NATURAL RESOURCES SYSTEMS PROGRAMME

FINAL TECHNICAL REPORT

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R 8192

Project title

Enabling rural poor for better livelihoods through improved natural resource management in SAT India

Project Leader

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Organisation

Central Research Institute For Dryland Agriculture (CRIDA), Hyderabad, India

NRSP Production System

Semi-Arid Production System

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Contents

GLOSSARY

Abbreviations and Acronyms

ACIAR	: Australian Centre for International Agricultural Research
AI	: Artificial Insemination
AICRPDA	: All India Coordinated Research Project for Dryland Agriculture
AL	: Action Learning
ANGRAU	: Acharya NG Ranga Agricultural University
APRLP	: Andhra Pradesh Rural Livelihoods Project
AP	: Andhra Pradesh
BAIF	: Bharatiya Agro-Industry Foundation
BIRD-K	: BAIF Institution for Rural Development-Karnataka
BPL	: Below Poverty Line
CBOs	: Community Based Organisations
CGIAR	: Consultative Group for International Agricultural Research
CHC	: Custom Hiring Centres
CMEY	: Chief Minister's Empowerment of Youth Programme
CPR	: Common Property Resources
CRIDA	: Central Research Institute for Dryland Agriculture, Hyderabad
DFID-UK	: Department for International Development- United Kingdom
DWACRA	: Development Of Women And Children In Rural Areas (A programme by Ministry of rural development implemented at the village level)
FTR	: Final Technical Report
GKVK	: Gandhi Krishi Vigyan Kendra(Gandhi Farm Science centre)
HH	: House holds
ICRISAT	: International Crop Research Institute for Semi-Arid Tropics, Hyderabad
ID	: Irrigated Dry
IFFDC	: Indian Farm Forestry Development Cooperative
ILRI	: International Livestock Research Institute, Nairobi
INM	: Integrated Nutrient Management
IPM	: Integrated Pest Management
JFM	: Joint Forest Management (Afforestaion project)
KAWADA	: Karnataka Watershed Development Agency
LGP	: length of growing period (is defined as the period during the year when prevailing temperatures are conducive to crop growth)
NAIP	: National Agricultural Innovations Project
NARS	: National Agricultural Research System
NATP	: National Agricultural Technology Project
NGO	: Non-Government Organization
NR(M)	: Natural Resources (Management)
NRSP	: Natural Resources Systems Programme
PD	: Process documentation
PPRs	: Private Property Resources
PRA	: Participatory Rural Appraisal
PRI	: Panchayat Raj Institution (official elected village-level body)
R&D	: Research and development
RDT	: Rural Development Trust (A NGO based in Anantapur)
Rs.	: Rupees (Indian currency)

SAT	: Semi Arid Tropics
SC	: Schedule Caste
SHGs	: Self Help Groups
SS	: Salaha Samithi (village advisory committee)
ST	: Schedule Tribe
TCB	: Trench cum Bund
UAS	: University of Agricultural Sciences
UG	: User Groups
UMMB	: Urea Molasses Mineral Block
VSS	: Vana Samrakshna Samithi (Plant / Trees protection Committee)

Wealth groups

Poorest of Poor	: No income source
Poor	: Labour, < 1 ha dryland
Medium	: Own house, 1-4 ha, Govt./Private work
Rich	: Own house, vehicle, >4 ha, bore/well irrigation, vehicle, Govt./Private work

Local terms:

anganwadi	:Village level centre to take up the developmental activities operated under ICDS (Integrated child development Scheme)scheme funded by world bank
bajra	: pearl millet
dhobi	: washerman or woman
Gram sabha	: meeting of all villagers
Green Festival	: local festival where tree planting was taken up
jowar	: sorghum
Kalajattas / jathar	: local religion festivals
kharif	: monsoon season
khurpi	: small sickle
krishi mela	: farmers' fair
Mahila mandal	: women's group
niger	: minor oilseed The niger (*Guizotia abyssinica* L. f. Cass.) crop is grown for seed used for extracting oil which is about 37 to 43 per cent of the seed weight
Panchayathi Raj	: Grass root body of Local Self Government elected by the villagers
quintal	: 100 Kilo grams(Quantity of Measurement of yield)
rabi	: post-monsoon season
ragi	: finger millet

Tree Names	
Cassia	*Cassia siamea*
Casuarina	*Casuarina equisetifolia*
Custard apple	*Annona squamosa*
Dalbergia	*Dalbergia sissoo*
Emblica	*Emblica officinalis*
Eucalyptus	*Eucalyptus camaldulensis*
Gliricidia	*Gliricidia sepium*
Leucaena	*Leucaena leucocephala*
Mango	*Mangifera indica*
Neem	*Azadirachta indica*
Pongamia	*Pongamia pinnata*
Sesbania	*Sesbania sesban*
Silver oak	*Grevillea mimosaefolia*
Subabul	*Leucaena Leucocephala,* A Forage tree with multiple uses
sughandi	local name of Medicinal Plant ***Hemidesmus indicus***
Teak	*Tectona grandis*

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Date: December 2005 Director, CRIDA

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DFID-NRSP R8192

1. EXECUTIVE SUMMARY:

The purpose of project R8192 is to identify and promote strategies for sustainable management of natural resources to improve the livelihoods of landless, small and marginal farmers and herders (including women) and to do so by applying existing technical and social research knowledge and skills within an enabling environment. The project was executed by an inter-disciplinary partnership, comprising scientists from CRIDA (Central Research Institute for Dryland Agriculture), the Andhra Pradesh and Karnataka State Agricultural Universities and ICRISAT, and an NGO BIRD-K (BAIF (Bharatiya Agro Industries Foundation) Institute for Rural Development-Karnataka) staff. Project sites covered 8 villages within 3 semi-arid districts in southern India.

Project interventions were need-based and developed in consultation with villagers. If successful, they would lead to the outputs: 1) Increased capacity of rural institutions to improve access of the poor to natural resources (NR); 2) Improved conservation and sustainable use of NRs in common and private property resources (CPRs, PPRs); 3) Improved rural livelihoods through improved NR-based livelihood enterprises; 4) Promotion of improved tools that reduce drudgery and increase productivity; 5) Communication to policy makers of the improved knowledge of enabling processes for rural community motivation and service provision.

Action-research was undertaken on the process of setting up and performance of a range of interventions: functional NR management community based organizations (CBOs) *e.g.* the village advisory committee *Salaha Samithi* (SS); water harvesting structures; soil nutrient management; bio-mass planting; improved crop varieties; legume intercrops; irrigated dry crops, including pasture; agri/horticulture and agri/silvo/pasture systems; bee keeping; forest nurseries; animal health camps; mobile AI (artificial insemination) centres; mineral concentrate blocks; sheep rearing; backyard poultry; seed planters; weeders/cultivators; threshers/strippers/shellers; chaff cutters; sprayers; sprinklers; and local custom hire centres (CHC) for the implements.

These interventions enabled project purpose OVIs (objectively verifiable indicators) to be met. The livelihoods of rural poor target households in all 3 districts have benefited; new pro-poor rural service providers are functioning effectively (SS, CHC) and project partners (CRIDA, the universities and BIRD-K) report that applying the project learnings will increase the relevance and effectiveness of their rural development service work. Project outputs are contributing to policy-level and strategy planning discussions within CRIDA, ICAR (Indian Council for Agricultural Research and ILRI (International Livestock Research Institute,CGIAR Institution). Project outputs were very largely achieved, although scarcity of CPRs limited the CPR focused interventions.

Key learnings were:

1) Informal, representative and potentially sustainable CBOs (*e.g.* SS), can result in strong, non-conflictual, community ownership and pro-poor management of NR interventions.

2) “Seeing is believing” still holds true for introducing interventions.

3) If involved in planning, women and rural youth are very receptive to interventions.

4) The action-research, project-partnership, inter-disciplinary project model is effective for implementing NR research.

5) A livelihood perspective, that recognises socio-economic-cultural factors, facilitates effective development interventions.

6) The 27-month project was too short for project partners or villagers to assess the outcome/impact of the NR interventions and for village communities to fully internalize the enabling, pro-poor, NR development processes and organizations.

7) Flexibility, transparency and an enabling environment are cardinal principles for success of projects such as R8192.

2. BACKGROUND:

The project, R8192, was an outcome of the findings from the three NRSP-SA (Natural Resources Systems Programme – Semi-Arid) projects namely R 7877 - "Common pool resources in semi arid India – dynamics, management and livelihood contributions", R 7973 - "Policy implications of CPR knowledge in India, Zimbabwe and Tanzania", and R 7974 - "Human and social capital aspects of soil nutrient management, semi-arid India"

Some key issues and findings that emerged from these projects contributed to the design and scope of the present project. Among these findings are: the greater importance of degraded CPRs (common property reseources) for the livelihoods of poorer groups than wealthier groups; the importance of representation of all main stakeholders, including women, in discussions and decision making for CPR management, in order to develop effective approaches to CPR management (including capacity building among local community based organizations (CBOs) that accommodate the different users and uses of CPRs; the lack of coordination between different development and service departments; the need for investments by external agencies that yield recognizable (livelihood) returns; the need to inform and assist policy makers to understand how policies do or could impact on CPR use and productivity (R 7877, R 7973).

R7974 brought out that: the proportion of landless and small farmers owning livestock is increasing; there is a growing market for organic matter (OM), which is an opportunity for the increasing number of livestock-owning landless poor; forest / grazing lands are decreasing with a negative impact particularly on the poor and landless; soil fertility is only one component of a larger set of constraints that limit NR productivity; and that addressing NR management is better achieved through a livelihoods perspective, and through local management of NRs by effective self help groups.

These concerns were taken into consideration in the R8192 project which aims at developing strategies for an enabling process for improving the livelihoods of the rural poor through social, institutional and technological interventions that will lead to improved NR management and productivity. Project features are:

- its emphasis on and support to decision making and management of NR and development resources by the local community groups;
- its recognition that watershed development programmes generally focus on PPRs (private property resources) and hence, by default, help primarily the resource rich and its decision to focus on the poor, working for their improved access to CPRs and for improved management and productivity of CPRs as well as PPRs;
- its determination to identify an increased range of livelihood enterprises and marketable products available to the poor;
- its support to interventions which improve soil and moisture conservation and management and hence improve soil and water productivity and minimize the impact of drought.

Further, in its approach, the project has purposefully moved away from the traditionally top-down government development programmes and towards a strongly participatory approach with local, regional and state stakeholders as decision makers. It has done so, recognizing that the earlier top-down approach has frequently not yielded sustainable benefits; and recognizing that introducing a range of interventions prioritized by the community, through an action-research process which facilitates adaptation of the interventions to suit the locally available resources, is more likely to lead to sustained post-project benefit.

The project tested this new approach to government-led NR development interventions in Andhra Pradesh and Karnataka States, in a total of 8 villages in 3 districts (Anantapur and Mahabubnagar in Andhra Pradesh; Tumkur in Karnataka).

3. PROJECT PURPOSE

The purpose of the project spins around identifying strategies for improving the livelihoods of the rural poor, and specifically the landless, small, marginal farmers and herders (including women), through sustainable management of their NR. This was to be achieved by action-research on existing research knowledge and technologies and by assisting the community to establish an enabling environment, through appropriate social and institutional interventions.

If the project was successful, it was expected that rural poor households would perceive that their livelihoods had improved in terms of natural resource or social or financial capital, due to, for example, livelihood diversification, improved access to CPRs, improved CPR and PPR productivity, or improved representation in CBOs; and it was hoped that these improvements would be sustainable. It was also expected that rural service providers would learn from the project outcomes and project approach (and specifically its participatory and integrated livelihoods nature) to improve the service that they provide to the communities; and that policy institutions would assimilate and respond positively to the project outputs, leading to scaling up and replicating the lessons learnt. For these reasons, efforts were made to involve the existing rural institutions and community, government, non-government and private service providers and policy makers.

4. OUTPUTS

The expected outputs defined in the log frame have largely been achieved with good potential for upscaling.

Output 1: **Capacity of rural institutions to provide the poor better access to specified natural resources strengthened (Annexure A Section 2)**

The *Salaha Samithi* (SS), newly formed with project support in each of the 3 districts as the community's natural resource management (NRM) CBO of choice, proved itself as an institution capable of ensuring access of the poor to the project NR interventions and of lobbying the PRI (Panchayati Raj Institute) on behalf of the poor. (Annexure A Section 2.3.1). In one village in each of two districts, it successfully negotiated with the PRI for poor households to have cultivation rights to temple endowment land in Anantapur (1 household) and to a tankbed in Mahabubnagar (2 households). This demonstrates both the awareness of the SS and PRI regarding the need to improve the accesss of the poor to NR, and their capacity to implement this. In both locations, this has increased the household livelihood

security, through increased food production, with the potential to increase income through sale of crops.

By project end, no clearly defined and established mechanism was in place through which to grant poor households improved access to CPRs and their products. The absence is due to the short duration of the project, its action-research nature (both the PRI and the participating households were testing the value of this CPR access) and the relative scarcity of CPRs. With only two cases in differing locations, developing and validating an effective mechanism was not feasible.

The transparent decision making on project resource allocation by the SS reduced the conflicts that often occur during selection of benefiting participants, resulted in community ownership of the project-supported interventions and community willingness to cost share. In turn, this facilitated the accumulation of financial resources by each SS to be used for further community development. From a broader perspective, these attributes, together with the demonstrated awareness of the SS and PRI concerning the need for pro-poor interventions, and the self help groups (SHGs) developed during the project, in which the poor are represented (*e.g*. the Weaver SHGs (Annexure A, Section 2.4.1) are all positive indicators for the post-project capability of the communities to improve the access of the poor to natural development resources.

Working with a CBO that can fulfil the functions of the SS in the project communities is an important component of a strategy for sustainable and pro-poor NR management and productivity.

Output 2: **Conservation and sustainable use of NR (soil, water, vegetation and organic residues) in CPRs and PPRs improved with special emphasis on specific target groups (Annexure A Section 3)**

Village communities have recognized the need and usefulness of soil and water conservation (SWC) interventions, as evidenced by the good uptake of farm ponds , trench-cum-bunds and water diversion channels to dried up wells (Annexure A Table 3.1).

As is frequently found, many farmers were initially reluctant to participate in SWC activities that remove some of their land from cultivation. The success of the project in overcoming this reluctance is attributed to its effective use of action learning tools such as a rainfall simulator, exposure visits to other communities having SWC structures, and, later during the project, the use of participatory monitoring of ground water. These allowed the farmers to clearly understand and experience the soil and water loss on their lands, and the requirements for and benefits from the structures. Once some of the target area farmers had come forward to test the structures, other farmers saw their benefits and were interested to participate.

Throughout the project area, farmers reported increased ground water levels in (bore)wells even before the good 2005 monsoon and believed that this was due, at least partially, to the water harvesting structures. A few farmers were able to use their farm pond water for life-saving irrigation of nearby vegetables or groundnuts and by the end of the project, two farmers were adapting their ponds for fish farming. Farmers valued both the groundwater recharge and the immediate benefit of the structures on crop productivity (Annexure A, Table 3.4).

One conclusion of the project was that poor farmers are more receptive to SWC structures than had been realized, but are constrained by limited resources: a supply of

external resources such as those of the project overcame this constraint. A second observation was that a combined intervention of biomass (tree) planting on the bunds of the water harvesting TCBs is of greater interest to the farmers than either intervention separately.

Villagers also recognised the relevance of the soil fertility management interventions, as can be seen by their participation in biomass planting on field bunds, schools, roadsides and village waste areas; in vermicomposting and soil testing (Annexure A Table 3.1). However, the extent of adoption of these as ongoing, sustained practices is not yet easy to judge. For example, the benefits of biomass (tree) planting will not be fully apparent to the communities until some years in the future, while any benefits from biofertilizers or soil test based fertilizer applications may not be apparent in drought years such as those that occurred during project implementation.

Vermicomposting was readily accepted in locations where there was a, largely internal, "market" for the compost but was not found to be very appropriate for the landless, one of the project target groups. All three *Salaha Samithis* considered it more suitable for small or marginal farmers or herders than for the landless who had less access to the compostable materials. In Mahabubnagar, the SS did agree to also include the landless poor, as part of the pro-poor focus and as action-research into livelihood diversification options for the landless. In all clusters, all participants produced good vermicompost but the only "market" appeared to be use of own compost on own land. It seems likely that landowners, and particularly in Tumkur with its coconut and horticultural cash crops, will continue vermicompost production but that, in the absence of a cash market, the landless have no interest to do so.

Output 3: **Diversified farming systems/enterprises identified and promoted for improved livelihoods of various target groups through the use of appropriate participatory methods (Annexure A Section 4)**

Based on the priority constraints, opportunities and choices of the villagers, a range of diversified enterprises were introduced for assessment by the villagers. Of these, the most enthusiastic uptake has been for: sheep rearing, an intervention targeted towards the landless poor; pasture production (for landholders); locally based AI (for large-livestock owners); and irrigated dry (ID) crops (any farmer with irrigation water). As for some of the soil fertility management interventions, the long maturation period of tree-based farming systems (agri-horticulture; agroforestry/silvipasture, including planting of fruit trees *e.g*. mango, tamarind, cahews, oranges on CPRs) means that their benefits and hence adoptability are not yet known while the low rainfall during the short project life has not allowed a valid assessment of those interventions based on rainfed annual crops (improved varieties; intercrops with pigeonpea).

The poorest households in the communities identified sheep rearing as a viable opportunity for them, either as a breeding or (in Anantapur) fattening unit. The process of defining the unit flock size was a clear example of the use and relevance of participatory methods and farmer knowledge and led to the project staff revising their earlier decision of providing standard flocks of sheep. The Anantapur participants explained that they could access enough feed resources for a fattening unit of 2 while still engaging in daily labour, but not for a flock of five. This flock size would require full time use of one person as a shepherd for a return that did not match the loss of the person's daily labour wage (see Annexure A Table 4.7 for returns to sheep rearing).

Pasture, as a crop, was seen by most farmers as an unfavourable alternative to (ID) food crop production until they saw its performance in the fields of the three farmers who

came forward to test it during the first project implementation year, 2003. From then on, pasture (primarily Hybrid Napier grass Co-2 and Co-1, but also fodder sorghum) had an unexpectedly high uptake by livestock owning farmers (82 farmers in 2004, Annexure A, Table 4.4), and showed a clear financial return through increased production and sale of milk (Annexure A, Table 4.11).

As an improved livestock productivity intervention, AI (artificial insemination) is well known and accepted among rural communities. The project support to a mobile AI centre, based in one of the project villages in Mahabubnagar and managed by a rural youth, facilitated access of approximately 400 livestock to AI service with a markedly higher conception rate (70%) than the Government AI centres (25-45%) (Annexure A Table 4.10). The mobile service was in high demand: coupled with feed and fodder interventions such as pasture and concentrate blocks (Annexure A, Section 4.4.9) and, subject to an economic assessment, this rural service could be a promotable intervention and livelihood.

Animal health camps were also effective in terms of farmer uptake and livestock coverage. Their continuation is likely to require commitment of line department staff and equipment, with farmers sharing the cost of medicines (Annexure A, Section 4.4.5).

Among the crop-based technologies, those that showed some promise in the farmers' trials were: 1) improved cultivars of castor (Kranthi), finger millet (MR-1, GPV-28), groundnut (Vemana K-134) pigeon pea (LRG-30, TTB-7) and sorghum (SPV-462, CSH 14) (Annexure A Tables 4.1, 4.3, 4.5), which outyielded the local varieties by increases ranging between +30-70%; 2) irrigated dry crops (particularly chick pea and hybrid napier Annexure A Table (4.4), which increase the productivity per unit area and per unit water through judicial use of the available ground or surface water; and 3) the use of shriveled, rather than bold, groundnut seed, which compared well for yield and profitability with the use of more expensive and better quality bold seed (Annexure A Table 4.2).

Backyard forestry nurseries, established and cared for successfully by rural poor and a few enthusiastic landless women (The term rural poor includes men) were thought to be an alternative livelihood opportunity. For the project duration, when the project bought seedlings for biomass planting and tree based alternative land use systems, the nurseries were viable and enabled one of the women to invest her profit in gold. With the closing of the project, the long term viability of tree nurseries for project village livelihoods seems uncertain unless the nursery products can be linked with a market. As for vermicompost and alternative ID crops, this emphasizes the importance to the landless and poor of a market, preferably monetarized, and the need for projects to pay early attention to establishing market linkages.

Enterprises that were tested but proved unsuccessful were backyard Giriraja and Vanaraja poultry rearing by the landless poor (Annexure A, Section 4.4.12) and bee keeping ((Annexure A, Section 4.3.6). With some modification to the details and siting of these enterprises, both are thought to be potentially viable.

Output 4: Improved tools, implements and techniques for reducing drudgery and increasing outputs promoted (Annexure A Section 5)

The end-of-project assessments of the interventions implemented under Output 4 appear very positive in terms of the appropriateness, effectiveness and uptake (hire) of the majority of the implements and in terms of the method (Custom Hire Centres) tested for sustaining tool availability post-project.

The process of participatory need identification and implement selection through focused participatory interactions enabled the farmers to identify their production operation constraints, to prioritise those operations where mechanization could ease the constraints and, in discussion with project staff, to select the implements that were a priority for improving the productivity and reducing the drudgery. The inter-district differences in cropping systems, resources and constraints were reflected in the differences in the implements held by the district level CHCs. The implements included tractor and ox-drawn planters, multi or single row; manual and ox-drawn weeders; manual and power sprayers; manual and power chaff cutters and threshers/shellers and a sprinkler set (Annexure A Table 5.1): all of these reduced the labour requirements for operations that are mostly done by women (crop spraying excepted).

Most implements were in demand, with demand exceeding supply. However, the multi-row tractor or ox-drawn planters were rejected by Mahabubnagar farmers whose small field size meant they could not afford to waste the unplanted headlands needed to turn the implements, and whose small oxen struggled to pull the heavy planters. The farmers decided to replace the multi-row planters with single-row ox-drawn planters and these were well accepted. In contrast, the larger field sizes in Anantapur and greater availability of tractors meant that the 9-row planter was accepted there. Cost benefit calculations suggested that there was a net saving in operational costs from using the implements (Annexure A Table 5.1). District records showed that the main users of the implements were the resource poorer small farmers (Annexure A Table 5.2), one of the target groups.

In general, manual chaff cutters which are usually household based were preferred to the centrally located and higher capacity power chaff cutters. These are more relevant where there are large volumes of cereal stover, when ownership and operation of the powered chaff cutter could be a livelihood enterprise for rural youth.

Project flexibility enabled rejected tools to be replaced by others more suitable, and enabled tool design modifications in response to farmer feedback.

The performance of the CHCs, a building or space where the implements are stored, rented out and maintained under the supervision and control of a trained manager-operator, appears to have high potential as a sustainable and profitable rural service enterprise. The approach had been piloted in the region by CRIDA through the Agricultural Technology Development Programme and its introduction to project districts was approved by the SSs, who acted as the overall controllers. With a 3-week training to interested and literate unemployed youths that covered operation and maintenance of the implements and basic business management, and with some on-the-job backup, the project experience suggests that the CHCs generated sufficient revenue (Annexure A Table 5.2), to maintain them as enterprises and to provide the manager-operator with a livelihood.

Both the process used by the project to identify appropriate implements that increase productivity, reduce operational costs and reduce (women's) drudgery, and the CHC as a mechanism for maintaining the implements within the community are promising interventions that could be promoted for wider uptake. A longer period of assessment would be advisable before their large scale promotion. Expansion of the CHC concept would be assisted by policies that enable entrepreneurial manager-operators to obtain start-up credit.

An intervention that reduces women's agricultural drudgery also reduces employment opportunities. The project areas do face labour deficits during the peak operation times but follow-up studies of the impact of these interventions on the livelihoods of the rural landless (a project target group) should be considered.

Output 5: Understanding of enabling processes for both rural community motivation and service provision, which are inclusive of various target groups of the poor, improved and communicated to policy makers (Annexure A Section 6)

Findings from the preceding four outputs contributed to an improved understanding of the institutional, social and technical interventions and processes that allow and facilitate rural and pro-poor livelihood improvements. The variety of communication activities implemented under Output 5 enabled stakeholders (including policy makers) to assimilate project achievements and practices and their relevance and potential for wider application.

At the village and district level, the performance of the SS (outlined previously under Output 1 and also Annexure A Section 2.3), shows the effect of project communications (discussions, training, workshops, on-the-job back-up) on the understanding within the community of the enabling process for (pro-poor) rural development, and how the understanding has been converted into the practice of empowering rural development.

At the local level of project partners, the on-going planning, implementation and review communication activities and experiences in the field were consolidated during the various review and planning workshops (Annexure A, Section 6.2.1). These proved to the partners the importance of taking a broader livelihood perspective to rural development; and the feasibility and effectiveness of multi-agency collaboration and research-development partnerships for rural livelihoods development, through integrated and multi-dimensional interventions. Representatives and managers of the institutions have publicly endorsed this approach (Annexure A, Section 6.6) while the project-involved scientists express a much deeper understanding of the multiple and inter-disciplinary and local socio-economic/cultural factors that determine household decisions on technology uptake. They state that this understanding will help them in their research for adoptable NR-based interventions.

The interactive regional workshops (Annexure D; also Annexure B) attended by all key regional stakeholders (including policy maker representatives) and with presentations by the project communities and SSs, contributed to a clearer understanding of the potential of the project approach and the potential of CBOs such as the SS to manage and shape the livelihood developments for different groups within the community. This resulted in verbal commitments from the project partner NGO and government line agencies to work with and through the SS, and the NGO continues to do so. (Annexure A, Section 6.5, Section 7).

Use of visual and print media, (*e.g.* policy briefs, case studies, photo exhibitions (Annexures F, G),) at national conferences and workshops, combined with presentations on the project and its learning outcomes, have enabled wide dissemination of the project's development model and practices, and of the policy issues that arise from it. This has generated interest among the concerned authorities and individuals in the State and Central Governments and within international institutes like ILRI (International Livestock Research Institute, Nairobi, A CGIAR Institute and ACIAR (Australian Centre for International Agricultural Research. Indications from these institutes suggest that the project's local need-based action-research approach, with community and CBO based development decision making, seem very likely to be incorporated within future projects currently under planning (*e.g.* National Agricultural Innovations Project (NAIP)) and research focus in All India Coordinated Research projects (AICRPS) in ICAR for implementation not only in the target domain but elsewhere.

5. RESEARCH ACTIVITIES

The research activities were jointly developed by the project partners (research institutes and NGO) in consultation with *Salaha Samithi* members, focus groups, and the participating villagers (as co-researchers). As already mentioned, most activities were in the form of action-research on interventions to address community needs, with assessment and development of the interventions running concurrently with their incorporation within the livelihood systems of the households and community. The activities are summarized in the table below, grouped according to the community need or problem that they addressed, but cross-referenced to their log-frame output and to their more detailed description in Annexure A.

Table 1: Research activities

Issue and interventions	**No. clusters**	**No. inter-ventions**	**Output**	**Annexure A section reference**
Diagnostic and planning surveys				
Situation analysis PRA	3	8	1-4	2
Topical PRAs livestock	3		3	4
mechanisation	3		4	5
Lack of awareness and confidence of villagers to initiate NRM improvements				
Formation / capacity building of:				
Salaha Samithi	3	3	1	2.3
SHG	3		1	2.3
CHC	3	7	4	5.3
Water scarcity in agriculture				
Trench-cum-bunds	3	241	2	3.2
Farm ponds	3	88	2	3.2
Water diversion structures	2	34	2	3.2
Mini-percolation tank	1	3	2	3.2
Check dam	3	3	2	3.2
Gully plugs	1	61	2	3.2
Irrigated dry crops: chick pea, groundnut, maize, sorghum	2, 3	1	2,3	4.3
Poor crop yield/profitability	**Poor crop yield/profitability**			
Diversified farming systems (agri/horti/ silvi/pasture systems)	2	32	3	4.3
Improved crop varieties: castor, ground-nut, finger millet, pigeon pea, sorghum	3	3	?	4.3
Irrigated dry crops (above)	2,3			
Seed quality: groundnuts	1	1	8	4.3
Soil fertility management				
Soil testing and advice	3	184	2	3.3
Soil test based fertilizer use	1	8	2	3.3
Biomass plantation (multi-purpose trees)	3	19	2,3	3.3
Bio-fertilizers	1	Drought	2	3.3

Issue and interventions	No. clusters	No. inter-ventions	Output	Annexure A section reference
Integrated pest management (IPM)	3	Drought	3	
Improved implements				
Crop planters: tractor-drawn	1	1	4	5.2
Crop planters: ox-drawn	1	10	4	5.2
Weeders/inter-cultural hoe	1	24	4	5.2
Sprayers	3		4	5.2
Sprinkler	1	1	4	5.2
Thresher (groundnut, finger millet)	2	2	4	5.2
Sheller: maize, castor	1	2	4	5.2
Chaff cutter	3	12	4	5.2
Soil and water conservation (see above)				
Poor fodder resources				
Pasture: Hybrid napier, para grass, fodder sorghum, lucerne	3	163	3	4.3
Agri-silvi/ pastoral system (above)				3
Multi-purpose trees/biomass	3			2,3
Low cattle productivity				
AI centres (mobile)	1	411	3	4.4.7
Animal health camps	2	4	3	4.4.5
Feed supplement concentrates	2	228	3	4.4.9
Improving access of poor to alternative livelihoods				
Backyard poultry	3	91	3	
Bee keeping	1	21	3	
CPR access	2	3	1,2	
Forest nursery	3		3	
Sheep-rearing	3	73	3	
Vermicomposting	3	44	2	3.3
Custom Hire Centres	3	7	4	
Power sprayer rental	3	3	4	
M&E surveys/assessments				
Farm ponds			2	
Fodder/ Mineral block	3	15	3	
Mechanisation			3	
Sheep			3	
Water monitoring	1	10	2	

6 ENVIRONMENTAL ASSESSMENT

6.1 What significant environmental impacts resulted from the research activities?

The project duration was not long enough to be able to confirm any environmental impact. However, farmers consistently reported rises in ground water levels in wells, despite poor monsoons, and concluded that the rises could be due to recharge resulting from the water harvesting structures supported by the project: and farm ponds, water diversion canals and TCBs visibly increased and prolonged the availability of surface water. Future positive impacts would be expected from: the bio-mass plantations; soil conserved in the water harvesting structures; any integrated nutrient management practices that are taken up; or pasture production (and chaff cutters) reducing the grazing pressure during rabi and summer

seasons. These would contribute to better soil health, and improved vegetation. The project had no known negative impacts.

6.2 What are the potentially significant environmental impacts of widespread dissemination and application of research findings?

The positive and anticipated impacts identified above would be expected. In turn, these could lead to positive effects on drought mitigation, and to increased productivity and income of cultivators and herders, accompanied by improved availability of village domestic water supply.

The action-research planning process and findings increased awareness among users of the need and benefit of using natural resources in a sustainable way. Wider application of the project action-research process would further increase this awareness and could strengthen sustainable use practices.

Potentially significant negative impacts could arise for down-stream users of run-off water, if most of the run-off is harvested in the upstream land areas. If the strong interest that project villages expressed in sheep rearing leads to increased sheep numbers, grazing pressure will increase, with its threat of degradation of vegetative and soil resources.

6.3 Has there been evidence during the project's life of what is described in section 6.2 and how were these impacts detected and monitored?

The harvested rainwater and soil were visible in the surface collection structures, with visibly improved crop or tree plant growth downstream of the structures and better survival of tree seedlings on the TCBs. The potential economic benefits of the farm pond stored water on rural livelihoods was assessed from cost-benefit calculations on an ID groundnut crop, given life saving irrigation from a farm pond, and on fish farming in the ponds (Annexure A, Section 3 Tables 3.3, 3.4) The ground water levels were visible to the villagers and were also measured in sample wells through participatory monitoring (*ibid* Figure 3.1*)*. Farmers' production and use of vermicompost and their assessment of its positive impact on crop yield and quality were recorded (*ibid* 3.2).

6.4 What follow-up action, if any, is recommended

Intermittent participatory surveys and interactions with farmers and project communities on the performance of the interventions would establish more clearly any positive or negative environmental impacts that have arisen. This would strengthen any recommendations for scaling up. The interest created by the participatory water level monitoring among the communities suggests that this intervention should be continued, as the monitoring device could become an effective community tool for crop planning and productive, sustainable use of ground water.

7. PROJECT'S CONTRIBUTION

7.1 NRSP purpose and Production System (PS outputs)

The achievement of the project has been its success in taking existing concepts of best practice (*e.g.* participation; need-based; ownership; CBOs; capacity development; business development; development partnerships; collaboration; livelihoods) and existing NR interventions or technologies, applying and integrating these with local adaptation to suit local conditions, and, in so doing, demonstrating that this does lead to improved NR-based livelihoods for the rural poor. This combination of existing best practices into a flexible and integrated approach is the "new" (or locally affirmed) knowledge that R 8192 contributes to the NRSP purpose, and a promising strategy, contributing to the goal of the Semi-Arid (SA) Production Systems.

While caution is still necessary in asserting promotable practices derived from a short duration, NR systems project in the SAT, project outputs are expected to contribute to attainment of the NRSP and SA OVIs.

NRSP purpose

The project has identified/confirmed a range of NR-based technologies or enterprises that improve productivity and/or profitability of different components of the livelihood systems of the rural poor and that are in use by households, including the poor and poor women, in project communities. These are detailed in Annexure A and highlighted in a preceding section (4. Outputs). Among these are farm ponds, water diversion channels into dried wells, irrigated dry crops including pasture crops, improved crop varieties, mineral licks, chaff cutters, sheep rearing (landless households), mobile AI service, and a range of cultivation and post harvest implements. There are indications that some of these will spread beyond the project areas, if, as seems likely, project learnings are incorporated within new or proposed regional, national (NAIP) and international (ILRI) projects that are currently being planned. Expansion of technologies and other project learnings to regional non-target sites is expected to result from the on-going activities in the region of the project partner NGO, BIRD-K.

The service institutions/organizations established through support from the project (*Salaha Samithi*, Custom Hire Centre), and that embody project learning on local community control through CBOs for NR-based development, are continuing to function post-project in all three districts. If the interest that these community organisations have attracted from project and non-project partners is acted on (new knowledge in use), similar organisations may be set up to service the poor elsewhere in India or internationally. Among the institutions interested in the project approach and achievements and its potential for broader application are policy makers within ICAR, an NRSP constituent, the Government of Ethiopia, and within ILRI/ICRISAT.

Semi-Arid Production System

At the Production Systems level, the participatory appraisals and surveys, together with learning from the interventions action-research, significantly deepened the understanding by the project partner scientists and, consequently, by their institutions, of the livelihoods of the rural poor. This was documented during the pre-FTR workshop (Annexure B) and is presented in Annexure A, Sections 6-7. The project did contribute to knowledge of the relative importance of CPRs to the livelihoods of the poor, but in an unexpected way. It found that relatively little CPR land remained in the project districts, much having been converted to PPR during earlier land redistribution programmes (Annexure A, Section 2.2.2.2).

Action-research by the community households on rainwater harvesting interventions (farm ponds, water diversion channels, trench-cum-bunds; Output 2; Annexure A Section 3) indicated increases in water productivity, in terms of increased production or increased economic returns, resulting from the increased ground water and prolonged surface water availability. Crop, livestock and implement interventions (Outputs 3, 4; Annexure A, Sections 4,5) acted as multipliers of the increases. The most promising of these interventions have been highlighted in the preceding section "4. Outputs" and form a part of the strategy that the project has been promoting. The potential for productivity increases from the project-supported improved soil nutrient management practices (bio-mass planting, soil test based fertilizer application, vermicomposting, legume intercrops, bio-fertilizers) was less discernible due to the poor monsoons during the project life and the slow returns from bio-mass planting. Landowners reported that vermicompost increased horticultural crop production by 25%.

Supporting the adoption of acceptable water harvesting structures as part of the community NRM development strategy is one way in which the project has improved access and sustainable use of the poor to one CPR, water. The maximum benefits accrue to landowners through crop cultivation but landless households also benefit through village groundwater recharge, and surface water available to livestock (and *dhobis* (washer(wo)men)). Project support also enabled two village communities to grant 3 landless households the user cultivation rights to two CPR lands (temple endowment land in Anantapur and the dry upper portion of a tank bed in Mahabubnagar). This was achieved through the responsible SS lobbying their PRI. With only two case studies (due to the lack of suitable CPR land) being tested and as yet unknown sustainability, this is not at the level of a promotable strategy or institutionalised approach. It is an innovation, negotiated and managed by and within the community, that merits continued support and assessment.

7.2 Impact of outputs:

The information presented in preceding sections (4, 5, 7.1) gives clear indications of project impact and attainment of its logframe Purpose OVIs.

Rural poor

Output specific monitoring and evaluation assessments (incorporated within Annexure A) and the regional workshops (Annexure D) document that in each target district, some participating households from the small or marginal landowning and/or livestock owning and/or landless rural poor reported improved livelihood outcomes through combinations of, for example:

- increased livestock capital (from sheep rearing, or increased cattle herds due to pasture production);
- increased livestock productivity (from pest and disease control [livestock health camps; ethno-veterinary service], improved feed [pasture production, mineral concentrate blocks, chaff cutters]; improved breeding [mobile AI centre]);
- increased land and crop productivity (from increased yields and incomes due to crop-based interventions, water harvesting interventions, vermicomposting, improved implements);
- increased land access (for 3 landless households granted CPR user rights);

- increased financial capital (from increased enterprise income due to any of the above or, for the landless, forestry nurseries where there is a market; or from implement hiring enterprises, for unemployed youth);
- human labour productivity (from agricultural implement interventions which relieve the agricultural drudgery of particularly women labour).

Although not measured, social and political capital also increased due to participation of rural poor households in the SS. In future, livelihood outcomes may improve as a result of environmental improvements and the products deriving from the bio-mass plantations on CPRs.

Rural service providers

The continuing activities of the *Salaha Samithi* and CHC, new rural service providers (established in 2003) that are successfully managing development resources for the benefit of the community households, demonstrate the improved rural services now available to the rural poor.

At the regional level, representatives from four of the main project partners (the NGO BIRD-K, the two agricultural universities and CRIDA) have all expressed their conviction that the new knowledge and attitudes, or mind-set, that they have developed as a result of using the project approach in the target communities, enables them to be more effective in their on-going and future work to meet the NR development needs of rural households in southern India. Among their chief learnings (Annexure A, Section 6; Annexure B), several are highlighted.

Firstly, the recognition that rural communities, through CBOs, can take the lead in their own NR development; secondly, the need for project flexibility and transparency, in planning and implementing interventions and in budget allocation, in order to respond to the rural communities; thirdly, the relevance of the livelihood approach to rural development and the consequent realization that any interventions that they as professionals develop for the rural households will be judged by multiple criteria, including social criteria, in addition to the criteria of profit and production; fourthly, the feasibility and benefits gained from working in partnership with other institutions; fifthly, the importance to the rural poor and landless of markets for new enterprise products; and, sixthly, the importance of using the opportunities and constraints experienced during development activities in the field to feed back in the form of policy implications to policy makers.

Policy-process

Policy feedback has been a feature of the project (as mentioned in 4 Output 5; and 7.1 above) and the project outputs are known to be used as inputs during policy-level planning discussions within ICAR. Working in partnerships, taking a livelihoods perspective, and the need for resource flexibility are all issues that may have policy implications for parent institutions. More broadly, the success of the newly established SSs, has generated policy issues in relation to defining the boundaries of PRIs and SS-like CBOs, and the legitimacy of the SSs while the potential of CHCs as viable business enterprises has implications for policies of credit availability to rural entrepreneurs.

Implementation approach

Moving beyond the specific project purpose OVIs, some less tangible impacts can be illustrated.

The project succeeded in bringing a change in mindset in villagers, enabling increased access of the poor to CPRs in one village in Anantapur and one in Mahabubnagar. The change in mindset also led to farmers in one Mahabubnagar village giving a portion of their unused PPR land for the construction of a check dam and agreeing that the water should be available to all village households. Similar agreements were made for the water held in the farm ponds in all districts. Further, through its enabling environment, the project contributed to empowering the communities, and built their confidence in their ability to access and manage NR development resources, through the SS and CHC, in a non-conflictual way, which allowed members of any interested groups in the community to access and benefit from the resources.

This project piloted and demonstrated the potential of a new and participatory research model for implementing action-research within ICAR, based on new research and development partnerships (Government and NGOs) and inter-disciplinary action. Project team members concluded that the project achievements in the village clusters depended on three cardinal principles viz., flexibility, transparency and enabling. The flexibility built in the project is rare in government run projects but is essential for a demand based action-research (learning by doing) project in which implementation, the "doing", generates "learning", which may point to a need for further "doing" and mid-course corrections (see Annexure-I).

Through its achievements, the project affirmed the competence of developing countries in handling such projects without any collaborators or collaborating institutes from the donor countries. This too is enabling and empowering.

7.3 Uptake Promotion:

Two main areas for follow-up to promote uptake can be identified.

The first, itself an outcome for promotion, also doubles as a pre-requisite for further uptake promotion. It arises from the promotable project learning that development projects which involve natural resource interventions should be of an adequate duration (a minimum of 5 (Five) years) to enable clear and confident outcomes (and impact) for the livelihoods of the poor. This is especially relevant in semi-arid environments with marked weather differences between years, and in projects where newly formed CBOs are developing their capacity to manage NR development. Follow-up monitoring of the project supported interventions, and facilitating linkages with relevant service providers (markets, credit) is recommended to enable more confident assessment of achievements and promotable interventions. BIRD-K and CRIDA, with linkages to line departments and proposed, new, projects are the present pathways for this.

Added to this are two specific topics for further research before widespread promotion or rejection of the project findings: investigation into management of heat stress in Giriraja and Vanaraja poultry (Annexure A Section 4.4.12); and investigation of the effect and impact that use of improved implements is having on the livelihoods of the agricultural labour dependent rural (landless) poor.

The second is continuing the promotion of the new understandings and lessons learnt to date. For this, the major promotion pathways used by the project are still valid:

- the planning, implementation and review processes in the villages for uptake promotion by rural households and service providers;

- regional workshops (Annexure D), primarily for regional government development departments, NGOs, development projects and other service providers;
- national workshops and print media (Annexure F&G), for national and policy level institutions and departments.

Continuing participation of CRIDA and project partners senior management and scientists in regional and national workshops and other fora allow continued promotion of project learnings and continued impetus for assimilation of the learnings within institutional policies and within new projects. For example, formation of several livelihood consortia (partnerships) for action-research is one of the thrust areas for the newly planned National Agricultural Innovation Project (NAIP) of ICAR; while CRIDA is re-focusing its research programme towards livelihood improvements for the poor instead of productivity increase alone.

At local level, in rural villages BIRD-K is promoting uptake through its incorporation of project outcomes, including the SS concept, within the approach and support it offers to villages. The partner agricultural universities also plan to widen the application of project outputs in the region. Continuing the contact between CRIDA, BIRD-K and the universities will strengthen this.

8. PUBLICATIONS AND OTHER COMMUNICATION MATERIALS

8.1 Books and book Chapters - *"Nil"*

8.2 Journal Articles - *"Nil"*

8.3 Institutional Report Series - *"Nil"*

8.4 Symposium, Conference, Workshop papers and posters

Ramakrishna Y.S, and Subrahmanyam K.V 2004 "Ongoing Efforts and NRM related livelihood issues" in brainstorming workshop on *Rainfed agricultural technologies for different agro-eco regions of Andhra Pradesh (AP)*, held at CRIDA on August 24, 2004.

VijayShankar Babu, M., YellamandaReddyT.Y., and Subrahmanyam KV 2004. "Role of PRA in planning of watershed development activities in Atmakur cluster of Anantapur district, Andhra Pradesh" presented in National Seminar on "Impact of Assessment of Watershed development: Conceptual and methodological issues" held at TNAU, Coimbatore from November 24-26, 2004.

Display of Project communication products such as policy briefs, case studies and folders where project findings were shared with the participants of NRSP Workshop on *Realizing Potential: Livelihoods, Poverty and Governance* held during 3-4 August 2004 in New Delhi.

A photo exhibition was organized during the one-day brainstorming workshop on *Rainfed agricultural technologies for different agro-eco regions of Andhra Pradesh (AP)*, held at CRIDA on August 24, 2004.

Poster Presentation and discussion of the project learnings with Dr Christian Roth, Project Manager, Australian Center for International Agricultural Research (ACIAR),

Canberra, Australia who was accompanied by Dr Lex Cogle, Principal Scientist, Queensland Department of natural Resource Management and Mines, Cairns, Queensland during a visit to CRIDA during 25-26 August 2004.

8.5 Newsletter articles

Ramakrishna Y.S,. Subrahmanyam K.V and Nagasree K 2005**.** " Enabling Rural Poor for better livelihoods through Improved Natural Resource Management in SAT India " **AgREN Newsletter no-51 , pp 9-10,ODI Network ,U.K.**

Central Research Institute for Dryland Agriculture, 2005. Improved NRM for better livelihoods, CRIDA Newsletter January-June, 2005, Hyderabad, India**.** Central Research Institute for Dryland Agriculture

8.6 Academic Theses - *"Nil"*

8.7 Extension leaflets, brochures, policy briefs and posters

Project Flier

CRIDA. 2004. DFID-NRSP Project R8192 Improved NRM for better livelihoods Hyderabad, India: CRIDA and Karnataka, India: BIRD-K.

Policy briefs

CRIDA. 2004. "Ground Water Management: Decision Support System with People's Participation" Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (Policy brief I).

CRIDA. 2004. "Institutionalisation of Farm Mechanization: Innovative Promotional Methods for Successful Implementation in Rural Areas and Policy support" Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (Policy brief II).

CRIDA. 2004 "Efficient Water Use: Policy for Promotion of ID Crops" Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (Policy brief III).

CRIDA. 2005. "Improving Access of CPRs to poor. Lessons from Tankbed cultivation in Zamistapoor" Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (Policy brief IV).

Case studies

CRIDA. 2004: Rediscovering the Value of Green Fodder – The story of Pampanur Farmers Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (Case study 1).

CRIDA. 2004: Rainwater Management for Drought Proofing Farm Pond Technology for Sustaining Groundnut Production in Anantapur Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (Case study 1I).

Folders

CRIDA. 2003. *Biofertilizers in rainfed farming.* Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. 6 (folder).

CRIDA. 2003. *Cultivation of Maize crop.* Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. 6 (folder).

CRIDA. 2003. *Ground water recharge techniques.* Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. 6 (folder).

CRIDA. 2003. *Preparation of vermicompost.* Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. 6 (folder).

Shankar, M.A., Manjunath, A., and Preamalatha, B.R. 2003. *Preparation of vermi compost.* Bangalore, India: University of Agricultural Sciences (UAS-B); Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. 6 (folder).

Shankar, M.A., Manjunath, A., and Premalatha, B.R. 2003. *Preparation of compost.* University of Bangalore, India: University of Agricultural Sciences (UAS-B); Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. 6 (folder).

CRIDA. 2004. Biofertilizers in rainfed farming ,Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (folder in Telugu).

CRIDA. 2004. *Ground water recharging techniques.* Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (folder in Telugu)

CRIDA. 2004. Efficient water use by growing alternative ID crops instead of paddy cultivation Hyderabad, India: CRIDA and Karnataka, India: BIRD-K. (folder in Telugu).

8.8 Manuals and Guidelines - ***"Nil"***

8.9 Media Presentations(websited Papers)

Display of project publications in the Institutes website i.e www.dryland.ernet.in

8.10 Reports and data records - ***"Nil"***

8.10.1 Citation for the project FTR

Ramakrishna, Y.S. and K.V. Subrahmanyam 2005. "Enabling Rural Poor for Better Livelihoods through Improved Natural Resource Management in SAT, India" Final Technical Report DFID-NRSP Project R8192, Central Research Institute for Dryland Agriculture, Hyderabad (AP) India

8.10.2 Internal Project Technical reports - ***"Nil"***

8.10.3 Literature reviews - ***"Nil"***

8.10.4 Scoping studies - ***"Nil"***

8.10.5 Dataset software applications - ***"Nil"***

8.10.6 Project web site and/ other project related web addresses

http://www.crida.ernet.in/DFID brochures/DFID.html

9.References cited in the Report, Sections 1-7

Annexure A, B, C, D, E, F, G & I

10. Project Log frame

Log frame for " Enabling Rural Poor for better livelihoods through improved Natural Resource Management in SAT India "

Objective narrative	Objectively Verifiable indicators	Means of verification	Risks & assumptions
Goal			
Strategies for improving the livelihoods of poor people living in semi-arid areas, through improved integrated management of natural resources, under varying tenure regimes, developed and promoted	• By 2002, livelihood strategies of poor individuals, households and communities and dependence on various components of the NR base, including the relative importance of access to common pool resources, in target areas in at least 2 target countries, understood • By 2005, strategies for improving the livelihoods of poor people, by increasing the productivity of water in rainfed agriculture, through the use of appropriate rain-water harvesting and/or soil nutrient management practices, developed and promoted in target areas in at least 2 target countries. • By 2005, strategies that improve access to, and sustained use of, common pool resources by the poor under the most appropriate tenure and management regimes identified, tested and pro-moted in at least one target area in each of 2 target countries	• Reviews by NRSP management • Reports of research team and collaborating /target institutions • Appropriate dissemination products • Local, national and international statistical data • Reports of research team and collaborating /target institutions	• Target beneficiaries adopt and use strategies and/or approaches • Enabling environment exists • Budgets and programmes of target institutions are sufficient and well managed
Purpose			
To identify and promote strategies for sustainable management of NR in a participatory mode to improve livelihoods of landless, marginal and small farmers and herders (including women) through:	• By March 2005, at least 2 target groups in each target district report improved livelihood outcomes (social capital, financial capital, livestock and other natural capital, etc. • By March 2005, at least 3 rural service providers report that they are better able to provide relevant services to specific groups of the poor relative to the 2002 situation	• End of project, NRSP-PM research impact survey report • Service provider records • Feedback from target organisations	• Long gestation in flow of project benefits • Government policies remain favourable for the

Objective narrative	Objectively Verifiable indicators	Means of verification	Risks & assumptions
through: - Application of research knowledge, technology and skills in the context of the livelihood circumstances of the target groups; and - Establishing an enabling environment and appropriate social mechanisms	poor relative to the 2002 situation • By March 2005, at least 2 organisations report that the project's outputs are contributing at a policy-related level to the development of their planning strategies		the development of rural livelihoods
Outputs			
1. Capacity of rural institutions to provide the poor better access to specified natural resources strengthened.	• By 2003, rural institutions (eg. CBOs, PRIs, other UGs/SHGs, development organizations) aware of the need of the programs to provide improved access to specified Natural resources. • By 2005 the rural institutions in at least two target areas report adoption of some measures / mechanisms that enhance access of poor to specified NRs.	• Impact assessment report	• Socio-political conflicts
2. Conservation and sustainable use of NR (soil, water, vegetation and organic residues) in CPRs and PPRs improved with special emphasis on specific target groups	• By 2005 at least 25 % of the target groups adopt soil and water conservation measures • By 2005 at least 25 % of the target groups adopt INM practices to sustain soil health / fertility • By 2005 CBOs in at least 2 project sites report improved productivity of CPRs through site specific interventions	• Project annual reports • Media products for communicating soil and nutrient management options • Reports of target and collaborating institutions	• Absentee landlordism • Weather uncertainties • Socio economic factors •
3. Diversified farming systems/ enterprises identified and promoted for	• By mid-2003 , existing farming system and constraints in the targeted villages assessed and documented		

Objective narrative	Objectively Verifiable indicators	Means of verification	Risks & assumptions
improved livelihoods of various target groups through the use of appropriate participatory methods	• By 2004 , target groups (both end users and intermediate service providers) see evidence of ways by which they can benefit from improved utility of CPR and PPR products • By 2005 at least 2 target groups report adoption of at least 2 management practices for improved livestock production		
4. Improved tools, implements and techniques for reducing drudgery and increasing outputs promoted	• By 2003, suitable tools/ implements/ techniques identified for better management of Natural resources in targeted areas and for reducing drudgery • By 2005, 20% of target groups report adoption of improved implements / techniques and reduction in cost and time • By 2005, 30% of target groups including women report reduced drudgery • By 2005, ways established to sustain availability of improved tools etc by existing service providers	• Project Report	• Cost effectiveness and replicability
5. Understanding of enabling process-es for both rural community moti-vation and service provision which are inclusive of various target groups of the poor, improved and communicat-ed to policy makers.	• By mid-2004 , project stakeholders (grassroots and other rural institutions) interactively compile the lessons learnt on transacting NRM change and formulate at least three policy briefs for policy makers at different levels • By 2005, at least one key policy-related institution in the state of each target area of the project well briefed on project's findings	• Project Reports • Policy Briefs • Report on Policy- level dialogue	

Objective narrative	Milestones	Risks & assumptions
Activities		
1.1 Identification of existing institutions and their role in selected villages	PRA and action plans by August, 2003	• That all approvals come on time and project launched on schedule
1.2 Participatory Rural Appraisal for ascertaining the availability of and access to specified NR s		• Good rapport is built in targetted villages and community is mobilised effectively
1.3 Interactive workshops for sensitisation of CBOs and rural institutions	Workshops to be held by January, 2005	• Aberrant weather (rainfall deficit) in target villages may result in the treatment effects being not so visible
1.4 Mobilization and formation of user groups for improved access to CPRs and PPRs.	Need based formation of groups by September, 2003	
1.5 Capacity building of UG s and PRIs through training and field visits to successful project sites	Youth, landless and farmers trained in livelihoods by and start enterprises by 2004	
2.1 Action learning exercise using rainfall simulator: awareness building on resource losses	On-farm appraisal of technological interventions by October, 2004	
2.2 Treatment of CPRs with location specific soil and water conservation measures by blending recommended technologies and indigenous knowledge for sustainable use through user groups.	-do-	

Objective narrative	Milestones	Risks & assumptions
2.2 Promotion of *in-situ* moisture conservation and soil fertility management practices in CPRs & PPRs to target groups	-do-	
2.3 Promoting regulatory mechanism to avoid over exploitation of CPRs through participatory groups and rural institutions (CBOs etc.)	On-farm appraisal of technological interventions by October, 2004	
3.1 Characterisation of existing farming systems of targeted groups	On-farm appraisal of technological interventions by October, 2004	
3.2 Identification and promotion of alternate land use systems /enterprise diversification by appropriate participatory methods	-do-	
3.3 Identification and promotion of feed and health management practices for improved livestock production	-do-	
4.1 Identification of appropriate tools and implements for various farm operations in the targeted areas	-do-	
4.2 Capacity building of rural service provides unemployed youth for maintenance and upkeep of tools and implements	Unemployed youth trained by July, 2004 in all clusters	
5.1 Regional work-shop for compiling the lessons learnt	To be held by February, 2005	
5.2 Inter-regional workshop for validation of findings	To be held by February, 2005	

Objective narrative	Milestones	Risks & assumptions
5.3 Dissemination Workshop for policy makers	To be held by February, 2005	
5.4 Research study component: Standardization of check list and documentation tools Field level data collection and facilitation of documentation across all outputs Data analysis and report writing	Identification/Documentation of research by February, 2005	

11. Keywords

CBO
Farm diversification
INM,
Livelihoods,
Mechanisation
NRM,
Rural poor
SAT India
SWC