were to acquaint participants with goals and objectives and with the target communities. Roles of each stakeholder group were discussed.

Baseline survey

A primary baseline survey was conducted on current socio-economic status and livelihood practices of the HHs with emphasis on dry fish business. A database was developed using collected primary data, incorporating with the secondary information already held by the NGOs and other agencies. This information collected has formed the basis for measurement of improvement in livelihoods..

Participatory planning

Following group formation, with facilitation by the NGOs, a participatory planning workshop was organised by each OG to determine the innovation process, schedule and partners to be involved in dry fish business.

Skill development of NGO and DOF partners on pesticide-free dry fish production

Technical capacity building of 50 NGO and DOF staffs on *pesticide-free dry fish production* was done by the technical back stoppers through adequate training approaches (participatory community-based training of trainers, method and result demonstrations, distribution of training manuals, leaflets, booklets, etc.) and visits to communities with existing production sites from earlier RNRRS research. Training manuals and other training materials

like booklets, leaflets, etc. were prepared and distributed by the technical back-stoppers before the training.

Skill development of primary partners: Community training

All partner HHs were trained by the NGOs on *pesticide-free dry fish production* within the first 6 months of project start. Regular guidance was provided to the OG members by the NGOs and technical back-stoppers on a schedule that suits OG needs. Additional support from DOF, potential service providers and marketing actors were also facilitated by the NGOs as requested by the OGs. Regular monthly meetings at each OG were held by NGO facilitation.

Initiation of improved and pesticide-free dry fish production: Initial production period

The OG members were actively supported for initiation of pesticide-free dry fish business through an initial production period by technical back-stoppers and NGOs. Dry fish had a production cycle of 4-5 days maximum, i.e., after initiation of drying the ready to use dried products were at hand within 2-3 days under safe production mood. Potential improved marketing opportunities were evident for long for safe dry fish products. Along with the Technical Backstopper's support, the community partners brought their own knowledge (ITK) to the innovation process. In addition to that, in order to expand and sustain the business, the community partners assisted in the identification of local, sustainable input supplies.

Refinement of pesticide-free dry fish production technology

limplementing partners tested and improved the pesticide-free dry fish production according to learning and local materials/inputs. The technology required fine tuning and field acclimation to enable effective scaling up in a range of environmental and social contexts. Side by side, a review of innovation was done to guide further production by community partners. Understanding the innovation process at early stages under different local contexts enabled effective development and scaling up of the *pesticide-free dry fish production* technology during the successive years.

Quality control of safe dry fish products

The quality of the dry fish products was tested and design of the tunnel and its drying protocol were fine tuned based on field and laboratory analyses. Routine laboratory analyses were done to monitor the quality of dry fish produced through ring tunnels. The analyses included proximate compositions, peroxide and thioberturic acid value, recurrence of insect attack, etc.

Horizontal scaling up of refined pesticide-free dry fish production technology by community partners

In the second year, community partners continued with production using the adapted systems developed as a result of innovation in during first year. Refined fish drying technology was disseminated to the small-scale fish processors of Cox's Bazar and Shamnagar by December 2009 and spread along the coast by January 2011 on ward. The additional HHs on dry fish business were provided with most updated information on adequate process and quality control of safe dry fish production and on awareness raising through exposure visits by community partners, technical back-stoppers and NGOs. Leaflets, pamphlets, posters, and booklets highlighting the use of technologies were prepared and distributed.

Development of rural entrepreneurship through small business training

The NGOs, COAST Trust and SHUSHILAN provided small business training to the to community HH members to enable them to become active in promoted technology. The existing business actors or primary initiators of 160 HHs were the main beneficiaries of training. Having been trained some of the most innovative community HH partners successfully operated their business at profitable level and took lead role in successive exposure visits, experience and information sharing and community training programs facilitated by the NGOs. Through this process huge secondary adapters came to the forefront in safe dry fish trade, not only in the cox's Bazaar but also through out coast by May 2011. The NGOs, DoF and technical back-stoppers provided various business supports to the trained community partners to develop successful entrepreneurship. Supports were extended in the form of further training, counseling, field visit, business linkage and network development, access to credit, etc. Through these supports huge number rural entrepreneurship on improved dry fish trading were formed and sustained till date.

Participatory Result Oriented Monitoring and Evaluation (PROME)

A participatory result-oriented monitoring and evaluation (PROME) was used as the basis for judging initiative success. Community partners lead the PROME exercise on quarterly basis to assess how effectively their goals for the innovations are being met. Indicators of success for PROME, as selected by the technical back-stoppers and implementing partners were fieldtested, reviewed and made acceptable by OGs, with facilitation from NGOs. Quarterly PROME meetings involving all implementing and community partners provide feedback and discussion opportunities in relation to monitoring and evaluating progress. The PROME approach centred around community partners developing their own suitable mechanisms (along the lines of checklists for each output) to follow implementation at every stage from their own perspectives. PROME provided for an assessment of the innovation process as well as outputs, providing a learning tool to improve the activities and aims of the initiative as it progresses. This process learning also enabled community partners to ensure their future scaling up activities were effective. Other partners received on-going feedback about how well received their engagements had been either directly in quarterly meetings or indirectly through initiative management channels, depending on how vocal each OG was.

Wider livelihood training for women through improved and pesticide-free dry fish business

Women were actively targeted throughout the safe dry fish trading initiative. In the ethic coastal fishing villages, women are frequently widowed as husbands were lost in the sea or killed by tigers in the forest. These women were targeted to become initial HH community partners. During the up scaling process, emphasis was given to attract more poor and disadvantaged women to come into this easy business. Earners of Women-headed HHs were more interested and frequently joined the fish trading business country wide due to improved shelf life of left over fish, higher profit and less risk. A total of 250 women were trained by the two NGOs. In addition, more than 400 women entrepreneurs were trained by the skilled early adapters.

Business support specifically suited to women

Small-scale logistic and technical supports were provided particularly to women community partners in order to support them further on pesticide-free dry fish production. This business supports were made available in the second year in order to develop the improved production processes into small business entrepreneurships. The NGOs were conscious not to burden women further, but realized that in order to fully benefit from any improvements in production the women might also be in control of the financial returns from these businesses and this training would be targeted to support that aim. Through this process 10 women led local entrepreneurship groups were produced who marketed safe dry fish to the affluent metropolitan city outlets. January 2011.

Assisting community partners to develop Innovation network linkages among community, NGOs, marketing agents for adequate marketing of products

Partners were assisted to identify potential marketing opportunities in the local, national and international areas. Community partners were facilitated in developing their market

linkages. The two NGOs, back-stoppers and DOF played vital role in the innovation network. Extension materials covering wet fish handling and icing, safe dry fish production and marketing were produced and distributed. Direct selling to the consumers or retailers like affluent outlets omitting intermediaries were established. Effective and attractive packaging of products expedited marketing process. Innovation network linkage made the local coastal production more widely available in local and city markets.

Develop training materials

Training materials like manuals, pamphlets, etc. were developed by the technical backstoppers by October 2008 to support training of NGO staffs. These materials were developed further by NGOs and reviewed and edited by technical back-stoppers for use in exposure visits and training with community partners on the basis of assessment of specific learning methods from literature reviews, direct discussions and experience. For scaling up of the safe and pesticide-free dry fish production technology about 1000 information leaflets were produced and distributed by August 2010.

Exhibit products and process and media coverage

Pesticide free dry fish produced by the community partners were exhibited at local, regional and national fish fortnight events. DOF facilitated exhibitions of products at 2 Fish Fortnight events from August 2009 to August 2010. Output achieved and lesson learnt out of the RIU activities were published through mass and electronic medias. Research articles are under preparation to publish in international journals and on development websites. A website promoting "Coastal Aquatic Products of Bangladesh" has been developed and hosted. Partners, products and potentials along with technical information were posted for others to use.

Quality of the dry fish produced in ring tunnel

To construct a ring tunnel, a 5-6 feet ling piece of bamboo was torn into 6 to 8 shreds of equal size, keeping a rear end of the bamboo untorn. Several rings (outer rings) made of split bamboo were tied up inside the shreds at regular distance to give it a shape of robust torpedo. Three to four rings of descending diameters (inner rings) were fixed after each of the outer ring inside the tunnel to which the fish were hung over. In case of drying small fish like punti, channa, tengra, baicha, mola etc, inner hanging rings were replaced



by round thin meshed sieves made of split bamboo. Small fishes were spread on these sieves inside the tunnel. The tunnel was covered by mosquito net and itself hung over a bamboo bar. The efficiency of this ring tunnel in drying fish of various sizes was tested. Ring tunnel was found to be effective in drying Bombay duck, ribbon fish, carp, pomfret, jewfish, etc. in both house hold and small scale commercial operations. A tunnel with a 2-step outer ring having three inner hanging rings after each of the outer rings required a cost of about TK. 70-80/- that could able to dry a batch of 20-25 kg Bombay duck or ribbon fish.

Prior to drying, fish were scaled, beheaded, gutted, and finally split by cutting longitudinally close to the mid bone up to tail region so that they were divided into two equal halves except the caudal region where they remain join together and served for hanging the fish on the inner ring. Both the greater haves were again split longitudinally into two/three parts to facilitate drying. After dressing, fish were washed with running tap water to remove blood, slime, gut content, and other unwanted material.

After dressing, split fish were hung on inner ring of the tunnel at late night or before dawn. The whole tunnel was covered with mosquito net and hung on strong bamboo pool and bar. No chance of entry of flies and insects was noticed, as the fish were hung in the covered tunnel at night, so turning of fish at day time was not required. Bombay duck, ribbon fish, pomfret, and jewfish were dried well within 2-4 days. Physical qualities of dried fish such as colour, flavour, general appearance, loss of body parts and sign of distortion in skin were checked. The dried fish were also checked one by one for any spoiled or damaged product and removed. Moisture content, a key indicator of dried fish quality was also examined in the laboratory (Table 1)

Dried fish	Drying	Moisture	Physical qualities				
	period (d)	(%)	GP	LoBP	SoDS	Colour	Flavour
				(%)	(%)		
Harpadon nehereus	3	16.8±0.7	Excel	0	0	Glossy	Fresh
Trichiurus lepturus	3-4	17.1±0.8	Excel	0	0	Glossy	Fresh
Pampus argenteus	3-4	16.7±1.0	Excel	0	0	Glossy	Fresh
Johnius argentatus	3-5	15.8±1.2	Excel	0	0	Glossy	Fresh
Puntius sophore	2-3	15.2±0.2	Excel	1.5±0.2	2.2±0.4	Glossy	Fresh
Commercial	-	23.6±2.2	Good	10.8±1.1	16.6±1.7	Blunt/	Pungent/
T. lepturus						ashy	spoilt

Table 1 Physical qualities of dried fish produced by ring tunnel

GP= general appearance; LoBP= loss of body parts; SoDS= sign of distortion in skin

Dry fish were packaged in polythene pouch or bags soon after taking out from the tunnel to avoid any cross infestation by beetles and mites. The dried fish was cut into adequate size on clean table and packaged in good quality in air tight consumer package (polyesterpolyethylene co- polymer or polypropylene coated polythene) immediately so that beetles and mites can not



come in contact of the products. Observation was made periodically on the changes of physical and biochemical characteristics of the dry fish. This observation was carried out for a period of several months at room temperature.

Moisture content was determined according to the methods given in AOAC (1980) with certain modifications. It was determined by air drying of a given sample in a thermostat oven (Gallenkamp, HOTBOX, Model ovb-306) at 105° c for 24 hours. While peroxide value was determined according to Egan et al (1981).

Every two month of intervals stored dried fish were examined for evaluation of presence of any insect infestation in the fish. First four month were completely devoid of any kind of infestation. After six months, few infestations occured in *T. lepturus* and ribbon fish but were not in alarming rate (Table 2).



Fish name	Occurrence of insects in dried fish (%)						
	0	2	4	6	8	10	
Month							
Harpadon nehereus	0	0	0	0	0	0	
Trichiurus lepturus	0	0	0	2.0±0.8	2.5±1.0	3.3±1.2	
Pampus argenteus	0	0	0	0	0	1.4±0.7	
Johnius argentatus	0	0	0	2.2±1.0	0	3.6±1.2	
Puntius sophore	0	0	0	0	0	0	
Commercial T.	2.2±0.4	6.6±2.3	10.2±2.5	12.8±3.1	21.4±2.6	34.6±5.2	
haumela							

 Table 2. Incidence of insect attack in stored dried fish produced by ring tunnel

The results of the peroxide value of the dried fish in sealed polythene package during ten month of storage shown in Fig: 1. Initially peroxide values were with the range of suggested value of 10-20. As normal course these values gradually increased with the increment of time due to oxidation of lipid. After ten month of storage peroxide values were with the recommended value expects commercial churi. The results indicated that the dry fish produced by the ring tunnels were in good conditions till 10 months.



Fig. 1 Peroxide value (PV) of dried fish

Impact and achievements

The OG members were supported for pesticidefree dry fish business. Potential improved marketing opportunities were evident for long for safe dry fish products. The Technical Backstopper's promoted the OGs to bring up local technical knowledge to intensify the business. On the other hand, in order to expand and sustain the business, the community assisted in the identification partners of local, sustainable input supplies. The OGs also tested and improved the pesticide-free dry fish production according to learning and local materials/inputs. A review of innovation was done to guide the production by community partners. Understanding the innovation process at early stages under different local contexts enabled effective development and scaling up dry fish production of the *pesticide-free* technology during the successive years.





In the second year, up-scaling process for safe dry fish production technology reached the target. The refined fish drying technology was disseminated to the small-scale fish processors of Cox's Bazar and Shamnagar by December 2009 and spread along the coast by January 2011 on ward. The additional HHs on dry fish business were also provided with most updated information on adequate process and quality control of safe dry fish production and on awareness raising through exposure visits by community partners, technical back-stoppers and NGOs. With the training received from the initiative, some of the most innovative community HH partners successfully operated their business at profitable level and took lead role in successive exposure visits, experience and information sharing and community training programs facilitated by the NGOs. Through this process huge secondary adapters came to the forefront in safe dry fish trade, not only in the cox's Bazar, but also through out coast by May The NGOs, DoF and technical back-stoppers provided various business supports to 2011. the trained community partners to develop successful entrepreneurship. Supports were extended in the form of further training, counselling, field visit, business linkage and network development, access to credit, etc. Through these supports huge number rural entrepreneurship on improved dry fish trading were formed and sustained till date.

Women were actively targeted throughout the safe dry fish trading initiative to become initial HH community partners. During the up scaling process, emphasis was given to attract more poor and disadvantaged women to come into this easy business. Earners of Women-headed HHs were more interested and frequently joined the fish trading business country wide due to improved shelf life of left over fish, higher profit and less risk. A total of 250 women were trained by the two NGOs. In addition, more than 400 women entrepreneurs were trained by On the other hand, small-scale logistic and technical supports were the skilled early adapters. provided to women community partners in order to support them further on pesticide-free dry fish production. This business supports were made available in the second year in order to develop the improved production processes into small business entrepreneurships. The implementing partners were conscious not to burden women further, but realized that in order to fully benefit from any improvements in production the women might also be in control of the financial returns from these businesses and this training would be targeted to support that aim. Through this process 10 women led local entrepreneurship groups were produced who marketed safe dry fish to the affluent metropolitan city outlets. January

2011. The initiative assisted the OGs to identify potential marketing opportunities in the local, national and international areas. Direct selling to the consumers or retailers in affluent outlets omitting intermediaries was established. Effective and attractive packaging of products expedited marketing process. Innovation network linkage made the local coastal production more widely available in local and city markets.
Number of female beneficiaries became more than double for drying fish in the coastal region. In addition to purchase from landing centre, sometimes they also collected fish from their male partners who engaged in artisanal fishing boats and taking care of fish drying initiatives. The male beneficiaries also showed increasing trends for drying fish. Considering the social class, muslim households increased from 276 to 473, Jaladas

from 59 to 97 and Adivashi became 38 beneficiaries within the project period (Fig. 2).



Fig. 2a. Involvement of gender in fish drying process



Fig. 2b. Involvement in fish drying process with social class of Jaladas, Muslim and Adivashi community

The production, market price and HH income out of the safe dry fish business have been given in Table 3. Average production and price increased to 153% and 173% respectively. The annual household income showed a huge increase of 208%l role and a motivating factor for attraction of more households and tremendous up-scaling of safe dry fish production business.

	Southeast coast				Southwest coast			Total					
	2008	2009	2010	2011	2008	2009	2010	2011	2008	2009	2010	2011	Incre-
													Ase
													(%)
Avg													
productio	795	800	1195	1240	120	133	133	160	915	933	1328	1400	153
n Kg/HH													
Average													
price	600	620	920	940	180	300	380	410	780	920	1300	1350	173
TK/Kg													
Annual	1200			0270		3320	3637	4760		8050	10672	1/120	
income	4200	47300	70400	5570	6000	0	0	4700	68000	0050	10072	14130	208
тк/нн	0			U		U	U	0		0	0	U	

Table 3. Average production, market price and household income of fish drying beneficiaries

Conclusion

Due to ProSCAB-RIU good-efforts, safe dry fish production initiative has got a shape of sustainable business enterprise and income generation machine for small-scale to medium level entrepreneurs. Blessed with people's awareness on taking pesticide-free dry fish, along with the huge peoples' preference towards dry fish flavoured dish, the business initiative has been continued to go up and up and now shown the prospects to be scaled up further using many new marine and freshwater species to be fed upon into the business.

Case Studies on Fish Drying under ProSCAB

Safe dry fish production has made Mostafa Begum confident!

Mostafa Begum, a widow of East Kutubdiapara near Cox's Bazar town and head of small house hold since her husband died in the sea in 2007, has been very confidant in meeting up livelihood demands through safe dry fish production business. She has overcome serious adversities and hardship as experienced in the past and now look forward to raise her 2 daughters with good food and education. She is one of the member of a OG for safe dry fish business of RIU funded ProSCAB programe and has been successfully running the business with 21 dry fish production unit at present. ProSCAB through a partner NGO-COAST-TRUST gave her 5 ring tunnels to initiate safe dry fish business. She was given skill development training on construction of ring tunnel and process of safe dry fish. She knew the basics of fish drying but training made her efficient and skilled on safe production process. She was very determined and hard working woman and now has been rewarded for her sincerity and devotion to work.

Along with 5 ring tunnels she was given 15,000/ loan from the COAST Trust to initiate safe dry fish business. In that season she earned a profit of abut Tk. 6,000/= (Six thousand taka) per month. To expand business, she took another Tk. 30,000/= in the next year. During the second year, she earned a profit of about Tk11,400/ per months, because of high quality and demand of her dried fish. Now, Mrs. Mostafa is a famous name in Cox's Bazar for safe and quality dry fish. COAST Trust also purchase her products to sell to effluent markets. In every lot of a ring tunnel Mrs. Mostafa can produce about 5 kg of dried fish out of 25 kg raw fish within 4 to 5 days. In each month during drying season, she could be able to produce at least 6-7 lots. Per kg of dry fish is sold by Tk.220/=. Drying season lasts for 5-6 months in year. Her success was transmitted among the new women and men entrepreneurs to initiate new dry fish business in Cox's Bazar. Now Mrs. Mostafa Begum is very happy and grateful to ProSCAB- RIU & COAST Trust.

Abdul Alim- a role model of safe dry fish production

Abdul alim (32) was a day labour of Munshigonj of Shayamnagar in Satkhira district. He has a family of five members with his mother, wife, son and sister. He was maintaining his family by his own income. But it was very difficult for him to run such a big family from the income of tradition dry fish production, since fish drying was seasonal and profit was very minimal. He was indebted with huge credit from money lenders with high interest rate.

The ProSCAB project of the BFRF has formed a group for safe fish drying in Munshigonj in 2008 with the supports of Shushilan. Alim was involved in that group. Training on improved fish drying was given to 15 members of the group. After receiving the training Abdul Alim started drying fish using ring tunnel made by the



design of ProSCAB. Alim started to dry the fish properly. He dried prawn, tilapia, little parse etc in the tunnel. The products were packed with sealed polyethylene pouch and sold in the market of Rangamati and Chittagang. In one month he could run the process twice. From each drying, he received a profit of Tk. 1500- 1600. Out of his profit, Abdul Alim has made up a larger Box Tunnel for fish drying and dried the fish in both box tunnel and ring tunnels.

People of his own village and neighbouring Vamia and adjacent villages, around 40, have come forward to be involved in dry fish business. Now Abdul Alim is a successful man in his village. After maintaining his family he has purchased four goats. Alim has communicated with the Upazila Health Office and received a loan for fish drying

Safe dry fish production made Abdus Sobur atop

Abdus Sobur (30) lives in the village of Atirupor in Shaymnagar, Satkhira. He has a family of 6 members with his old father, mother, 2 sons, a daughter and his wife. He maintained his family by daily wage along with little income from fishing.

In order to increase income and improve livelihood he joined ProSCAB project in September 2008. He got training from Shushilan on production of safe dry fish. After training, he also received a box tunnel surrounded by net and 20 kg of raw material wet fish from the ProSCAB. Using improved method, he started to dry and sell dried fish. He sold his high quality product in different depots in Rangamati and Chittagong with higher price. Sobur ran 4 cycles in one month and in each cycle he earned a profit of Tk 1800-2000. Thus he earned 7000 to 8000 taka per month for 5 months



in the first year. But next year he increased the number of box tunnel from one to 4 and earned a profit of Tk.100,000 in a year.

Sobur is a member of extreme poor family. His destiny has changed by his handwork and support from ProSCAB. Now he can provide three meals to his children. By his profit he set more box tunnels in 3rd year and started a poultry farm. The quality of his dried fish is better than the others. Abdus Sobur has been an example for others who want to produce quality and safe dry fish and change fortune. Sobur was elected team leader in group meeting. His acceptability in the society has been increased. Now many people are coming to him to take suggestions on safe dry fish production.

9. Marketing and Value Chain of ProSCAB Products

Product 1 Mud crab

Production system

Crabs coming to the market are collected from wild directly or are fattened for few weeks before marketing. There are two types of culture practices in the coast as introduced by ProSCAB - monoculture - crab fattening in pen or cage set in river; and polyculture - crab fattening in pond where crab is kept in bamboo-cages and tiger shrimp is cultured in pond. Crabs are fed with trash fish usually for two to three weeks. Two types of bamboo-cage designed by ProSCAB are currently in use at coastal Bangladesh – cage with compartment and cage without compartment. From the farmers' information, we found that crabs cultured in the cage without compartment gets enough space for roaming and fattens faster compared to the compartment-cage.

Market channel

Collection of crab from wild is done in several ways. These are – (i) directly by the fatteners; (ii) buying crabs from the fisherman (at Tk. 30-80 per kg); (iii) wholesale buying from shrimp farms during entire culture period; (iv) buying from the depot holders (who are the suppliers and buyers of crabs) which are bought from the crab collectors who collect crab from nature. ProSCAB target farmers sell the fattened crab to the same depot holder. Depot holders send the crabs to exporters in Dkaha (Figure 1). Most of the crab farmers are licensed crab suppliers having previous experience of selling crab to the exporters. Sometimes farmers face marketing problem due to very low and

fluctuating price imposed by the exporter syndicates.



Fig. 1. Market channel of mud crab

Market potential and future prospects

Crab farming is a growing aquaculture practice both in the south-east and south-west coast of Bangladesh. Many farmers, both small and large, are replacing shrimp with crab farming. Because of high demand and supply of this export item, crab culture has grown in these regions with the support of ProSCAB. The growing crab farming is demanding more and more crab seed from nature. In the coming days, crab culture in this region will expand at a rapid rate and will require increased number of seeds. Dependence on the nature for seed will not help sustaining its culture. Now it is the demand of the time to establish crab hatcheries both at Satkhira (south-west) and Cox's Bazar region (south-east). Recently ProSCAB has recommended the EEF (Equity and Entrepreneurship Fund) project of Bangladesh Government to finance setting up two crab hatcheries at Cox's Bazar and Satkhira regions to help sustain this new coastal aquaculture practice of the country and the EEF has agreed to fund. It is expected that hatchery produced crab seeds will be widely available to the farmers in the near future.

Product 2 Dry Fish

Production system

Dry fish in coastal Bangladesh are produced in very traditional ways. After collecting fish from the local landing centres, the fish are dried in traditional bamboo racks without any insulation. Infestation from insects is very common. Many of the producers dip raw fish into water with insecticide/pesticide before drying. Others provide salts to fish before drying to avoid infestation. Although the price of fish dried using insulation and without any insecticide, pesticide or salt are high but most of the producers were found to be reluctant in practicing improved methods. However, changes were observed in the farmers' attitude after ProSCAB introduced easy and low cost methods of hygienic and high quality dry fish production. Some farmers were found to adopt improved methods of dry fish manufacturing copying the methods used by ProSCAB contact farmers. In the coast, drying of fish occurs mainly during winter when there is no rain and there is high fish capture from the Bay of Bengal.

Market channel

Traditional packaging is open (not packaged) and unhygienic. From fish harvesting in the sea to retailers, no preservation method is usually applied except sun-drying. However, there are some producers who practice some preservation and insulation in producing and marketing dried fish, but are very few in numbers. The current dry fish marketing channel can be summarized according to the following diagram (Fig 2).



Fig. 2. Market channel of coastal dry fish

Market potential and future prospects

Price of fish dried by improved methods introduced by ProSCAB is higher compared to traditionally dried fish. Traditionally dry fish used to be consumed mainly by the people from coastal districts of Bangladesh. However, the scenario has been changed during last ten years. Due to development of communication between north and south parts of Bangladesh, people are increasingly getting used to eating dry fish. In the capital and major cities there are high demand of quality and insecticide/pesticide-free dry fish but the supply is scarce. Production of dry fish using ProSCAB introduced improved fish drying system will not only produce safe and high quality dry fish but also will improve income of the producers through receiving the premium price.

Product 3 Mollusc

Production system

Traditionally, mussel and oysters are being collected in the coastal regions of Bangladesh mainly for pearl collection. Consumption as human food was limited only amongst the tribal communities. Collection from wild was the only source of mussel and oyster. ProSCAB together with its partner NGOs performed mollusk culture in the sheltered coastal canals with transparent flowing waters collecting spat from the wild. Production performance was satisfactory.

Market channel

Local market is limited, only amongst the tribal communities. Majority *muslims* and *hindus* are not used to with the mollusc meat. After ProSCAB initiative, some local traders (who are also from tribal communities) were introduced with some Chinese restaurants and retailers from capital Dhaka and business city Chittagong. On the other hand, mollusc shells have good demand for production of lime for human consumption with traditional betel leaf.

Market potential and future prospects

Local market price of mollusc is still very low. However, the domestic market for meat is slowly growing with contact between the local harvesters and consumers which is expected to add value to the products. An arrangement for export can only support mollusc farming. Since mollusc farming requires tidal flushing, the farming structure should be set in the sheltered salt-water rivers-canals with tidal influence. As there is no scarcity of this type of environments in south-east and south-west coast, mollusc farming can easily be expanded to the wider community. However, the demand and value of the product should be ensured in local as well as overseas market. There are some social problems need to be addressed before going for large scale expansion of mollusc farming.

10. Lessons Learnt

As being the disaster prone remote areas, coastal Bangladesh has to take great pains every year to withstand disasters and overcome adversities. Among them Hindu *Jaladas*, muslim fishers and tribal Raikhaing are the poorest. The have very limited resources and suffer round the year from poverty. Any alternate option for improvement of their livelihoods, poverty alleviation and food security may greatly help them reduce their miseries. From the past research experience this research team had identified five technologies for coastal aquaculture and post harvest processing and transportation for promotion in the coastal regions. Crab fattening, seaweed culture, mollusk culture, fish drying and fish icing technologies have been

introduced among a wider community in the Southwest and Southeast regions. The success of some technologies have brought these poorer sections into economic gridline for livelihood. The coastal people understand that disasters are unavoidable natural phenomena and these will recur. They are in the coast and so they are with natural disasters. But they are patient, realistic and hard-worker. However, they need to have ample preparation and utmost fitness to cope up with all sorts of post-disaster adversities. That can be achieved in many ways as the project has realized.

Among these five interventions crab fattening, seaweed culture, fish drying and icing of fish have been found promising. Among these five technologies, crab fattening, fish drying and fish icing for transportation have been successfully adopted by the coastal people and expanding rapidly. Seaweed has been successfully grown, interested farmers are there but due the absence of outlets for export and reduced demand in the domestic market, its production is not taken up. Mollusc farming in some relatively sheltered pockets of the coast especially in the Moheshkhali channel is possible and technically feasible, but poaching of raft building materials is a great social problem. The poor people will not be able to stop poaching or investing more than once therefore its adoption will need time as well as need medium or large scale entrepreneurs.

Due to exceptionally higher tendency of the new entrepreneurs to come forward in the business and adapt new technologies for more profit, natural crab seeds have been very scarce. This burning issue can be mitigated by establishing crab seed hatcheries. Initiatives have been taken to establish two crab hatcheries in two coastal parts, one in Shamnagar of Satkhira and the other in Chakaria of Cox's Bazar through the support of Bangladesh Bank, Government of Bangladesh.

Local people are now more focused and oriented in adopting new coastal technologies popularized by the ProSCAB. Linking the coastal production with markets is important for smooth extension of these technologies. Many secondary or tertiary adapters have been formed and have come forward to extract the benefit exploiting all possible means.

Therefore, the GoB and different research institutes as well as the universities should pay proper attention in terms of adopting developmental and research programmes on coastal productions, their impacts on nature and livelihood of resource users and market promotion.

A comprehensive GoB policy on coastal production issues is very much essential for the development of this sector. A strong multi-sectoral coordination within the GoB departments like Ministry of Fisheries and Livestock, Ministry of Environment, Ministry of Agriculture, Ministry

of Land, Ministry of Water Resources, different private bodies like ice factory, power supply company, stakeholder-based groups, etc should be needed. Beside these, natural disasters like cyclone, tidal boar, land erosion, etc should be given due consideration during the planning process, as these can seriously hamper coastal production and livelihood of the people. Farmer-farmer, trader-trader and farmer-trader linkages are required for smooth marketing, ensuring fair price and market promotion. Regular monitoring and farmer's field visit by the DoF personnel and NGOs will also help resolve field problems instantly.

Many of the un-/under-utilized coastal waters have been brought under aquaculture practices through crab culture. Once, locally cheap tribal diet crab is now a high valued export item. It is expected that the cage and pen culture of crab that bas been introduced by the ProSCAB will continue to spread throughout the coast. Moreover, a successful attempt in establishing crab hatchery in the two regions along the coast and their successful production of crab PL and juveniles will not only help to sustain crab culture but also will preserve natural diversity of crab stock.

The local/domestic consumers have become very much aware of taking safe dry fish, while huge quantity of ProSCAB dry fish productions are being sold through the affluent outlets of different metropolitan cities.

Seaweed culture is although a new technology for the south-west, it grew interest among the people. However, more extension demonstrations are required. It was understood from the field activity that regular monitoring and farmer's field visit would help instantly resolve field problems. An effort towards diversified product development of the seaweed may increase its expansion.

The research results can benefit the people if these are not kept in the peer reviewed journals or in the report. The mature technologies should be made into usable and marketable forms for wider disseminations, the acceptability and utility of the research outputs will be understood. That has been experienced during implementation of the five technologies. Although, not all technologies have shown the same level of success.

The technology manuals developed and distributed by this research team has been appreciated by the farmers as well as the extension officers and policy makers.

The ProsCAB team shared the lessons learned with the local and national NGOs, Department of Fisheries as well Bangladesh Fisheries Research Institute (BFRI). We have circulated our technology packages in printed (coloured and glossy) to educational institutions so that other university teachers and students know these and teach their fellow colleagues and friends.

The five technologies developed and marketed by this research team are being taught as part of the Coastal Aquaculture in most Fisheries Faculties and Departments in different Universities and colleges. We have a plan to arrange a national seminar in coming August so that we can disseminate our findings of the Research Into Use (RIU) programme to a wider and strategic stakeholders. This mode of dissemination will not only impact on Fisheries but other branches of crops and live-stocks.

Mollusc farming technologically was alright, we had success during research closely monitored by the research fellows for their Masters degrees. But when took the technology through RIU, we found interest among only the tribal and Hindu community not amongst the Muslims, as they do not usually eat molluscs. Our clients faced serious risks of theft and poaching, the thieves and poachers are not interested in the crops, they are interested in the bamboo substrates and other structures. Possibly these have value as fuel wood and households purposes.

This research team did not face any adverse impacts of challenges so far. Only the Department of Environment showed concerns that we need official permission to work in the fragile coasts and use of coastal natural resources. They were highly critical about the collection of seaweeds for research from the St Martin's islands. They were later convinced that we are growing to reduce the risks of exploitation from the natural resources. After the mid-term review and suggestion received from the review team, ProsCAB employed G-Mark market consultant and later Dr. Harunur Rashid from BAU. With the help of these consultants we have been able to tie up the producers with the market outlets that enhanced the sustainability of our efforts.

The future challenges will not be from the technical or organizational rather policy level issues. These would include land use policy, access rights of the poorer landless people to the natural resources. Marketing channels and quality assurance of the products will appear as a challenge in the long run as well. It is hoped that crab seed problems will be sorted out in the long run. A good linkage with the agar companies or the traders/consumers of the Southeast Asian countries may help to sharply increase the production of seaweeds.

Largely through the three and half years activities of ProSCAB, coastal people of Bangladesh are now highly motivated towards crab fattening, pesticide-free fish drying and fish transportation with icing the fishes in cheaply made baskets. Now, in order to continue the activities and take forward the ProSCAB initiative to a much wider community in the days to come, the present mental make-up of the coastal people and zeal to be self-reliant should be directed using a coordinated approach with enough backstopping and ensuring the real value of the product at the farm-gate level and above all maintaining a peaceful socio-political environment.

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Project Title: Rojiroti: Promoting Sustainable Livelihood Development; P1064

Lead Project Organisation: GY Associates, Ltd.

List of Partners:

Centre for Promoting Sustainable Livelihood (CPSL), Bihar Indian Council for Agricultural Research (ICAR) Research Complex for the Eastern Region, Patna

Knowledge being put to use

Identify and describe all the knowledge products/processes that have been put to wider use in this project. This can refer to methodologies, techniques, tools and resources etc. Please refer to section 2.6 and 3.1 of your full proposal to answer this section. Please also provide data on the number relevant to, or designed primarily for use by, women.

RNRRS generated knowledge used:

High transaction costs limit community development and provision of agricultural services to the extremely poor in remote, rural locations. The formal credit markets and agricultural service providers do not offer products that meet the needs of the poor and socially disadvantaged. Hence in India microfinance and self-help groups as well as government agricultural programmes have failed to reach the poor and socially disadvantaged. disadvantaged.

From 2001 to 2004, DFID NRSP supported two sister projects, R7830 based in Bihar and R7839 in Eastern Uttar Pradesh. R7830 explored the opportunities for integrated management of land and water resources for enhancing productivity. Project R7839 developed a highly effective community development approach called the *dialectic approach*, now known as the *Rojiroti Approach*. Data from R7839 demonstrated that the Rojiroti Approach is particularly appealing for women. In this early work more than 90% of our group members were below the poverty line, and more than 70% were from the scheduled caste. Women comprised approximately 85% of groups, indicating that our approach was particularly attractive to this demographic.

This project was also informed by parallel projects R8109 (LPP, Bangladesh and Nepal) and R8083 (NRSP, Bangladesh) because they used selfhelp groups (SHGs) with some success (although on a much smaller scale than R7839 and with a less innovative methodology) in mobilising very poor people. Outputs of both projects have been scaled-out since the end of the projects, confirming the validity of the SHG approach in Bangladesh as well as in India. R8083 developed a model of information brokerage as a base for development agency support of SHGs, and in R7839 this also emerged as an important function of SHGs, alongside brokering of supplies, services and access to microfinance.

P1064, which was named Rojiroti, scaled up the Rojiroti Approach, providing access to financial, insurance and agricultural services that specifically meet the needs of the poor and socially disadvantaged rural population of Bihar, Eastern Uttar Pradesh and Madhya Pradesh.

Project Outputs

In this section we would like you to describe the status of achievement of your stated outputs and also the changes (if any) that have taken place to your project outputs. Kindly explain the reasons for the changes (if any) that have occurred. Please refer back to sections 2.6 and 3.1 of your full proposals.

Project Output Title	Status of achievement	Deviations if any	Reasons for the deviation
1 Non-deterministic	4,562 affinity-based groups with 50,880	We had to curtail group	The cost of group formation and
dialectic approach enables	members in 912 villages, in 3 states and 16	formation due hence	resources required were as we
increased numbers of the	districts	total numbers of groups	projected.
poor and socially	Innovations in the group facilitation process	formed is below our	We slowed the rate of group formation
disadvantaged who	demonstrated potential for cost savings	target.	as we could not meet the full demand
depend upon renewable	over our projections.		for group members' credit due to
natural resources to	We currently support 5,000 groups with a		restriction in the availability of bank
access community	core staff of 6 persons.		loans from Sentember 2008
development, and financial and insurance services.	 62% of members as scheduled caste/scheduled tribe; 80% of all them landless or with marginal landholdings, 5% widow, and 1% of them as obliged (bonded) labour; 98% women Trajectories of development (months after group formation)⁴: 9m 100% members have improved access to government (central or state) In the latest round of the group member survey, only 6% of members reported an inability to access the PDS ration system provided by the government. Over 	We exceeded our targets.	The Rojiroti Approach was very successful in meeting the needs of the very poorest and most socially disadvantaged.

⁴ These targets were set before the impact survey, which we feel better measures impact, was finalized. For more on the impact and development of our groups, see Sections 9 and 10 and the attached impact survey summary.

80% of the group members access		
the subsidized Gov't Public		
Distribution Shop (PDS) rations with		
a Rojiroti Ioan.		
9m 70% access loan from the SHG		
• 95% have accessed loans		
12m 100% have access to life insurance	Fewer purchased life	Life insurance product did not make
cover	insurance than expected	financial sense for group members (see
• 2% accessed life insurance		below)
12m 100% members are able to transfer		
remittances for a fee of less than 2% with		
delivery in 2 days		
All members can transfer		
remittances, either through CPSL or		
their own bank accounts		
24m 60% members typically demonstrate		
earnings from natural resources and find		
agriculture a viable business		
• In Round 2 of the survey, 87% of		
respondents indicated that they		
benefited from agriculture and		
natural resources for their		
livelihood. These members either		
owned or shared livestock, or		
farmed on leased or sharecropped		
land to earn income, among other		
activities.		
24m 25% loans are used to enable poor and		
socially disadvantaged to access natural		
resources e.g. landless access and control		
land through lease or purchase land and		
water resources, hired or own technologies		
which suits to them		

	,	
 Agriculture (land purchase, 		
livestock, farming technology)	1	
makes up the majority of loans		
24m more than 10% members increase	1	
livestock ownership or own livestock for the	1	
first time	1	
 In the last survey, 65.6% of group 		
members said they owned		
livestock. Specifically, small-stock	1	
poultry (such as chickens)	1	
ownership rose 173% between	1	
round 1 and round 2 of the survey.		
24m some of the group members take		
need-based business	1	
 Most members take a business 	1	
"need" loan, well before 24 months	1	
Livelihood improvements (months after		
group formation):	1	
By 24m all members report improved social	1	
situation	1	
 Between joining the SHG and the 	1	
2 nd round survey (24m old), group	1	
members reported that domestic	1	
violence reduced by 30%. Group	1	
members being allowed to leave	1	
the village without consulting their	1	
husband increased by 20%, as did		
members who knew their family's	1	
household income and expenditure	1	
figures.		
By 24m 0% of the members have to sell	We did not reach 0%.	Due to lack of credit, we were unable to
their assets in want of credit		meet group members' demand for loans.
• Survey reports indicate a huge		
		•

	reduction in distress selling of		
	assets.		
	 By 24m all children of group members go to school Demand for loans for educational purposes was high. Not all children went to school, but we did see an increase. 	All groups used loans for education purposes, either from their own savings or from external loans, but not all children attended school.	100% of children may have been an overly ambitious target, and during the course of our project, the government of Bihar started providing good incentives to send children to primary school (e.g. free food). Hence, the SHG has less impact now than previously. Interestingly, we saw a greater increase in private tutoring than attendance at public schools, particularly among marginalised group members. (See Section 9)
	By 24m all members report houses are improved or constructed as needed.	Not all members have improved housing.	Lack of credit to meet the demand for loans. Also, 100% of members may have
	 12% of members in 2-year-old or 		been an overly ambitious target.
	older groups borrowed loans for		However, there is a very large demand
	housing improvements.		for home improvement loans.
2. Improved service	Rojiroti proposed to deliver £1.2M (Rs87M)	Projected:	Why was there a shortfall?
delivery enables	as project-designed credit products that	1. Direct CPSL Credit:	 Banks disagreeing with the
significantly increased	meet the needs of the poor and socially	£0.3 M (Rs24.9 M)	processes of CPSL/Rojiroti, not
numbers of RNR-	disadvantaged.	2. Bank Linkages: £0.9 M	willing to lend based on operational
dependent poor to benefit	We have delivered loans for	(Rs 65.8M)	procedures of the credit delivery by
from and access	 Emergencies (notably medical 	3. MF Grant to	CPSL
agricultural services.	treatment, also to enable recovery	community: £0.2 M	 Strict documentation
	from natural disasters).	(Rs 17 M)	requirements ⁵ that CPSL did not

⁵ Many of CPSL's potential creditors were not comfortable loaning money to CPSL as the required paperwork for each specific loan document that is their customary procedure did not align with CPSL's way of doing business. Completing a 20- to 30-page loan document for a potentially illiterate borrower, when the loan is disbursed and managed by the group and not the individual anyway, made the banks uncomfortable. Additionally, when asking for repayment schedules and terms, the potential creditors were not comfortable with CPSL's flexible repayment methodology. The banks required a pre-determined and scheduled list of repayments that the borrower would be asked to make routinely. Because CPSL follows a flexible repayment methodology that lets group members repay loans as the money becomes available, this made banks uncomfortable due to

	 Clearing/reducing existing debts Consumption expenditure (especially to access fair price (PDS) shops for basic food and other essential goods) Ceremonies (funerals, weddings etc.), to avoid sale of assets Agriculture (including livestock husbandry and aquaculture) Other business/income-generating activity (inc. trading) House building/improvement 	Total: £1.5 M (Rs 107.7 M) Actuals: 1. Direct CPSL Credit: £0.2 M (Rs 15.6 M) 2a. Bank Linkages: Indian Bank: £0.03 M (Rs 2.5 M); Canara Bank: £0.03 M (Rs 2.5 M); Canara Bank: £0.02 M Rs1.8 M 2b. NGO-facilitated Bank Linkages: £0.6 M (Rs Rs 42 M) 3. CPSL wholesale lending to NGOs: £0.01 M 0.5 Rs M Total: £0.86 M Rs62.4 million (58% of projected)	 have resources to complete/administer Repayment terms that were inconsistent with the flexible repayment methodology of Rojiroti as provided to the group members Lockup of funding in Indian microfinance industry from 2010 onward Linkages not operating to as full of a scale as was projected
P e (F	rovision of remittances services has nabled transfer of more than £0.003 M Rs 0.25million).	We did not reach our target of £0.006 M (Rs0.5 million).	We had difficulty working with banks. An early partnership with ICICI never materialised due to problems in ICICI's other pilots, forcing us to transfer money to remote areas through CPSL's account.
lr m	nsurance services were provided to 1,000 nembers through Birla Sun Life.	We insured fewer members than expected	The product did not make financial sense for our members. Six members died, and INR 30,000 was collected in claims on the policy. However, the 1,000 group

uncertainty. Banks and creditors were also very keen to know Rojiroti's PAR, or Portfolio at Risk, which is a measurement of outstanding principal more than 30 days late. Because Rojiroti does not set a fixed repayment schedule to forecast this amount, tracking the PAR metric is not feasible. This too made banks very uncomfortable, as CPSL's method of tracking repayments based on historical repayment patterns of borrowers versus actual repayments was not sufficient.

	12 information and input supply centres established and run on a sustainable basis	Focused on developing scalable communication strategies at ICAR RCER and developing private sector linkages	members who purchased insurance determined that they could have made Rs108,000 in interest on the Rs150,000 premium for the three-year term of the insurance. RIU advised us to scale back and focus on MF activities.
3 Engagement by coalition	By 2011 CPSL's approach was to be	Rojiroti needs further	CPSL could continue serving its groups
partners by project team	sustainable without further external equity	investment to become a	without further investment. However, to
and promotion of project	or grant investment.	Non-Banking Financial	become an NBFC and continue scaling up
findings by project team		Company (NBFC).	its operations, Rojiroti needs \$200,000
and coalition partners			investment.
leads to uptake of the	By 2010 Madhya Pradesh Rural Livelihoods	MPRLP administrators	Partnership with this project fell through
non-deterministic	Project was to be involved directly in	have not expressed	due to staffing changes at MPRLP.
approacn	evaluation of project approach and	interest in our process,	
	promotion of findings to the MP	though there is interest	
	government.	at the field level.	
	State-level programmes such as the Bihar		
	Rural Livelihoods Project or DFID PACS were		
	involved in promotion of the project		
	approach and scaling up outside project		
	areas		
	BRLP has adopted our FAQ materials and approach to group		
	formation, though its anorations		
	differ as far as limiting loan		
	supported them during rescue		
	operations following the Kesi		
	floods		
	10003.		

 We have had influence at the 	
highest level in Bihar. The Deputy	
Chief Minister, after reviewing our	
entry to the Bihar Rural Livelihoods	
Project Innovation Award, said	
publicly, "I never realised that	
saving amounts as small as 2 Rs a	
week could change the life of the	
poor".	
 Our approach has been adopted 	
with government programmes.	
Notably, the Women's	
Development Corporation has	
adopted our approach and provided	
Rs1 million to CPSL for group	
formation. The first phase of this	
has ended, and they are considering	
scaling up our process.	
 We are in discussions with DFID 	
PACS about starting a relationship	
with them, promoting SHG model III	
Through our innovative strategy to engage	
stakeholders at the policy and state level,	
we have been offered the opportunity to	
engage the wider microfinance and banking	
industry in an examination of the policy and	
business implications of microfinance,	
namely at the 2011 Sa-Dhan national	
conference. This involvement has led	
members of the industry to act as partners	
in the promotion of their findings,	
expanding our network.	
We've received recognition as a leader in	

MF by groups like BASIX, Sa-Dhan and		
APMAS in their reports and conferences.		
49 NGOs approached CPSL for support, and	35% of NGOs that	
17 have adopted our process.	approached us adopted	
	our processes,	
	exceeding our target of	
	10%. They have adopted	
	our method of group	
	formation, some	
	following our method	
	themselves and others	
	contracting CPSL to	
	form groups for them.	
By 2009 elements of the project approach		
were promoted and included by ICAR RCER		
in the design and implementation of WB		
NAIP projects as part of their planned		
strategy for convergence and consortia		
support. WB NAIP adopted the SHG		
approach in its activities, and our		
agricultural case studies were used to		
educate people about new income-		
generating activities.		

Activities undertaken for putting knowledge into use

Briefly describe the nature of specific activities you have adopted in your project to achieve the outputs stated above, please refer to the Project Log frame to answer this section. Did you have to use any new activities [other than what you have committed in the log frame] or modify these activities and if so explain the reasons for the same.

The overall objectives of this project were:

1. To establish CPSL as a sustainable microfinance organization delivering more than £1 million (more than Rs70 million) annually in microfinance with a consulting arm supporting independent volunteers and enabling adoption of the Rojiroti Approach by other organisations and "scaling-out" of the approach, across 11 districts in Bihar, Uttar Pradesh and Madhya Pradesh. A business plan will be

complete by the end of the project.

2. To reinforce the existing innovation platforms in order to achieve recognition within development focused organisations and microfinance institutions, and changes in policy or practices at national and state government levels to enable "scaling-up" of the Rojiroti Approach on a sustainable, cost-effective basis.

We set a goal to reach 2,000 villages and to support formation of approximately 10,000 groups (100,000 members and 500,000 direct beneficiaries) during the life of the initiative, with an ongoing capacity to reach 100 new villages annually without further equity or grant investment.

The ICAR Research Complex for the Eastern Region facilitated the exchange, and access to, new agricultural information and ensured convergence with existing agriculturally focused programmes, including, where appropriate, access to the products of RNRRS-funded research. The ICAR team has connected members with agricultural education programmes and has created case studies to spread knowledge and new practices to members.

Output 1. Non-deterministic dialectic approach enables increased numbers of the poor and socially disadvantaged who depend upon renewable natural resources to access community development, and financial and insurance services.

Contribution to purpose

By providing an equity investment to a private-sector organization (CPSL Society) that facilitates community development and microfinance activities, RIU has demonstrated how donor/investment funds can be used to remove blockages to accessing existing credit resources for poor people who depend on renewable natural resources.

Component activities

Investment by RIU in CPSL Society

The project made an equity investment in CPSL to enable the implementation of the business plan prepared by CPSL to scale-out delivery of the Rojiroti Approach. The business plan enabled CPSL to support community development and credit provision at a scale where the income from service provision supported its operating costs.

Rojiroti used three models to scale-out the dialectic approach (Figure 1).



In those areas where CPSL had no previous exposure but where a partner NGO is not operating, we followed Model I. Here CPSL directly supported community development activities for a limited period by providing financial support and training for local volunteers as well as the first lines of external credit.

In those areas where CPSL has worked previously and an established network of volunteers exists, Model II was adopted. In these areas the volunteers are now acting as independent service providers. The volunteers typically draw upon CPSL's services to support their new business activities. Revenue to CPSL is derived from interest on microfinance loans and fees paid by volunteers for data-management services.

Under Model III, CPSL provided training to NGOs in the Rojiroti Approach. NGOs formed more than 3,000 groups in seven districts over the

course of the project. We further describe our experience sharing or approach with NGOs in Section 7.

There were, however, some alterations to the plan in response to the demand for SHG formation in the Northeast – promoted to a large extent by the Kosi River flood in August 2008 and the need this generated for credit for house reconstruction. Thus this activity took place in four districts of Bihar, and in one district of Uttar Pradesh, where it had not been planned.

Risk management products and insurance

In addition to the provision of credit, CPSL offered a simple term life insurance policy in partnership with Birla Sun Life to cover the value of their loan. The key product is a three-year product that offers Rs 5,000 of coverage for three years. If no claim is made on the policy, the premium plus 10% interest is returned after three years.

We also explored two insurance products with Munich Re and Swiss Re. Munich Re is willing to provide a policy that would underwrite our exposure to extreme weather events. The policy would be held by CPSL (or an offshore entity), and it would be an insurance against our portfolio at risk. Munich Re developed and piloted this product in the Philippines and have proposed to undertake an exercise where we would assess the relevance of the product in our situation. Swiss Re is keen to introduce us to their national agents and to provide a life insurance product that is better tailored to our volume needs.

Village-based banking and remittance services

Originally, CPSL planned to utilise biometric card technology to offer a banking service directly to villages through ICICI Bank; however, ICICI withdrew its product from the market due to difficulties in other pilots.

CPSL has established ways to transfer funds, either through CPSL bank accounts or through accounts set up by group members. Rojiroti has enabled its group members to transfer funds between themselves and family members in cities.

Recently, Canara Bank delivered on a partnership to open 1,200 bank accounts for group members. They opened accounts with as little as Rs25 each, and now these accounts are being used to transfer money from CPSL to groups. Group members sign withdrawal documents and get money at home from coordinators, and coordinators withdraw it from the bank. We are charging a commission of 1% on such transactions.

We expect Canara and other banks to offer more bank accounts to our members. Those members who don't yet have access to their own accounts currently can turn to CPSL and its accounts as a safe avenue to transfer money.

Financial products

We used a number of strategies to mobilize finance from the formal banking sector:

- 1. Direct loans from banks and MFIs to CPSL, which lends on to groups
- 2. Promote linkages between banks and SHGs formed under model I & II
- 3. Credit is provided by partner NGOs from grants or loans available to them.

Output 2. Improved service delivery enables significantly increased numbers of RNR-dependent poor to benefit from and access agricultural services.

Contribution to purpose

By providing a cost-effective model for delivery of agricultural services, including access to quality agricultural inputs in quantities and at times needed and at reasonable cost, a substantially increased number of RNR-dependent poor, particularly women, are able to pursue new livelihood strategies.

Component activities

Promoting the opportunities for local service providers

We supported the development of local service providers or "infomediaries," who meet information needs and provide access to quality agricultural inputs. We have fostered the development service centres, known as Kisan Soochna Kendra (KSKs). These centres connect with village agents (VSKs), who act as intermediaries between the KSKs and our villages. Some KSKs have registered with the Agricultural Technology Management Agency (ATMAS), avoiding the need to pay bribes.

Our KSK owners are operating their centres as a business, with early facilitation from ICAR staff members and CPSL staff. The model has proved commercially sustainable but is very dependent on credit. As we have been severely credit constrained and given advice received from RIU to focus on the MFI component we did not scale these activities within our project.

Raising awareness of possible new agricultural strategies and livelihood options

To raise awareness of our KSKs and the potential opportunities they offer, ICAR hosted a workshop with agricultural input suppliers, who recognized the demand for these centres and the benefit of working with them. This was a unique opportunity for input sellers and buyers, who seldom interact in an open atmosphere at an early stage of an initiative.

To reach out to farmers, we developed case studies designed to raise awareness of opportunities. A strategic assessment using existing assessments as well as feedback from our volunteer networks was undertaken to identify potential opportunities in each project district.

The case studies tell the real stories of people using a particular technology or strategy. We used a rigorous methodology that does not only

focus on technical elements but explains the costs and benefits in livelihood terms. These drew on real-world case studies or examples of practices and technologies that may be relevant to the communities in the project districts. The case studies were compiled in printed and video format and are available at farmers' service centres and to group coordinators, who can take the information to group members. The case studies are also used by ICAR Research Complex for the Eastern Region to promote technologies (See Section 7*i* for more on the case studies.)

ICAR also used 3G mobile phone technology to communicate with group members. They were able to answer specific agricultural questions, quickly, without the expense of traveling to remote locations.

Convergence with existing government and other programmes

A key element of the NAIP consortium approach developed by the IRCER has been to recognise that there are many existing governmentsponsored programmes that are not fully utilised that could benefit the poor and socially disadvantaged.

Whilst it is sometimes the case that programmes are shunned because they do not offer products or services of interest, in other instances a factor in their lack of adoption is the inability of programme representatives to reach their intended customers. Simply put, within the life of this project we provided a route for government programmes to reach more than 25,000 group members and their families.

Thus our project offered a facility to such programmes to raise awareness of their services. We compiled and regularly updated information for the volunteer network on existing programmes that may be of interest. The first expo during the inception activities for the initiative facilitated introductions between senior, state-level representatives of programmes on our coordinator and volunteer network. Over the life of the project, we connected our group members with agricultural education programmes, and one of the most important programmes to our group members was the Indra Awas housing and the Rural Guarantee Employment Scheme. Rojiroti loans helped our group members qualify for this scheme, and many were able to improve or construct housing.

Output 3. Engagement by coalition partners by project team and promotion of project findings by project team and coalition partners leads to uptake of the non-deterministic approach

Contribution to purpose

Through the promotion of the Rojiroti Approach by our uptake promotion partner and its adoption by NGO partners, government agencies, development programmes, and the banking, microfinance and insurance sectors, community development services are delivering products that better meet the needs of the poor and socially disadvantaged, particularly women.

Component activities / strategy

There is a significant demand for ways to overcome the transaction costs that constrain the delivery of services in rural situations. Approaches

that were demonstrated to reduce these costs effectively were rapidly assimilated. We leveraged the network of partners we established in our earlier projects to scale-up the project outputs.

Influencing policy

In our proposal we proposed using a traditional "workshop" model to influence policy. We initially planned to initiate a policy discussion forum, initially with our coalition partners, to assess and validate the findings that would feed into the internal learning processes described above and policy briefings and advocacy. This was planned to culminate in a policy-focused event to be held in Delhi to promote awareness of our findings.

However, reflecting on experience of workshops where it was difficult to engage the key decision makers we focused on strategies to engage policy influential groups with our work. Early success was achieved when through a submission to the Bihar Innovation awards we were able to engage the Chief and Deputy Chief Minister of Bihar as well as World Bank staff in an evaluation and discussion of our work.

With guidance from Rasheed Sulaiman, we focused on ways to engage potential stakeholders and policymaker, which included networking and presenting at national microfinance workshops and events and participation in competitions. We identified two partners, BASIX and Sa-Dhan, which are particularly influential in forming the norms and practices of the microfinance sector.

BASIXs mission is to promote a large number of sustainable livelihoods, including for the rural poor and women, through the provision of financial services and technical assistance in an integrated manner. We engaged BASIX through a sub-contract to document and evaluate our project as part of our strategy to engage a policy relevant audience.

Sa-Dhan's mission is to build the field of community development finance in India to help its member and associate institutions to better serve low-income households, particularly women, in both rural and urban India, in their quest for establishing stable livelihoods and improving quality of life.

Founded as the Association of Community Development Finance Institutions (CDFFIs) in 1999 Sa-Dhan as the designate national association of CDFIs represents this rapidly growing sector. Sa-Dhan has a crucial role to play in increasing capacities, affecting the evolution and adoption of best practices, increasing the number of service providers and contributing to improving the policy and operational context for Microfinance in India. Their involvement in our coalition and as critical advocates of our approach will be important to scaling up our findings. Thus we focused on engaging Sa Dhan in an assessment of our work. We invited Sa Dhan to visit our project area and to meet with our groups and volunteers. After seeing our work in the field, Sa Dhan became one of our most important advocates and networking partners.

We go into greater depth in Section 5.

State-level government

At the state level we CPSL formed relationships with individuals and organisations that could influence policy through provision of consultancy services, influencing a number of programmes and NGOs that helped us scale up the Rojiroti Approach.

In negotiating relationships with individuals and organisations that influence policy, our strategy has been to establish our partners' interest in our approach and encourage them to internalise information from our initiative. We evaluate their likelihood to adopt our approach, and we pitch our efforts where they are likely to influence. Further details are provided by state:

Madhya Pradesh

We planned to partner with the Madhya Pradesh Rural Livelihood Programme, funded by DFID as part of its partnership with the government of Madhya Pradesh. The director of MPRLP, indicated that our pilot is positioned in a district where, if we succeed, the implications will be immediately clear to the state government of Madhya Pradesh. However, after the director of MPRLP left, the new director expressed little interest in Rojiroti.

Bihar

The most senior level of the Bihar government has recognized our work from an early stage. We formed an informal partnership with the Jeevika, Bihar Rural Livelihoods Programme, which informally adopted many elements of our approach and our materials.

Also in Bihar, the Women's Development Corporation gave CPSL a grant of INR 1 million to form groups.

Uttar Pradesh

In Uttar Pradesh, we deliberately did not seek to establish pre-existing partnerships with government or development programmes in order to explore how we could build awareness of the approach and establish a network for scaling-up.

This model was successful, but relatively expensive. (See more in section 4 below)

CPSL Consultancy

CPSL saw significant demand from NGOs and funding agencies for their consultancy services. This consultancy typically involves provision of capacity building and support to existing NGOs, enabling them to adopt elements of the Rojiroti Approach. Often these organisations establish an ongoing relationship with CPSL (as described in Model III above) or their activities are further supported by the sponsoring agency.

In the first phase of the DFID-PACS programme, CPSL provided support to 39 NGOs in seven districts. In the current project, CPSL supported 17 NGOs in seven districts. We further describe our experiences with NGO partners in Section 7.

The method of supporting NGOs varies, but CPSL, specifically Sunil, usually advises on proper group formation methods, as well as provides advice on basic group interactions. For example, advising on basic approaches for group/NGO interaction and the use of frequently asked questions (FAQs) to prepare staff for what to expect when interacting with groups, as well as ways to enter villages and gain trust of potential new members without imposing unnatural/unfamiliar activities or skill sets as so many other NGOs do. Occasionally CPSL would lend core staff to NGOs to train them in the Rojiroti methodology, visiting for a week or several weeks per month for 6 months at a time.

Supporting the internal learning processes of our banking partners

Within Bihar there is considerable demand for credit that the existing banking and microfinance sector has not met so far. The Rojiroti Approach has proved particularly attractive because it has a proven record of reaching the poor and socially disadvantaged.

As was described above, we pursued a strategy of engagement with those we sought to influence. We describe our relationship with BASIX and Sa-Dhan above.

In addition to these strategic engagements we made applications for credit to local banks. In each of these applications we represented accurately our ways of working and innovative approach. This enabled us to engage State level staff in evaluating our approach.

Find more on this in Section 5.

Promotion of the policy implications for agricultural service delivery

Rojiroti aligned well with the strategic objectives of the NAIP. We built upon our experiences and lesson-learning with NAIP consortia at the state level. Our colleagues at ICAR integrated elements of their learning into projects and consortia that were developed. Also members of our staff particularly RAs were transferred into NAIP funded projects.

Additionally, our ICAR team promoted Rojiroti and the farmers' service centres at the policy level. Dr. M.A. Khan, the now former director of ICAR-IRCER presented on Rojiroti to the National Planning Committee and at a meeting with the Deputy Director General in Delhi. Overall the experiences were very positive. At the state level, agencies realized the Rojiroti Approach strengthens the agricultural system, and distribution of quality seeds, fertilizer and other agricultural inputs at good prices. Currently, the Bihar government is establishing the e-Kisan Bhawan in Public Private mode that would act as an information and advisory centre for farmers.

Partnerships

i). Have all partners listed in your project proposal contributed as expected in the project? Did you have to drop some of the partners and bring in new partners to achieve the objectives of your project? Kindly describe your experiences in this regard.

The project partnership was envisage as a "delivery partners" and a "Coalition for Scaling up"

The Project Delivery Partners comprised:

- 1. GY Associates Ltd (GYA)
- 2. Centre for Promoting Sustainable Livelihood (CPSL)
- 3. Indian Council for Agricultural Research (ICAR) Research Complex for the Eastern Region, Patna

The delivery partners had worked together over a number of years and were signatories of the project contract. All the partners contributed to the project as expected and worked together as needed over the life of the project.

The Coalition for Scaling-up comprised organisations with which we did not require a contractual relationship:

Madhya Pradesh

Our coalition in Madhya Pradesh was dependent on a relationship with the director of the Madhya Pradesh Rural Livelihoods Project (MPRLP), Mr Jitendra Aggrawal, previously identified the potential of the dialectic approach developed by R7839 and sponsored a successful pilot in 28 villages in Sheopur District. During the life of the project, Jitendra left MPRLP and although our work continued successfully in Madhya Pradesh the partnership with MPRLP did not.

Bihar

Our relationship with Jeevika, Bihar Rural Livelihood Project, was less formal than we expected, but the BRLP did adopt much of our process and has remained an informal partner.

Also in Bihar, National Agricultural Innovations Project (NAIP) consortium "Sustainable Livelihood Improvement through need based Integrated Farming System Models in Disadvantaged districts of Bihar" and through CPSL Consulting with a second consortium "Improving Livelihood Quality in Salt-Affected Watersheds through Sustainable Agriculture" enabled us to establish linkages with NAIP. The NAIP adopted our SHG approach and used our case studies to help share information about income-generating activities.

Uttar Pradesh

In Uttar Pradesh, we deliberately did not seek to establish pre-existing partnerships with government or development programmes. Our goal in this state was to explore how we can build awareness of the approach and establish a network for scaling-up. We wanted insight into the process of building this coalition and to enabling the initiative to demonstrate that the existence of such a partnership is not a pre-condition to the effective functioning of the Rojiroti Approach.

Banking and micro-finance

We used our early coalition members, namely BASIX, Sa-Dhan and Indian Bank, to build our network. These organisations promoted our approach and gave Rojiroti staff members the platform to speak and make contact with a wider network of banks, MFIs and policymakers.

Specifically, BASIX and Indian Bank provided funds to CPSL as credit to support its microfinance activities. BASIX and Sa-Dhan documented our project experiences as part of our strategy to engage a policy relevant audience and were important players in the promotion of the Rojiroti Approach.

ICICI bank was an early member of our coalition, but the relationship there never fully materialised.

Agricultural services

The private sector – linkages arising out of promotional events. KSKs themselves and volunteers.

Policy change

i). Have you engaged with policy makers in this project and what has this experience been like?

ii). Who are the critical policy makers /policy influencing groups that are essential for up-scaling your interventions? What mechanisms were used to engage with policy makers?

iii). Please detail policy changes to which your project has contributed, for example have any other organisations adopted or promoted lessons derived from your project?

 i) Engagement was achieved as described above. Overall the experience was positive, but we decided not to pursue the traditional "workshop" model, where policy makers come to us. We felt going to the policy makers through workshops, meetings and networking would be more cost effective and efficient.

ii) and iii)

Sa-Dhan – Sa-Dhan was identified in our proposal as a coalition partner. Sa-Dhan included Rojiroti's work in a "Side-by-side" report and visited our project area. Sa Dhan drew the attention of the Indian Chamber of Commerce, to our work and Rojiroti has been invited to participate in the Indian Chamber of Commerce/Sa Dhan/UNDP Workshop on financial inclusion and the role of microfinance in agriculture. The organisation gave Rojiroti group members and staff members the platform to speak at their national conference in 2011, which gave us the opportunity to talk about the Rojiroti Approach to a large audience. Sa-Dhan also promoted us in their annual reports and other national publications.

BASIX – Another early partner, BASIX performed assessment of Rojiroti Approach and provided credit to Rojiroti.

Bihar state government – Our involvement with the Bihar government started after BRLP gave us an award. The deputy chief minister presented the award, and we remained connected to him. The Bihar government remains a partner, and we've received support through their programmes, namely Bihar Rural Livelihood Project (BRLP) and the Women's Development Corporation (WDC).

BRLP – We worked with BRLP in our earlier projects as consultants and in training programmes. Unofficially, BRLP has adopted our approach to group formation and adapted our FAQ and materials used to facilitate group formation. We recently applied for grant funding with BRLP and were turned down, but we attracted the attention of a World Bank representative (the World Bank funds the BRLP), who suggested that the BRLP would like to partner with Rojiroti in another manner.

Women's Development Corporation – The WDC invited us to apply for a grant for innovative work in the field of women's empowerment. The WDC awarded Rojiroti an INR 1 million grant to facilitate group formation, promoting our approach.

We came into contact with other groups, like the United Nations Development Programme, Indo-Global Social Service Society, and the World Bank, by attending workshops and providing independent consulting. APMAS' report on the status of self-help groups in Bihar included the Rojiroti Approach. CPSL participated in the APMAS workshop in Patna on developing a federation of self-help groups.

Additionally, we have influenced a number of NGOs by providing advice and consultancy, though we are not active partners in forming their groups. These NGOs have picked up elements of our approach, such as using our FAQs to facilitate group formation. These organisations reach more than 200,000 members in 20,000 groups.

Organisational & Institutional Change

i). Has your project resulted in development of new working practices, regulations, functional changes in organisations, emergence of new partnerships etc. within your own project teams and also outside? What has been the effect of these changes? ii). Have there been any unintended changes / consequences?

 The key groups that Rojiroti has influenced have been other NGOs and banks. CPSL has been very successful providing consultancy to NGOs to facilitate SHG group formation, thereby putting into practice the Rojiroti Approach outside of our own project. This has provided a wider demonstration ground for the cost-effectiveness and success of the Rojiroti Approach.

These NGOs have been able to form many more groups using our approach than they had previously, expanding their reach greatly.

We faced a struggle convincing banks to lend to us. Early on, CPSL was offered access to loans to support its microfinance activities

but was unable to take the loans because the associated terms prevented the delivery of its innovative products – which are crucial in enabling it to meet the needs of its clients. The key constraint was that CPSL proposed to lend to individuals who were not considered bankable (due to their inability to save enough money to meet normal loan requirements), and also CPSL allowed loans to be used for "non-productive" purposes, such as health, social, shelter or educational purposes.

As part of our strategy for engagement, rather than submit fraudulent loan applications (as we were advised to) we've had to take a stand with banks that would not provide credit on group terms and conditions. We've made a point of turning down partnerships with banks that are unwilling to embrace our approach. This has been an important part of our communication strategy in trying to influence bank policy.

We have in some instances convinced bank representatives of the viability of our approach, but changing norms and practices and bank policy has come slowly. Further, the current microfinance crisis in India has led to banks ceasing lending to microfinance organizations until government policy is clarified.

We have seen recent success with bank-linkage programmes that connect our SHG members with bank loans and bank accounts. Canara Bank is expanding its reach by providing loans and bank accounts to previously unbanked customers in Rojiroti SHGs (See Section 3), and National Bank for Agriculture and Rural Development has invited us to go ahead with their SHG-Bank Linkages programme, though the payment has been delayed.

Only two other NGOs/MFIs are working with Canara in this way. Particularly notable is that we influenced Canara to accept our practices for group formation and rating. Representatives from the bank visited our project areas and remained doubtful; however these experiences, together with the experience of full- and on-time repayment from the first groups they lent to encouraged them to scale up our partnership.

Within our own partners, ICAR recognized the value and cost effectiveness of our communication strategy. Creating case studies, video, and phone in live programmes have become new working practices there.

Lessons learnt

i). What lessons have you learnt about how to put research into use and enable innovation in agriculture?

ii). Have you shared these lessons with others and if so with whom and how?

iii). Also, describe what has not worked and explain the reasons why not.

iv). What kinds of challenges did you face while upscaling/promoting new knowledge under this project and were you able to address these and if so how?
v). What kinds of challenges [technical, organisational, marketing, policy etc.] continue to remain and how you think these could be resolved? i) Lessons:

1. Models for SHG mobilisation are scalable and cost effective

The 'rojiroti' model initially developed during the antecedent project R7830/R7839 has proved highly effective in *reaching* very poor people, and in *engaging with* very poor people. It has achieved this via the following important practices, which are central to the approach and also mutually reinforcing:

- 'Unspectacular entry' to poor rural communities, i.e. a low-key approach which facilitates initial engagement with poor and marginalised people and avoids attracting the attention of local elites.
- Use of community members as volunteers (group facilitators), which further strengthens the capacity to link with poor people and which is allied to a general principle not to use professionals at village level. This both reinforces unspectacular entry but also very importantly keeps down the cost of group formation.
- The 'dialectic approach', by which poor people are facilitated to identify their own problems and needs, and to explore with a facilitator and with each other how they can address these.
- Allowing group members to make the decision of how much they should contribute weekly to the group fund and of the terms of all loans made from the fund, and encouraging very small (truly micro-) loans to be made in the early stages of a group's life (as well as making very small loans accessible to SHG members throughout).

Within the current project we have succeeded in scaling the approach by adopting the models set out in the proposal to involve partner NGOs (see section 2 above). A summary of the number of groups formed via the three different models (and the number of people joining groups) is in Table 1 below, and the the projected and actual coverage by State, District and model is provided in Table 2.

The number of groups formed overall was fewer than projected because of the difficulties we had in securing credit (see sections 2 and 3 above). However, the models deployed were effective.

	Model 1	Model 2	Model 3
Number of groups	812	1,425	2,325
Number of members	8,353	15,093	27,434
Number of women	8,341	14,977	25,435
Number of villages	162	285	465

Table 1. Reach by group formation model

State	Districts	Model 1		Model 2		Model 3	
		Projected	Actual	Projected	Actual	Projected	Actual
Bihar	Patna			200	285	100	0
	Jamui					100	21
	Nalanda					300	231
	Nawada					300	24
	Madhepura	150	48				
	Purnea	150	53				
	Araria	150	62				
	Supaul	150	52				
Not in our action plan	Jahanabad					0	5
	Saharsa	0				0	28
	Gaya					0	7
	Banka					0	58
Madhya Pradesh	Sheopur			200		50	52
	Tikamgarh					100	27
Uttar Pradesh	Maharjganj	15	0	15		20	7
Not in our action plan	Mirzapur					0	16
Total		615	215	415	285	970	476

The geographical distribution of SHG promotion can be seen from Table 2, with Model 2 being implemented in the 'Rojiroti heartland' of Patna District, and in the project's 'core' district of MP, Sheopur. Model 3 has been implemented in the relatively accessible districts adjacent to Patna and Model 1 in the more remote districts of Northeast Bihar.

In Patna district, where the development of SHGs started in 2002, the extent of 'viral spread' of the Rojiroti model was revealed particularly by the task of drawing a sample for the control study. The initial aim was to select villages close to existing treatment sites, but it rapidly became clear that this was unworkable as relatives of nearby SHG members demanded formation of their own groups. We therefore selected control groups that were 15 km or more from those where SHGs were already active as CPSL judged it would take at least two years for groups to spread this far. In a handful of cases the demand for groups spread to control sites within 18 months.

We were not able to keep full-time trained staff at our unit in UP. We've found working with partners and building our coalition there is key to scaling up our approach. We succeeded in establishing a coalition in UP by building relationships with NGOs working with the funding of UNDP and IGSS. We provided training to IGSS NGOs and staff, and the UNDP's groups are pressing UNDP to scale up our approach on a larger scale.

2. Sharing our approach with NGOs via consultancy and simple uptake of our strategy has been an effective means of scaling up

The scaling of the Rojiroti Approach to the extent shown in the tables above has been achieved while CPSL has remained an extremely lean organization (with a core staff of 7 in Patna and 129 directly-employed co-ordinators in the field). Thus scaling has not depended on the capacity of CPSL, but has resulted from adoption of the approach by other organistions. In addition to the Model 3 partnerships (17 NGOs in 7 districts, which resulted in 2,325 groups being formed) the following links (mostly mentioned in section 2 & 4 above) have been significant:

- Bihar Rural Livelihood Project (BRLP), which adopted important aspects of the Rojiroti model
- Madhya Pradesh Rural Livelihoods Project (MPRLP) in the early stage of the project only
- National Agricultural Innovations Project (NAIP) consortium, which has adopted our SHG approach and used our case studies (see lesson 6 below) on income-generating activities

Another contribution to scaling has also been made by CPSL's responding to requests for training in the Rojiroti model by various organisations (and earning a fee for this). Examples are:

In Uttar Pradesh, CPSL is working with Swami Viveka Nanda society, which is funded by UNDP, and another group funded by IGSS. In Bihar, several NGOs including Help-Age India have taken up the Rojiroti approach.

3. Challenges in raising funds for MF

CPSL has faced significant challenges in fundraising from the inception of the project. Many times banks or funding organizations have looked into funding and provided near-guarantees of raising debt or grants, only to renege on their offers after lengthy and detailed reviews, not before long administrative processes had been started and significant amounts of CPSL staff time invested.

But CPSL has successfully raised debt from several local banks and funding organizations.

CPSL received a loan from Rashtriya Gramin Vikas Nidhi (RGVN), a non-profit society in India that helps to promote and support organizations working in social and economic uplift of the rural poor. RGVN's support to CPSL was in the amount of an INR 2.1 million loan.

CPSL was engaged early in the life of the project with BASIX, a large Indian livelihood promotion institution, to raise significant debt over a 5- to 10-year span. However, BASIX decided that the Rojiroti methodology was not fully acceptable and provided only INR 1 million in the end, as

opposed to a potential INR 5-10 million.

CPSL has also leveraged loans from two more Indian financial institutions, ICICI and Indian Bank, in the amounts of INR 500,000 and INR 1 million, respectively, totaling INR 4.6 million.

Funds to CPSL	Amount (million INR)
RIU Equity Infusion	5.3
RGVN Loan	2.1
BASIX Loan	1
ICICI Loan	0.5
Indian Bank	1

4. Investment in agriculture follows financial stability

We have discovered that investment in agriculture (as well as other income-generating activities) by poor people does take place once they reach a degree of financial and livelihood stability. This is likely to involve (notably) improvement in health status and in housing, as well as reduction of indebtedness, needs which can successfully be met by (small) loans. Subsequently investment in agriculture (financed by larger loans) is made, notably purchase of inputs to enable sharecropping or farming on rented land to be undertaken. In this way many project beneficiaries have been able to change their socio-economic status from day labourer (or even bonded labourer) to tenant farmer.

5. There is a demonstrated demand for local suppliers of quality agricultural inputs and information

Support for investment in agriculture via brokerage of information and agricultural inputs has been an important role for volunteers and coordinators from the early stages of the Rojiroti model in the antecedent NRSP projects. This has continued throughout the project, with volunteers both sharing information with group members and also helping group members to get best input available by bringing them in contact with suppliers of chicklets, agricultural inputs, etc. However a limitation on the development of this service (which has not been addressed) is that volunteers are not getting any commission on providing the service.

This role which volunteers have taken up is an indication of the demand for better access to both agricultural inputs and information, and it is in response to this that we have promoted the development of service centres (KSKs) connecting with village agents (VSKs); (see Section 3 above, Output 2.2). To make supplies available (of good quality and fair price) to the poor farmers that SHG members represent is a crucial development, and to combine an information function with this (e.g. access to print, video, electronic media within the KSKs - under the same

roof) has potentially a large impact and is an objective which the project is exploring but which will not be realised within its life.

6. Information on innovations promoted from the supply-side proved less useful to our poor farmer clients than information on innovations which are relatively widely used

It is a feature of the Rojiroti Approach that SHG members are not directed to any particular technology or activity (and not even to an agricultural rather than a non-agricultural income-generating activity). Something of a tension arose between this tenet (developed by project partner CPSL) and the activity set 2.2 undertaken by project partner ICAR to 'raise awareness of possible agricultural strategies and livelihood opportunities'. ICAR took a supply-side approach, identifying five farm-tested technologies to promote, namely "Raising horticultural nursery," "Mushroom production," "Vermicompost," "Beekeeping," and "Fabricating low-cost polyhouse for vegetable production." On the basis of existing adaptive research, these appear suitable for implementation by small farmers, and some farmers using them in the field could be identified although they are not widespread. These were developed into case studies, incorporating a printed brief and a video. We screened some of these case study videos with groups and received favourable feedback. However, the process of gathering feedback did not explore reasons why adoption of this set of technologies is not more widespread; and no uptake could be traced to our promoting the case studies. In preparing a second round of case studies, ICAR identified activities which are being practised by rural people, namely poultry production, horticulture nursery, marigold cultivation, and bangle-making (this last was the result of a chance encounter in a village; it proves to be a significant income-generating activity in some locations). A video of a KSK including interview with the owner was produced as part of this second round of case studies. We screened some of these case studies are available to group members through CPSL volunteers and coordinators, through KSKs and VSKs, and on video. Additionally, ICAR is putting these case studies into broader use outside of Rojiroti.

ii) Sharing of lessons:

The sharing of project lessons was core to output 3. The activity plan aimed to achieve this using print media, a project website and other electronic media (activities 3.1, 3.2, 3.3), as well as two 'policy workshops' on (a) finance and community development and (b) delivery of agricultural services (activities 3.4.5 and 3.5.5). (The 'Expos' under Activity group 2.3 had the different purpose of promoting convergence between project activities and existing government, and other, programmes). The communication strategy (activity 3.0, developed after the start of the project) proposed using video, in addition to the media specified in the activity plan, in two ways: (a) to support the activity set 2 by communicating information to stakeholders in the field, and (b) to provide stakeholders themselves (and particularly SHG members) with the opportunity to articulate their experiences to a wide audience. (Note: this approach was informed by the principles of 'participatory video' but cannot be regarded as meeting the criteria of participatory video since participants did not have control of editing or using the video material.)

As the project developed, and we aimed to apply our communication strategy to the sharing of lessons learnt, the team itself underwent a series of learning process, as noted below.

(a) *Sharing of lessons with policy-makers*. The policy workshops were conceived as national-level events. Our experience of the antecedent projects (section 1 above) made us confident that we would have strong messages for these events. However, it was a feature of several high profile workshops held within these earlier projects that, although 'successful' in terms of internal criteria (organisation, numbers of participants, the quality of discussion) they had not succeeded in attracting the key policymakers who would have been the most desired participants. Nor were we able to identify specific policy decisions which had been affected by the transactions at any workshop – even though we felt we came close to this at some points. In this project, attendance at the inception workshop in December 2008 led us to question how cost-effective the planned end-of-project workshops might be, and to take the different approach of devoting person-time and resources to a much more dynamic and opportunistic engagement with those we wanted to reach with the Rojiroti message. This involved taking part in a number of workshops organised by other bodies within the social development and microfinance communities, entering for competitions which would gain us recognition.

The most recent events of this type are:

- World Bank-sponsored DM India workshop which aimed at providing resources to innovative business models
- SIDBI workshop for microfinance funded by DFID
- RGVN workshop on solar energy
- MFIN (network of MFI in Bihar) meeting/workshop

(b) *Sharing of lessons with partner and other NGOs*. As noted above (in (i)of this section), 17 NGOs were formal partners in the project, facilitating SHG formation using the Rojiroti Approach, while several other development agencies working with poor rural people were influenced by the approach and have adopted elements of it. These include the major Bihar Rural Livelihoods Project as well as NGOs that have commissioned training and consultancy from CPSL. In the process of undertaking project activities, notably with the partner NGOs, there has been widespread sharing, both of the basic Rojiroti model developed in the antecedent projects and also of innovations (e.g. promoting non-literate groups) which have been developed during this project. This might be the most potent aspect of the project in terms of short-term impact on livelihood.

(c) *Sharing the testimonies of project beneficiaries.* To enable the voices of project beneficiaries to be widely heard (and discussed) was discovered in the 'parallel' RNRRS projects (see section 1 above) to be a highly effective means of communicating project achievements and lessons. It was not used in the immediate antecedent projects to this (R7830, R7839), but the benefits of SHG membership were seen to be so striking that video testimony of SHG members was planned to be an essential part of the project' communication strategy. Some of this video material is posted on YouTube (www.youtube.com/watch?v=wBcMt50BrDA). These have had a significant impact, notably at the Innovation Asia-Pacific Symposium in Kathmandu May 2009 where they formed part of a marketplace exhibit by the project. Thus, though we were initially disappointed that the video medium was not more skilfully used (in conventional terms), we drew the lesson that having slickly edited videos is not critical for important messages to be communicated.

(d) *Sharing of lessons of farm-level innovation.* Another use of video in the project was to raise awareness of possible agricultural strategies and livelihood opportunities (activity 2.2). The process we went through in moving from promoting supply-led innovation to using the medium of video to capture farmer practice is outlined under (i) above in this section. We draw from this the lesson that this is an important exercise and that video is a potent tool both for the recording and for subsequently communicating grassroots practice and experience at several levels, from farmer through to researcher. We are interested to see that some of our video material is now being used by ICAR outside the context of the project.

iii) What has not worked:

Formal engagement has proven difficult with *government and banks* in lesson learning. This is reflected in the strategy we pursued described above (Section 3) – which has enabled us to influence policies institutions and processes.

iv) Challenges faced while upscaling/promoting new knowledge

Successfully adapted strategy, but there have been some key challenges:

- Currency shortfall that affected project partners
- MF crisis is spurring new government regulation of microfinance practitioners. It is unclear what effect this regulation will have on Rojiroti.
- Restrictive bank policies kept us from meeting the demand for our services. We lacked credit to scale up our MF operations and our farmers' service centres to their fullest extents.

v) Challenges remaining

The sustainability (and scalability) of the SHG model, as developed in the earlier research projects, has been demonstrated, and it will continue post-project in that CPSL will continue to exist, as a result of 'viral spread' and providing CPSL continues to be moderately successful in securing either grant funded work or consultancy.

However, the business model proposed by CPSL for Rojiroti has not yet been proven. It requires CPSL to leverage debt finance to support its microfinance activities. Given the cost-effective operational model developed by Rojiroti the costs of CPSL can be met from the margins available. However, to date CPSL has failed to secure the debt required to sustain its operations. Approximately \$200,000 is required to secure the current staffing levels.

We estimate that the unmet demand for credit from our nearly 5,000 existing groups is between \$5-10 million. Clearly if we are able to put in place a strategy to meet this demand (which could be done without significantly increasing our operational costs) this would secure CPSL's future

A strategy review and business planning exercise have set a strategy that enables Rojiroti to meet its initial challenges and to grow. Our plan for this post-project is outlined in a separate business plan document.

In brief, the plan is to establish either a for-profit non banking financial company (NBFC) or a Section 25 (not-for-profit) company. That would provide a more transparent corporate vehicle to take on significant debt, allowing us to meet requirements for capital adequacy, collateral etc. This company will provide financial services to CPSL, supporting its innovative Rojiroti Credit product through a wholesale loan and providing direct loans to group members for asset based loans (for home and business). Our short-term goal is to meet the existing unmet demand for credit. In the next phase of growth we will i) expand our customer base, focusing on areas that our completion are unable to reach and ii) develop new innovative products for our existing customers, focusing primarily on supporting access to homes and energy as well as agricultural businesses.

Alongside our activities in India we are proposing innovative products that enable ethical investors, savers and donors to support Rojiroti.

Project Beneficiaries / Scale achieved

Please state the estimated number of people affected by your project. Please note that it is very important that the data entered here is supported by the data you have collected. In the table below an example is given, please use columns below this to enter your own information.

Project Output	Indicator of	Number &	Number &	Male	Female	Total	Evidence
	achievement	Type of	Type of	Beneficiaries	Beneficiaries		Index*
		Indirect	Direct	(indirect and	(indirect and		
		Beneficiaries	Beneficiaries	direct)	direct)		
Output 1. Non-deterministic		254,400	50,880	2,127	48,753	505,280	Table below,
dialectic approach enables		Rojiroti	Rojiroti	Rojiroti	Rojiroti		data from
increased numbers of the poor		group	group	group	group		CPSL
and socially disadvantaged who		members'	members	members	members		database
depend upon renewable natural		family					
resources to access community		members		40,000	160,000		
development, and financial and				members in	members in		
insurance services.		200,000		groups	groups		
Contribution to purpose		members in		formed by	formed by		
		groups		NGOs using	NGOs using		
		formed by		the Rojiroti	the Rojiroti		
		NGOs using		Approach	Approach		
		the Rojiroti					
		Approach					
		(NGOs					
		where CPSL					
		provide					
		consultancy					
		only)					
Output 2. Improved service	By 2011 CPSL	254,400	50,880	2,127 group	48,753	305,280	CPSL
delivery enables significantly	approach delivers	group	group	members	group		database
increased numbers of RNR-	£1.2million (Rs87	members'	members		members		
dependent poor to benefit from	million) as project-	family					
and access agricultural services.	designed credit	members					
	products that meet						

	needs of poor and socially disadvantaged						
	By 2011, provision of remittances services enable transfer of more than Rs 0.5 million in remittances to more than 50,000 SHG members	6,000 group members' family members	1,200 group members	0	1,200 group members	7,200	CPSL database
	<i>By 2011, provision of insurance services</i>	5,000 group members' family members	1,000 group members			6,000	CPSL database
	By 2009, information and input supply centre established in areas where demand exists	50,000 group members' family members	10,000 have access to KSK or VSK, though they receive different scales of services			60,000	CPSL database
Output 3. Engagement by coalition partners by project team and promotion of project findings by project team and coalition partners leads to uptake of the non-deterministic approach		N/A	N/A	N/A	N/A	N/A	

*Please provide evidence for the figures included here as a separate attachment, use this column in the table to indicate where this evidence can be found.

Rojiroti users						
State	District	Cumulative total, to May 201				
				Female		
		Groups	Members	members		
Bihar	Patna	1425	15093	14977		
	Nalanda	1156	12686	12548		
	Nawada	120	1223	1223		
	Banka	288	2818	2792		
	Jumui	105	1012	919		
	Madhepura	238	2275	2275		
	Supaul	246	2722	2710		
	Araria	310	3244	3244		
	Purnea	18	112	112		
Three districts	Jahanabad	25	253	253		
not in our	Saharsa	139	1880	1706		
action plan	Gaya	31	329	329		
Madhya						
Pradesh	Sheopur	260	4652	3252		
	Tikamgarh	120	1680	1512		
Uttar Pradesh	Maharajganj	12	128	128		
	Mirzapur	69	773	773		
Total		4562	50880	48753		

Poverty reduction & Income generation

i). Describe your achievements here, and please refer to the details in your logframe, for example '2000 farmers from Nawaparashui in Nepal have increased their income by 20%'.

ii). How much has the base line data collected in the beginning of the project helped shape your project activities? Has that data been analysed and do you have a copy of the baseline report?

iii). Have you conducted an impact assessment study? What are the main findings? Kindly attach a copy of the impact assessment report Make sure that all information provided here correlates with the evidence you have collected. Please include the evidence as separate attachments to this report and label the attachments appropriately.

The agreed best practice approach to identifying and attributing impact we are following in this project is to compare differences in livelihood outcomes for randomly selected beneficiary and control samples across two survey rounds. Rather than simply making Round 1 of our monitoring survey just a baseline, we ask 3,200 project beneficiaries about their situation now and their situation when joining the SHG.

Comparison of round 2 and round 1 surveys for Rojiroti (treatment) and control groups allows us to identify the difference that Rojiroti has made to livelihoods (using a difference-in-difference approach) over approximately 18 months. A full description of the methodology used and detailed discussion of the results can be found in the impact assessment paper⁶. One methodological issue that does need to be mentioned at the outset is that the difference-in-difference (DiD) estimates relate to Rojiroti groups that had already been formed for an average of 3.4 months but had not yet started receiving loans from CPSL. Some benefits may be gained simply from forming and attending a SHG and using very small loans made from rotated savings even in the first few months. These benefits are not captured in the DiD estimates, but by asking SHG members to recall key variable values when they joined the SHG (just a few months earlier) we estimate the magnitude of these additional gains.

Major findings are as follows:

1. The proportion of new group members needing to borrow to eat fell between survey rounds whereas the proportion of the control group rose over this period⁷ and the difference is statistically significant. Only households in a desperate situation – the very poorest 20% of those joining SHG – say they need to borrow to eat at the outset. Access to Rojiroti reduces the *requirement* for households to borrow for food as it enables access to the subsidised Public Distribution System (PDS) for rice and kerosene and it also effectively

⁶ Yaron G., Kelly, B., Choudhary S., Kumar R.,, Best J. and J. Gaunt (2011), *Innovative microfinance for the very poor: assessing the impact of the Rojiroti approach*, journal paper submitted May 2011

⁷ This reflects the difficult agricultural conditions across rural Bihar 2008 – 2010.

increases incomes by replacing loans at usurious interest rates from money lenders. Recall data suggests that loans made in the first 6 months of SHG members from rotated savings are also used for this purpose and so the full Rojiroti benefits exceed the DiD estimates.

- 2. Household asset ownership (bicycles, radios and mobile phones) increased significantly for the Rojiroti sample relative to the control group.
- 3. Rojiroti results in improved agricultural outcomes for the poor, but it takes at least two years for the very poor to see a significant improvement in access to land. Those with access to some land (around half the treatment sample) increase the area cultivated significantly more than control group members. The decline in the proportion with no access to land is more modest as it takes a longer time for very poor SHG members to make progress. But they do eventually achieve this: the proportion of those without access to land fell by 13% between survey rounds for those who had been members for at 12-24 months at round 1 of the survey and it fell by 20% where women had been SHG members for more than two years at round 1. Very poor households in this part of India (particularly those without access to land) often include poultry rearing as a livelihood strategy. New SHG members achieved more than double the increase in average poultry holdings of the control group and the relative gain for small stock was greater still. As with access to land, the benefits of SHG membership for very poor households in terms of poultry and small stock ownership increase substantially over a two to five year period.
- 4. Children of SHG members gain from increased spending on education. Children of SHG members are more likely to increase primary school attendance than children of control group members, although this is only significant at the 10% level. A bigger change seems to occur for SHG members *prior* to receiving external loans (based on recall, attendance rises 9% in this period). The greatest impact in absolute terms and relative to the control group is the increased provision of private tutoring in SHG member households which rises from 40% at round 1 to 55% by survey round 2.

In order to try to understand how Rojirotii loans make a difference to borrowers, we have used a form of Peer Ethnographic Review (with the help of community mobilisers) and have also followed up the 53 loans taken by the 12 members of one randomly selected SHG over a two-year period and estimated the financial return on each one. The major conclusions for livelihoods and poverty from the qualitative and case study analysis are that:

- 1. Agriculture plays a critical role in generating cash to pay for "non-productive" loans even though beneficiaries are not landowners. Examples include:
 - Enabling SHG members to keep livestock such as pigs or a buffalo that generate high rates of financial return (50-80%). These would have to be sold at a significant discount to raise emergency funds without loans from Rojiroti.
 - Many women in SHG have husbands who work as agricultural labourers, and this income (Rs 60/day) helps repay loans. Some women also work as agricultural labourers. The government NREG scheme that provides 100 days of work is likely to have increased this income source.
 - Women often have a portfolio of livestock activities (with animals take on a shareholding basis) or sharecrop arable or tree crops

that generate high financial returns. Loans taken for medical purposes allow them to return to work or work more effectively, so generating financial returns.

- 2. Returns to agricultural activities in this part of India typically are high but not high enough to pay moneylenders, i.e. agricultural returns are typically in the region 50%-90% which is below the 120% charged by moneylenders.
- 3. The highest returns occur when borrowers take advantage of opportunities to use loans to move to sharecropping or livestock rearing arrangements that are available only to those with capital. Historically, the very poor, lowest caste families had no access to capital and the very one-sided arrangements they accepted (25% share of palm tree production or 20% share of agricultural yields if inputs are provided by landowner for example) reflected their marginal social and economic status. Overt discrimination along caste lines is politically difficult now so landowners offer SHG members the "standard terms" as leaseholders (for palm tree production) or sharecroppers providing purchased agricultural inputs. Livestock rearing based on a 50% share going to the person providing the animal is a common arrangement for those without their own animals. The return to buying the animal with a Rojiroti loan when it reaches maturity is usually very high e.g. easily 500% for a young lactating buffalo.
- 4. The cost of a tubewell can be offset by using some of the water for pig rearing (a livelihood option which is not available if water has to be carried a significant distance). The additional benefits are social (empowerment by eliminating the fear of attack from "polluting" a water supply shared with higher caste groups) but also economic as women will spend less time collecting water (freeing up time for productive activities).

Social Exclusion & Gender

i). Please explain how the project has targeted women and other socially excluded groups, and provide evidence of the projects impact on gender and social exclusion.

ii). Have you used the data your project has collected on gender and social inclusion in deciding or shaping the project interventions?

i). The project aimed to target women as well as scheduled and other backward caste members in forming SHGs. However, the proportion of women members of SHGs has exceeded the target (98% of members of groups started during the project are women, as against a target of 70%). We have also found that the proportion of marginalised women in SHG (lowest caste and Muslim) has risen strongly over time as demandled group formation is self-targeting toward the marginalised. Our sample survey shows that 75% of SHG members less than 6 months at survey round 1 are in this category compared to 49% in groups aged 24+ months at the same point in time

DiD results shown in the table below confirm our qualitative research findings that Rojiroti makes a significant contribution to female empowerment.

The first two outcome variables are self-explanatory, but the domestic violence index needs further explanation. It is based on the incidence of domestic violence in terms of the following categories: 1. Never, 2. 1-2/year, 3. 3-5/year, 4. 6+/yr. In newly formed Rojiroti groups, the average falls from 1.7 (51% report no violence and 35% 1-2 incidents/year) to 1.4 (where 58% of women report no violence and 33% 1-2 incidents/year). Rojiroti helps to reduce domestic violence, but it clearly does not eliminate it.

Difference in Difference estimates for empowerment indicators over time						
Outcome variable	Treatment	Control	t-statistic			
% change women knowing household income & expenditure	12.7%	1.4%	7.27			
% change women able to travel to relatives without permission	6.5%	3.9%	2.66			
Change in domestic violence index	-0.24	0.01	-7.78			

It is important to note that female SHG members believe that the process of forming and running a SHG leads to empowerment even before external loans are received. Recall data shows that knowledge of household spending, travelling to relatives without permission, and domestic violence are just about identical for treatment groups at the time of SHG formation and control groups at survey round 1. The biggest gains in these areas are actually made during an average of 3.4 months of SHG membership prior to round 1. So, for example, the proportion of women knowing household income and expenditure rises 28% from SHG formation to round 1 and then a further 12.7% from round 1 to round 2. The true empowerment benefits from Rojiroti membership are therefore much larger than those captured in the table above.

Other relevant statistics that indicate the type of gains made by women are the:

- Proportion of women able to visit relatives without permission has risen from 27% to 47% (for those in SHG > 12 months: 17% to 58%)
- Proportion of women reporting that they experienced domestic violence often (6+ times a year) fell from 14% to 5%. Overall, the median level of domestic violence has fallen from 3-5 times to 1-2 times a year
- Proportion of women saying they never experience domestic violence rises from 31% to 58% for those in SHG more than 12 months

ii) The target figures mentioned above were confidently based on the successful experience of women's SHGs in the earlier NRSP project (R78339), and subsequently. Although the following initiatives were based on general awareness of social exclusion and a spontaneous response to it (rather than on data systematically collected by the project and a top-down intervention), the process of SHG formation has successfully reached:

- women in highly excluded groups, including harawaha (obliged labourers) and Musahar caste members
- Muslim women
- non-literate women

Some of these SHGs have been facilitated by volunteers of the same communities. Non-literate volunteers have worked successfully with non-literate groups (in spite of initial scepticism on the part of field coordinators), taking the help of literate assistants (usually younger women).

Governance of CPSL reflects (to some extent) the importance of women as SHG members. The president is a woman (former SHG member and now volunteer) as are two of the four lay members of the Board of Directors.

Unexpected Outcomes

Have there been any events or activities that have happened during project implementation that were never planned, but resulted in new, better or worse outcomes related to your project?

Microfinance crisis

The current microfinance crisis in India has made banks even more reluctant to lend to MFIs, but it gave us the opportunity to differentiate ourselves from the failing MFIs. Building financial literacy has always been key to the Rojiroti Approach and is the reason we have not seen defaults on our loans. Our group members learn, at their own speed, how to manage their own credit.

We have promoted our success in the face of the microfinance crisis in informal meetings, in a newsletter, and in workshops and conferences. Importantly, Sa-Dhan invited our staff members and group members to speak about their experiences with Rojiroti at its national conference in March 2011.

Viral spread of Rojiroti Approach

The approach to group formation spread by word of mouth and without facilitation by CPSL staff. Individuals in villages started SHGs in locations outside our planned project areas. Once we became aware of these groups, we provided support and loans once the groups reached maturity. This has accelerated our approach in areas where there is awareness of our activities from nearby villages and family members. The time needed for groups to meet our criteria for receiving external microfinance can be shortened in villages that are already aware of our approach. This spread of the approach demonstrates its effectiveness. This approach to self-help groups meets the needs of poor people. They do not have to be sold on the approach. New group members hear that the approach worked for their family members in other villages and bring the ideas to their own villages.

This has resulted in two important outcomes:

1. The proportion of socially marginalised SHG (low caste and Muslim) members has risen significantly over time. Our sample survey shows that 75% of SHG members less than 6 months at survey round 1 are in this category compared to 49% in groups aged 24+ months at the same point in time.

2. The cost of group formation has declined, enabling even poorer sections of the community to be served.

Communication and networking

The viral spread of our approach informed the culture of our communications. We learned to lean less on formal events and communication avenues. We recognized that there is significant scope for promoting Rojiroti through informal and low-cost activities such as presenting and networking at seminars and conferences, face to face meetings, etc. entering competitions. Networking at events, word of mouth and using our

existing contacts has raised interest in our approach.

We also took advantage of improved technology to better our reach to volunteers and group members. We used 3G mobile technology to reach our volunteers in the field, who work with group members. ICAR was able to share its agricultural expertise via 3G and video, which was a new experience. These avenues to reach rural areas attracted attention at ICAR and has been adopted more widely.

Quick turnover of research staff members

We've seen many research associates at ICAR-RCER work about six months with the project and quickly graduate to a new, higher paying job. This has been positive because many of these former associates have moved on to new jobs where they can advocate for Rojiroti and its processes.