

NATURAL RESOURCES SYSTEMS PROGRAMME
PROJECT REPORT¹

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Report Title

Livelihood improvement of stakeholders based on constraints analysis under command of RPC-V.

Annex Bii of the Final Technical Report of projects R7830 and R7839.

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High Potential

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CONTENTS

1. Introduction.....	2
2. Methodology.....	4
2.1 Sampling.....	4
2.2 Constraints of farmers of different groups and their ranking.....	5
2.2.1 Methodology for ranking.....	5
Snowball sampling technique involves following steps.....	5
2.2.2 Ranked constraints of farmers at Panchayat level (28).....	6
2.2.3 Ranked constraints by non agricultural women Groups (11).....	7
2.2.4 Ranked constraints of sharecroppers (11).....	7
2.2.5 Ranked constraints of Water User Association (8).....	7
2.2.6 Ranked constraints of progressive farmers (16).....	8
2.2.7 Ranked constraints of women group based on agriculture (13).....	9
2.2.8 Ranked constraints of small farmer (11).....	9
2.2.9 Ranked constraints of landless and agricultural laborers (9).....	10
2.2.10 Final compilation of constraints of farmers of all the groups (9).....	10
3.1 Participatory community nursery.....	14
3.2 Farmers managed community nursery programme.....	15
5. Opinion of the Stakeholders.....	17
7. Conclusions.....	19
8. Lessons learnt.....	20
9. Strategy for Up-scaling.....	20

Summary

A study was undertaken in DFID project during 2000-2004 for the livelihood improvement of stakeholders based on constraints analysis under RPC-5 of Sone Command (Bihar). In this study constraints associated with land and water management were analyzed by adopting livelihood approach. We conducted resource mapping, group discussion with farmer and household interviews by application of new knowledge of natural resource management. The major focus of the study was on capacity building of resource poor farmers and communities rather than provision of resources required for land and water management. The team after rigorous discussion identified the key constraints, suggested different options and developed new knowledge to minimize the production gap in RPC-5.

We compiled key constraints of different stakeholders by using Snowball sampling technique. A total of 169 constraints were identified from 7 stakeholders and they were ranked according to their severity. Finally, 9 common key constraints were identified which limit the improvement of stakeholders' livelihood.

Scientists of the project broadcasted ideas based on constraints among the different stakeholders and collected their responses. On the basis of responses, we formed Interest Groups with basket of options like resource conservation technology, multiple uses of water, optimization of rice transplanting, community nursery, seed production, fish production etc.

The adoption of different options by the stakeholders in the project areas generated employment, increased farm income, reduced the migration of the rural youth, empowered women, reduced conflicts & developed linkages with developmental and financial agencies, which ultimately helped in improving livelihood of different stakeholders.

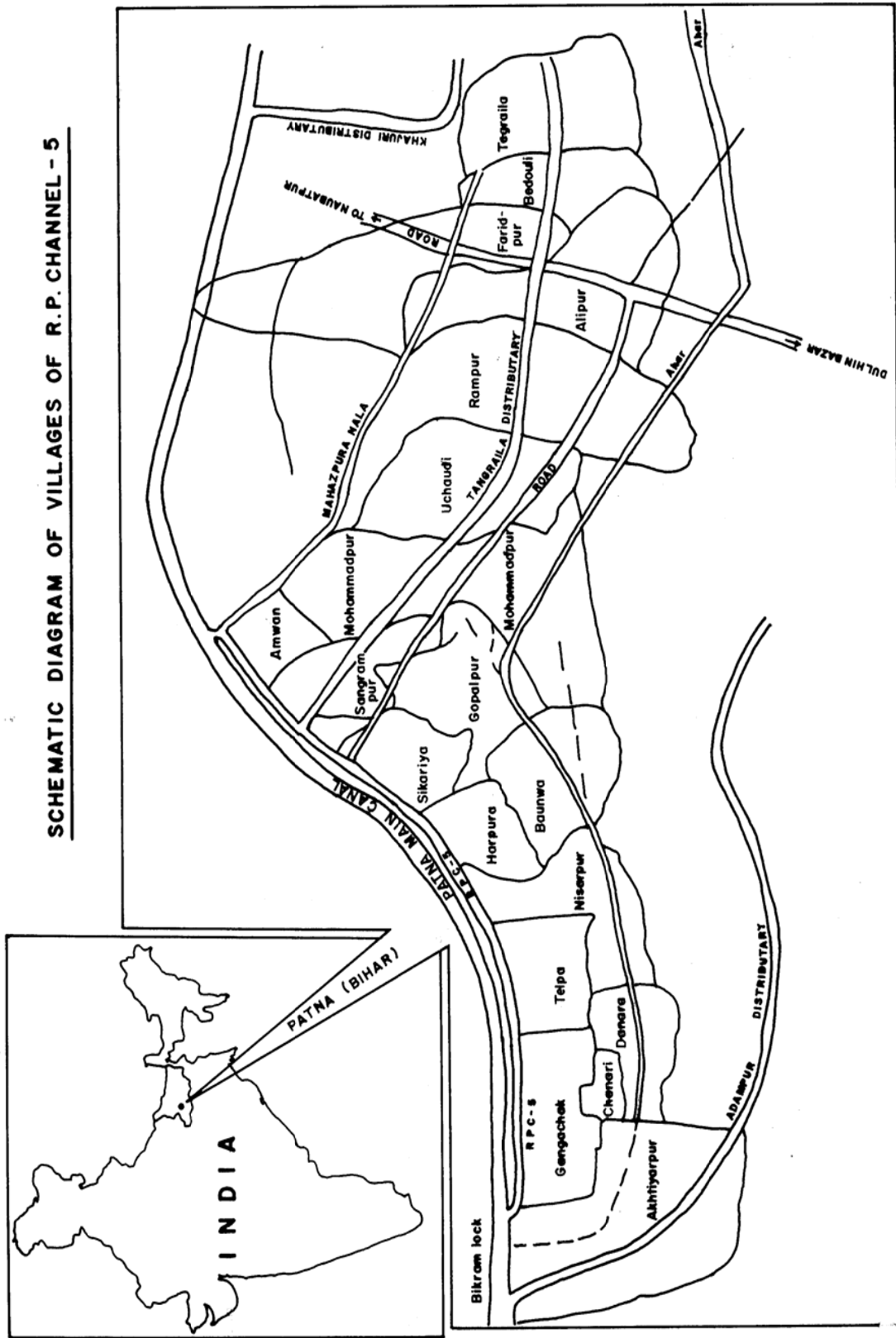
1. Introduction

RPC-5 comprises 20 villages of Patna district. It includes total area of 3022 ha under which irrigated Kharif area is 840 ha and Rabi area is 340 ha. Main crops are Rice and wheat having average productivity of 3 t/ha and 2.5 t/ha respectively. RPC-5 area has good alluvial soils and sufficient groundwater. Annual rainfall is 1200 mm. Various factors of low productivity and poor livelihood were identified.

The project aims at enhancing productivity in Bihar and eastern Uttar Pradesh and benefiting the poor people in the same region by application of new knowledge of natural resource management in high potential system based on constraint analysis of different farm groups including farm women. Capacity building of the institutions would be also taken up by imparting training to members of the institutions on land and water management on the one hand and making them aware of backward and forward linkages of agriculture on the other.

The project assessed the available land and water resources for productive utilization of these resources. Strategies for concomitant use of rain, surface and ground water management of the waterlogged areas, and main canal operation were evolved and selected. New tillage alternatives and establishment methods for timely wheat sowing were field-tested in participatory mode. Based on this, an action plan was formulated and implemented for enhancing overall productivity.

SCHEMATIC DIAGRAM OF VILLAGES OF R. P. CHANNEL - 5



2. Methodology

Constraints of various farmer groups in the project area were studied by directly interviewing and groups discussion, for these farmer groups. These farmer groups were:

- 1) Farmers at Panchayat level
- 2) Non-agricultural women group
- 3) Sharecroppers
- 4) Farmers belonging to water user association (WUA)
- 5) Progressive farmers
- 6) Women group based on agriculture
- 7) Small farmers and
- 8) Landless/agricultural laborers.



2.1 Sampling

Following stratified random sampling procedure, consisting of 30 sharecropper, 8 small farmers, 21 landless labours, 13 agri- based and 19 non agriculture based women groups, 15 village panchayat level farmers, 15 progressive farmer and 8 member of Water Users Association (WUA) were selected. Thus, in all, the sample constituted eight groups of respondents.



Interaction with different groups of farmers

2.2 Constraints of farmers of different groups and their ranking

2.2.1 Methodology for ranking

There are number of ways and methods to identify key agricultural production constraints in relation to land and water management. Snowball sampling technique has been employed for identifying and subsequently ranking key constraints perceived by key constraints perceived by key informants (Panchayat members, WIA executives, Progressive farmers, etc) and different groups considering following advantages.

- (i) Flexibility
- (ii) Quantitative rigor and
- (iii) Ease to implement

Snowball sampling technique involves following steps

- 1 Identification of key informants (KI)
- 2 KIs are asked to identify agricultural production constraint of the area
- 3 The constraints so obtained are compiled and a consolidated list of constraints is prepared.
- 4 Consolidated list is supplied to the KIs and they are asked to rank them according to its severity
- 5 A two-way frequency table is prepared keeping constraints in rows and ranks in the columns.
- 6 Rank Based Quotient (RBQ) is computed for each constraint using following formula :

$$RBQ = \frac{\sum_{i=1}^n f_i (n+1-i)}{N*n} * 100$$

Where

f_i = frequency of KI for the i^{th} rank
 N = total number of KIs
 n = total number of ranks

1. Based on RBQ constraints are ranked
2. Based on RBQ values proximate, intermediate and root causes for low productivity and low income are identified
3. Names of 80 farmers were collected from KIs and other sources
4. Steps 1 to 6 are repeated for farmers.
5. The Spearman's Rank correlation coefficient is computed to find out the correlation between KIs perception and farmers perception.
6. Constraints to farmers in general constituting all the groups were identified by selecting constraints common to all the eight groups.

2.2.2 Ranked constraints of farmers at Panchayat level (28)

1. Improper management of irrigation due to unlined canals and untimely supply of canal water. The canal water is being taken first by the head reach farmers, leaving less water for medium and tail reach farmers.
2. Lack of proper irrigation and electricity facility
3. Lack of availability of quality seeds, fertilizers and pesticides.
4. Non availability of modern agricultural implements
5. Non availability of tube well
6. Lack of capital
7. Non availability of proper grain storage facility
8. Lack of allied activities, viz. dairy, poultry etc owing to capital constraints
9. Ignorance of proper irrigation water management
10. Lack of agricultural training
11. Inadequate milk procurement agency
12. Water-logging of agricultural land
13. Social problem in the village viz. castism, factionalism, untouchability, etc.
14. Lack of agro-industry in the area.
15. No credit card to farmers
16. Risk in adoption of new technology
17. No arrangement for cleaning of *Ahar* (water bodies)
18. Problem of insect and disease in paddy crop
19. Low crop yields leading to low income and encouraging money lender to exploit farmers
20. Lack of agricultural technology extension
21. Lack of transport facility
22. Lack of veterinary doctors and training on livestock husbandry and dairying
23. Lack of proper education facility
24. Lack of soil testing facility
25. Lack of farmers organization/unity
26. Lack of market of agricultural produce
27. Fragmentation of land holding
28. Lower prices of agricultural produce



Meeting organised with Panchayat level members

2.2.3 Ranked constraints by non agricultural women Groups (11)

- 1) Lack of employment opportunity throughout the year
- 2) Lack of education and awareness
- 3) Lack of training for self employment
- 4) Lack of capital
- 5) Lack of advanced training to village artisans to pursue their traditional occupation, viz. pottery, shoe making, etc.
- 6) Lack of inadequate market facility to sell the produce.
- 7) Poor transport facility
- 8) Annual farm production being less than their annual subsistence requirement
- 9) Lack of subsidiary enterprises in the area to get employment.
- 10) Lack of credit facility
- 11) Lack of medical assistance

2.2.4 Ranked constraints of sharecroppers (11)

- 1 Lack of farm inputs viz. seed, fertilizer, pesticides, etc.
- 2 Lack of irrigation facility
- 3 Lack of technical know-how in crop cultivation
- 4 Unequal distribution of crop produce between sharecropper & land holders
- 5 Rent paid by the sharecropper for canal irrigation
- 6 Lack of organization among share- cropper
- 7 Lack of capital
- 8 Lack of durable nature of land ownership, as the land is transferred to the others in case of less production on the field.
- 9 Underemployment
- 10 Lack of basic health and education facility
- 11 Lack of confidence, and fatalism amongst sharecroppers

2.2.5 Ranked constraints of Water User Association (8)

- 1 Ignorance about irrigation water management in cultivation of various crops
- 2 Lack of credit card
- 3 Improper canal management by the canal authorities
- 4 Lack of quality seed
- 5 Lack of irrigation facility when canal is inoperative
- 6 Lack of transport facility
- 7 Lack of cottage industry
- 8 Water logging in the agricultural land



Improper diversion of water by creating obstruction against flow



Creation of obstruction in progress for improper diversion of water against flow

2.2.6 Ranked constraints of progressive farmers (16)

The constraints derived by the progressive farmers are as following.

- 1 Lack of training regarding scientific know-how of crop cultivation
- 2 Lack of proper marketing facility
- 3 Lack of quality seed
- 4 Lack of crop protection measures
- 5 Absence of soil testing laboratory
- 6 Lack of extension effort
- 7 Lack of agricultural food grain storage facility
- 8 Lack of transportation
- 9 Lack of proper support prices of agricultural commodities
- 10 Lack of basic health and education facility
- 11 Lack of organization amongst farmers.
- 12 Superfluous middle men in trading
- 13 Lack of latest scientific tools & implements
- 14 Lack of proper care of livestock by veterinary doctor
- 15 Lack of timely availability of agricultural credit
- 16 Lack of proper maintenance facility of diesel pumps sets and tractors.



Meeting organised with progressive farmers in Sahar Rampur village

2.2.7 Ranked constraints of women group based on agriculture (13)

A formal meeting women group based on agriculture held at Saharampur, the constraints derived from them are as following

- 1 Lack of Capital
- 2 Lack of training in allied activities viz dairy, poultry, bee keeping etc.
- 3 Lack of marketing facility
- 4 Lack of organization among women groups
- 5 Lack of basic facility for health and education
- 6 Lack of employment opportunity
- 7 Lack of quality farm inputs
- 8 Rural indebtedness
- 9 Less prices of agricultural produce
- 10 Lack of know-how for doing commercial agriculture
- 11 Lack of soil test laboratory
- 12 Lack of food grain storage facility
- 13 Lack of local market to sell agricultural produce.

2.2.8 Ranked constraints of small farmer (11)

- 1 Lack of timely availability of agricultural credit
- 2 Lack of quality farm inputs
- 3 Lack of local market to sell agricultural produce
- 4 Lower prices of agricultural produce
- 5 Lack of improved agricultural tools & implements
- 6 Lack of organization among small farmers
- 7 Lack of basic facility for health and education
- 8 Lack of proper maintenance and care of tube well and other available tools & implements
- 9 Ignorance of modern agricultural practices
- 10 Lack of proper marketing facility
- 11 Unemployment amongst youth



Meeting organised with small farmers

2.2.9 Ranked constraints of landless and agricultural laborers (9)

- 1 Lack of source of income i.e. lack of employment opportunity
- 2 Entire dependence on the wage earning
- 3 Indebtedness owing to paucity of work /wage
- 4 Lack of medical assistance
- 5 Lack of basic needs for health and education
- 6 Lack of organization among them
- 7 Exploitative rate of interest either in cash or kind.
- 8 Lack of social awareness
- 9 Illiteracy.



Meeting organised with landless/ labourers

2.2.10 Final compilation of constraints of farmers of all the groups (9)

A total of 106 constraints were identified from 8 stakeholders and they were ranked according to their severity. Finally, 9 common key constraints were identified which limit the improvement of stakeholders' livelihood.

- 1 Lack of capital
- 2 Lack of transportation & storage facility
- 3 Lack of plant protection measures
- 4 Lack of timely agricultural credit facility
- 5 Lack of basic need of health and education.
- 6 Lack of quality farm inputs and latest training regarding modern agricultural practices
- 7 Lack of dissemination of agricultural technology
- 8 Lack of training regarding keeping of live stocks on commercial basis
- 9 Lack of agro-industries and allied activities

2.2.11 CMS also identified a few agricultural production related issues of the project area based on the discussion with different SHGs. These are

- Need for crop choices and options for diversification particularly for small areas of non-irrigated land.
- Issues of water availability in non-irrigated land.
- Availability of credit beyond that available through rotational saving and credit.
- Issues of water logging that encompass both secondary water logging (ponding) and primary water logging (drainage).
- Availability, and quality of seed (rice, wheat and vegetable).

It is interesting to note that coincidentally the issues identified by CMS directly or indirectly related to the constraints identified by ICAR-RCER.

2.3 Interventions Based on Identified Constraints: Scientists of the project broadcasted ideas to overcome the constraints among different stakeholders and collected their responses. On the basis of responses, we formed Interest Group with basket of options

(A) Established linkage with financial institutions like commercial Banks and Cooperative Banks. After establishing linkages farmers resorted to beekeeping, Poultry and Backyard poultry production through Self Help Groups and landless women groups.



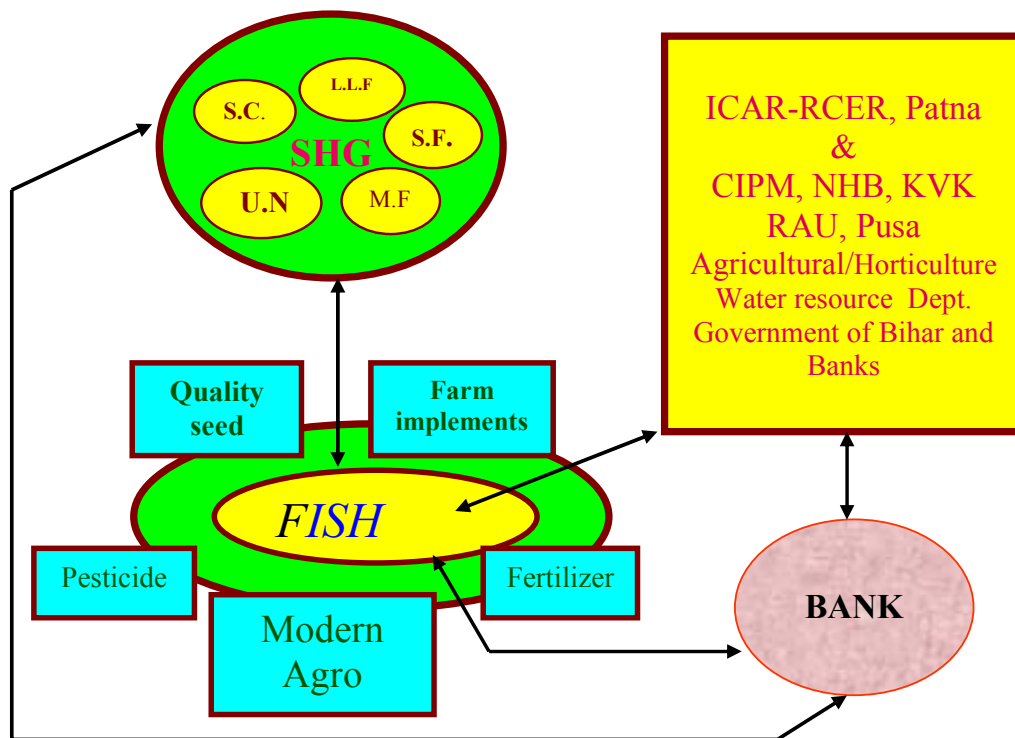
Poultry raising by SHG



Production of honeybee by rural youths

(B) Established linkages with the Farmer's Information and Service Centre for better exchange of knowledge and improve the capacity of the farmers and also for supply of inputs well in time. The centre managed by a group of the farmers in the village itself.

Farmers' Information & Service Centre (FISC)



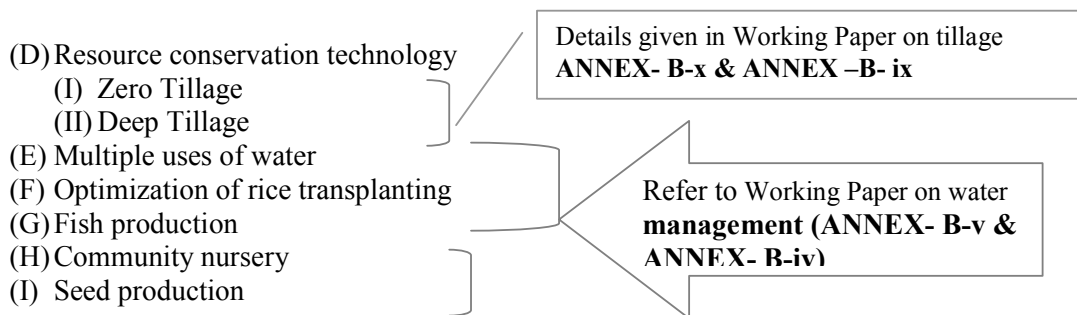
Note: S.C- Schedule caste, L.L.F- Landless farmer, S.F- Small farmers, U.N – Unemployment Youth, M.F- Marginal farmers

This centre is covering village such as Sangrampur, Gopalpur, Aspura, Danara & Mohanchack. FISC at Badauli covered Sahar Rampur Badauli, Alipur and Sona village. The Centre collect & seed from agricultural university National seed Corporation (NSC), Taraibeej Nigam (TDC), SCADA (Sone Command Agricultural Development Authority) and ICAR Regional station. Last year they sold seeds of paddy and wheat worth over Rs. 20,000. The Scientists from the Centre for Integrated Past Management (CIPM) visited time to time this centre and educated farmers about integrated plant production

- (C) CIPM (Centre for Integrated Pest Management), Patna time to time conducted field visits and transect walk of the project area for identifying the friends and enemy insect and they educated farmers through training camps and meetings for plant production management.



CIPM, Patna and ICAR Scientists demonstrating the use of Pheromone trap in Bengal gram to control the insect



These efforts led to Social mobilization to bring in harmony and reduction of conflicts, technological mobilization leading to improved farming and better yields, diversification and improved livelihood.

Details about Community nursery and seed production technology are covered in this working paper.

3. Community Nursery

Group of farmers came forward to raise community nursery by self motivation. They managed scarce farm resources at one point and saved the cost of nursery raising following a co-operative approach without any incentive. Farmers purchased foundation seed and other inputs with their own resources. Timely transplanting of rice was not being done by marginal and small farmers because of various factors including lack of tubewell, non-availability of canal water, poor economic condition, etc. Under community nursery programme marginal, small, medium and large farmers formed a group on community level.



Field preparation for community nursery

3.1 Participatory community nursery

Farmers were educated, organized and motivated to adopt community nursery programme. Stages involved in community mobilization for participatory community nursery of paddy are as follows.

1. Initial contact with farmers of different groups was made and their self assessment was observed.
2. Idea on community nursery programme was broadcasted among farmers. Problems in this context were analyzed by means of self-analysis and group diagnosis.
3. Emergence of appropriate farmers group was noticed and encouraged.
4. Awareness regarding community nursery of paddy was created among these group members. Group leaders were selected and details of community nursery were explained to them.
5. Community nursery was managed by providing them quality seed from Agricultural Research Institute (ARI), Mithapur, Patna.
6. Networking of different farmer groups with the ICAR-RCER, Patna was done.
7. Frequent monitoring was done by the Research staff of ICAR-RCER.
8. Stabilization of community nursery programme



Nursery uprooting for transplanting.

Community nursery raising minimized the cost of cultivation per hectare by 40%. Total cost of nursery raising before intervention was Rs. 46000 /ha while after intervention it was Rs. 27240 /ha resulting into a saving of Rs. 18760 because of reduced seed rate, use of consumed rainwater and less labour for uprooting of paddy seedling. Besides, community nursery utilized the rainwater effectively. Selling of paddy seedlings also generated income for SHG members.

3.2 Farmers managed community nursery programme

In order to optimize rice transplanting, farmers managed community nursery on the basis of participatory approach. Farmer groups of Aspura, Harpura and Badauli villages of RPC-5 managed inputs on their own. By helping each other they managed to organize different inputs required in the nursery raising. At Aspura farmers utilized the tubewell at the community level. All farmer group members jointly participated in the cultural operation of nursery raising. In a co-operative way they tackled the constraints of timely nursery raising with social harmony.






4. Seed Production


Awareness about seed production was created and training on seed production was organized with the help of Krishi Vigyan Kendra. SHG members were involved in seed production programme. They had produced 5.66 tones of paddy seed and sold @ Rs. 13/kg. The adoption of this technology is also spreading day by day in other distributaries.

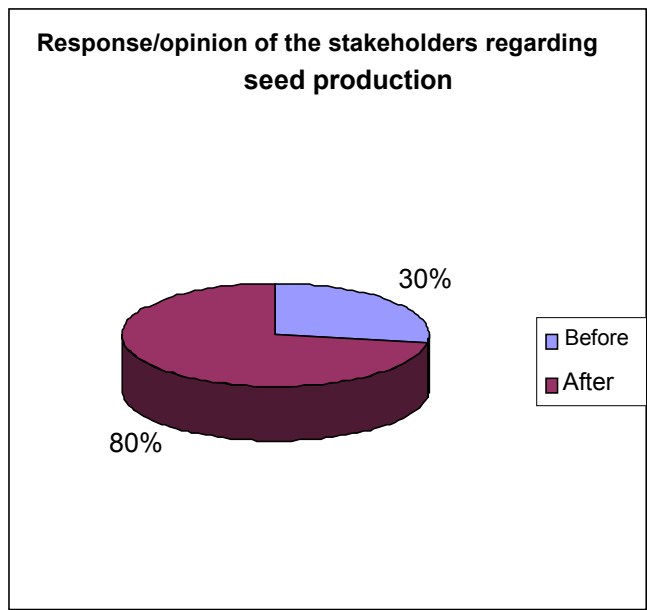
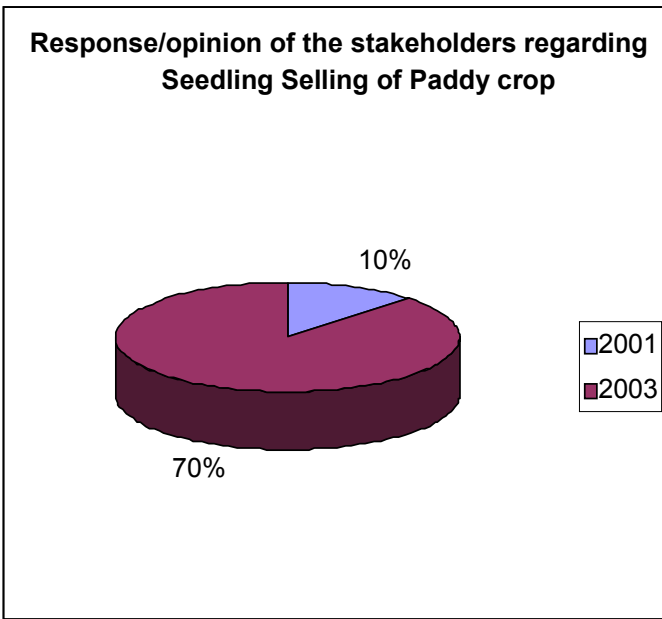


5. Opinion of the Stakeholders

Stakeholder's opinion about community nursery & seed production

Sl.No.	Name & Address	Stakeholders Opinion about Community Nursery & Seed Production
1.	 <p>Navin mishra Village:- Badauli, Nabatpur District:- Patna</p>	<ul style="list-style-type: none"> • It possible to sow crop one week earlier than normal sown • Rs 4000/ha saving obtained • Saving in irrigation (time and money)
2.	 <p>Rajandhari Singh Village: Aspura Distict: Patna.</p>	<ul style="list-style-type: none"> • Availability of quality seed in the village • Timely transplanting of rice crop and sowing of wheat crop • More yield due to timely sowing of crop
3.	 <p>Baleshwer Singh Village: Aspura District: Patna</p>	<ul style="list-style-type: none"> • Community nursery reduced cost of expenditure • Saving of time, money and irrigation water • Availability of quality seed

4.	 <p>Shiv Bihari Singh Village: Aspura District: Patna</p>	<ul style="list-style-type: none"> • Saving of time and irrigation water • More yield • Timely rice and wheat crop
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During 1999-2000 farmers sold water worth Rs. 42000/- whereas during 2003-2004, they sold water worth Rs. 104550/- which indicates that farmers are adopting optimization of rice transplanting through timely raising of nursery by using tube well water during non-availability of canal water. This also indicates, though subtle, but growing water market and also better utilization of rain water.
[Details are in Annexure IV]



7. Conclusions

The study was conducted to know the constraints of the project area and improve livelihood of stakeholders based on constraint analysis related to land and water management through basket of options. The various constraints were; lack of capital, lack of transportation and storage facility, lack of plant protection measures, lack of timely agricultural credit facility, lack of basic need of health and education, lack of quality farm inputs and latest training regarding modern agricultural practices, lack of dissemination of agricultural technology, lack of training regarding keeping of livestock on commercial basis and lack of agro-industries and allied activities.

The application of new knowledge for natural resources management was made through interest groups in the area with high potential of growth. The formation of interest groups and their capacity building was done through communication strategy to give a new direction to youth resulting into generation of employment, develop backward and forward linkages and new extension approach for rural service delivery system.

The community nursery raised by interest group reduced 40% cost and encouraged the conjunctive use of rain, ground and canal water. The adoption of different options such as resource conservation technology (zero tillage and deep tillage), multiple uses of water, optimization of rice transplanting, fish production, community nursery and seed production, etc. by the primary stakeholders in the project area generated employment, increased farm income, reduced the migration of the rural youth, empowered women, reduced conflicts and developed linkages with developmental and financial agencies, which ultimately helped in improving livelihood of different stakeholders.

8. Lessons learnt

- Meeting of farmers should be called for taking feed-back of every intervention.
- Communication product should be available at the time of broadcasting the ideas.
- Regular meetings by extension agents should be taken.
- Selection of group leaders of men and women should be done.
- Leadership should be changed from time to time.
- Exposure visits of farmers to different ICAR institutes, SAU, NGO and progressive farmers' plot should be organized.
- Farmer - to - farmer dialogue and strengthening of rural service delivery system should be done.

9. Strategy for Up-scaling

- ❖ Training and capacity building of target area farmers regarding technologies for upscaling is required.
- ❖ Audio-visual aid and communication material support required for the awareness.
- ❖ Linkage with financial and technological institutions required to be strengthened.
- ❖ Seed supplying agencies may be advocated to make available breeder /foundation seed of paddy and wheat for seed production.
- ❖ Alternate livelihood support interventions like mushroom production, beekeeping, backyard poultry, duckery, etc. for landless farmers and women should be strengthened through interest groups/SHGs.
- ❖ Mobile seed cleaner and processing units should be provided on custom hiring service basis.
- ❖ Linkage and co-ordination with developmental agencies to be encouraged for scaling up.