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Report on "Environmental Assessment Study and Development of Environmental Management Framework for Rajasthan Rural Livelihood Project"

Prepared for

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Rural Development and Panchayati Raj Department
Government of Rajasthan

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ABBREVIATIONS AND ACRONYMS

BMC:	Bulk Milk Cooler
CBO:	Community-Based Organization
CDO:	Cluster Development Organization
CIG:	Common Interest Group
CRP:	Community Resource Person
DPIP:	District Poverty Initiative Project
DPMU:	District Project Management Unit
EASS:	Environmental Appraisal Summary Sheet
EG:	Environmental Guideline
EIA:	Environmental Impact Assessment
EMF:	Environmental Management Framework
GEG:	General Environmental Guideline
GoI:	Government of India
GoR:	Government of Rajasthan
ICDS:	Integrated Child Development Society
IEC:	Information Education and Communication
M&E:	Monitoring and Evaluation
MoU:	Memorandum of Understanding
NABARD:	National Bank for Agriculture and Rural Development
NGO:	Non-governmental Organization
NRA:	Natural Resource Assessment
NREGS:	National Rural Employment Guarantee Scheme
NRM:	Natural Resource Management
PFT:	Project Facilitation Team
PIP:	Project Implementation Plan
PMGSY:	Pradhan Mantri Gramin Sadak Yojana
PO:	Producer Organization
RRLP:	Rajasthan Rural Livelihood Project
SGSY:	Swarnjayanti Gram Swarozgar Yojana
SHG:	Self-help Group
SPMU:	State Project Management Unit
SRIJAN:	Self-reliant Initiatives through Joint Action
SSO:	Sector-specific Organization
TERI:	The Energy and Resources Institute
ToR:	Term of References
WB:	World Bank
WLS:	Wild Life Sanctuary

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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

The government of Rajasthan is preparing the Rajasthan Rural Livelihood Project (RRLP) that is proposed to be implemented in 17 districts of Rajasthan with an aim to increase and sustain income of the poor, especially women. This would be achieved through social inclusion and community mobilization; building sustainable member-based organizations of the poor; creation of linkages between these organizations, and financial (banks and insurance companies) and other service providers; and adoption of new livelihood strategies for climate change adaptation. The project has the following five components:

1. **Institution building and social empowerment**
2. **Community investment support**
3. **Skill development and employment promotion**
4. **Climate change adaptation**
5. **Project implementation support**

An environmental assessment study was undertaken by the government of Rajasthan through a consultant for the proposed RRLP project. The study was conducted with the objective of understanding the environmental conditions and the related legal/regulatory framework, and to prepare an Environmental Management Framework (EMF) to minimize any adverse impact on the environment and to promote sustainable livelihoods. The adopted methodology to develop the EMF included:

1. *Secondary data collection and review:* Both quantitative and qualitative information were collected from government departments, World Bank documents, SHGs/CIGs, producer organizations, and so on. This included lessons learnt from the experience of implementation of DPIP–I.
2. *Review of legal and regulatory systems:* A comprehensive assessment of the relevant laws, regulations, and policies of the government of India and government of Rajasthan relevant to the project was carried out.
3. Stakeholder consultations and disclosure: The stakeholder consultations involved focus group discussions (FGDs) with identified stakeholders, mainly the SHG/CIG members, federation, and producer organizations. The FGDs were conducted with a total of 62 SHG/CIGs across 31 villages in seven sample districts (Dausa, Dholpur, Sawai Madhopur, Tonk, Banswara, Churu, and Udaipur). Two multi-stakeholder workshops were conducted at Jaipur and Sawai Madhopur where representatives from line departments, research and academic institutes, NGOs, federations, and SHGs were invited to provide their feedback and

suggestions on the draft EMF. It is also planned to disclose the EMF through the website of the Department of Rural Development and Panchayati Raj, Government of Rajasthan and on the Bank Infoshop.

Review of environmental status in the project area

The RRLP project will be implemented in 17 select districts of southern and eastern Rajasthan. An overview of the environmental status of the RRLP districts is summarized below.

1. *Water resources:* Except the flood prone eastern districts (Dholpur, Karauli, and Sawai Madhopur), the other project districts are classified as arid/semi-humid and arid. Of the 15 river basins in the state, the maximum amount of water is available in Chambal basin, which also covers nine project districts. Groundwater status has been categorized as critical or overexploited in 16 RRLP districts.
2. *Agriculture:* Agricultural activity in the state is primarily rain-fed, and observes two crops in a year viz. rabi (wheat, mustard, and gram) and kharif (bajra, maize and pulses). Soil fertility in the project districts is poor with low levels of nitrogen. The project districts have saline and alkaline soil ranging from 0.02% (Churu) to 12.48% (Dausa) of the total land area. The percentage of net irrigated area to net sown area also varies from 4.6% (Churu) to 85% (Baran). The main source of irrigation is tubewells, due to which a rapid depletion of ground water is observed.
3. *Pasture lands and fodder for livestock*: Rajasthan has 49 million livestock, which comprises 11% of the country's total. All the RRLP districts have livestock density exceeding the recommended carrying capacity of land available for grazing. The western districts like Churu and Bikaner have high proportion of small ruminants (goat and sheep) as compared to large ruminants (cattle/buffalo). The availability of fodder is a problem, especially in pre-monsoon months (February–June), and dependence on purchased fodder is high during this period. Degraded pasturelands and illegal encroachment of community grazing land aggravate the fodder problems, especially for small ruminants like goat and sheep.
4. *Forest cover:* The forest cover in the state is low (9.53%, as compared to 20.6% of India's forest cover) and can be characterized mainly as tropical thorn, tropical dry deciduous, and central India subtropical hill. The districts of Baran, Karauli, Udaipur, Banswara, Bundi, and Chittorgarh have significant forest cover, and support many

forest-related livelihood activities (mainly non-timber forest produce collection). The RRLP districts house one national park and 19 wildlife sanctuaries.

5. *Mineral production:* Rajasthan is one of the leading mineral producing states in the country. There are nearly 20,000 unorganized small-scale mining units in the state. Nearly 37% of the workers in these units are women. Workers in these units face health/safety issues.

The crucial environmental issues pertinent to the project districts have been identified as: a) water scarcity and depletion of groundwater; b) groundwater salinity; c) poor soil fertility; d) poor forest cover; e) inadequate pastures and fodder management; and f) air pollution from mining activity.

Regulatory and legal framework

All the relevant acts, rules, and regulations of the government of India, the government of Rajasthan and the safeguard policies of World Bank concerning livelihood activities that are likely to be supported under RRLP have been reviewed. The RRLP triggers the following safeguard policies of the World Bank:
Environmental Assessment (OP 4.01)
Forests (OP 4.36)
Natural habitats (OP 4.04)

The necessary measures to ensure compliance with these laws, regulations, and policies are included in the environmental guidelines (EGs) developed as part of the EMF.

Environment Management Framework

The Environment Management Framework (EMF) comprises a detailed strategy and procedures for environmental appraisal of activities to be promoted at SHG, CDO or producer organization level, capacity building and monitoring to enable the adoption of mitigation measures, and the promotion of environment-friendly activities as pilot subprojects. The main components of the EMF are:

a) *Environmental Management toolkit:*
Integration of environmental issues in the process of development of livelihood plans by SHGs: The procedures for integrating the environmental issues in the overall livelihood plans of SHGs have been detailed out, and a format for the village-level natural resource assessment has been developed for the same purpose.

Environmental screening of activities

Preliminary screening of the SHGs' livelihood activities, cluster development plans, and business plans of producer organizations were conducted and all the activities likely to be promoted have been categorized as having *negligible* (like sewing, retail sale), *low* (like agriculture, horticulture, dairy, NTFP, stone carving), and *medium* (irrigation well, brick making) and *high* environmental impacts. Considering the nature and scale of the activities to be supported under the RRLP, the environmental impacts from SHGs' livelihood activities are most likely to be small and localized, and manageable by implementing mitigation measures.

Environmental appraisal: The environmental appraisal will help assess the adverse environmental impacts of any proposed livelihood plan. This exercise will be undertaken as part of the livelihood plan/cluster investment plan/business plan development process by the field-level project facilitation teams (PFTs) with the participation of the SHGs/CDOs/POs.

Environmental Guidelines (EGs) have been prepared for the likely livelihood activities stating the potential impact, required mitigation measures, and the possible government schemes for convergence. A format to summarize the findings and mitigation actions identified during environmental appraisal has also been developed to maintain a record of the key observations of each appraisal.

b) *Promotion of proactive environmental subprojects:*

Based on primary studies and stakeholder consultations, the following proactive subprojects have been identified:

i) Rainwater harvesting (farm ponds, roof top rainwater harvesting and Kund bagwani)
ii) Fodder management
iii) Organic farming
iv) Community pasture land development

These proactive subprojects should be promoted: a) to demonstrate/showcase the feasibility and advantages of good environmental practices; and b) to identify the type and level of intervention required for scaling up.

It is proposed that these activities should be implemented at a pilot scale in two project facilitation teams (PFTs), with three villages in each PFT per district. The PFT would identify the suitable proactive subprojects based on the environmental appraisal summary and village-level natural resource information. The Sector-specific Organization (SSO) would facilitate the process of pilot implementation, and would help in training of PFTs, partner SHGs, and CDO.

c) *Institutional arrangement:* The institutional structure has been detailed out with overall responsibility and roles at the state, district, block, and village levels in order to ensure the successful implementation of EMF.

d) *Internal monitoring:* Periodic and regular internal monitoring by the project staff at district and state levels have been proposed through both desk review and field visits on the implementation of the EMF. A total of 10 internal monitoring exercises have been proposed for the five year duration of the project. This includes the process of assessing cumulative environmental impacts of any livelihood activity/cluster development plan or POs' business plan. The details on the sampling design and methodology have been also provided.

e) *External environmental audit:* Two independent external audits are proposed to identify ways to strengthen the EMF and identify the best practices. A Cumulative Impact Assessment (CIA) study will be undertaken as part of the mid-term external environmental audit

f) *Performance indicators:* A set of performance indicators has been developed to monitor the effectiveness of EMF implementation for all the components like process of environmental appraisal, pilot implementation of proactive environment subproject, institutional arrangement, and so on.

g) *Capacity building:* Trainings have been proposed at various institutional levels for capacity enhancement of project staff and beneficiaries to ensure efficient implementation of EMF.

h) *Budget:* An amount of Rs 510, 64,000 has been budgeted towards the effective implementation of the Environment Management Framework. The budget includes costs towards training and capacity building, internal monitoring, external audits, IEC activities, and promotion of proactive environmental subprojects.

i) *Timeline:* Detailed timeline depicting the various activities to be carried out for the successful implementation of EMF has been prepared for the five-year duration of the RRLP.

CHAPTER 1 Origin of the study

1.1 Introduction

The state of Rajasthan situated at the northwestern part of India is the largest state of the Republic of India by area. With 3,42,239 sq. kms, it comprises 10.4% of the country's total geographical area. With a population of 56.51 million, it houses 5.5% of the nation's total population. The state borders Pakistan to the west, Gujarat and Madhya Pradesh to the south, Uttar Pradesh to the northeast, and Punjab to the north. The diverse geography and social structure make the state distinct in many ways. Rajasthan is overwhelmingly rural, with more than three quarters of its population living in the rural areas. It has one of the highest proportions of scheduled castes and scheduled tribes population among the Indian states. The main geographic features are the Thar Desert and the Aravalli range which runs through the state from southwest to northeast—almost from one end to the other—for more than 850 kms. With Jaipur as the capital and the largest city, the state has 33 districts and 249 blocks with 41,353 villages.

The Rajasthan District Poverty Initiative Project (DPIP) was commenced to tackle the issue of chronic poverty levels in Rajasthan. Building on the World Bank's 1997 India Poverty Assessment Report that stressed upon the high levels of rural poverty in the state (the state's rural poverty was reported as 47.5% as against the national average of 36.7% in the country) the DPIP was initiated in the year 2000. The concentration of the poorest people being higher in the country's semi-arid tropical region, the state has high concentration of poor in the resource-poor regions. They are further burdened with issues such as lack of productive assets (mainly land), inadequate skills, and lower capability sets due to rampant illiteracy. Though various anti-poverty initiatives have been implemented by the government of India (GoI) and the state government, the results have been dismal on account of various reasons, mainly poor targetting and inefficient management. With this background, the DPIP was implemented in seven districts of Rajasthan during the period 2000–2007 with an objective of improving the status of the rural poor through increased income, improved standard of living, and improved social status.

To scale up the sustainable livelihood activities that were started under the DPIP (that came to an end in 2007), a second phase of the DPIP—termed as the Rajasthan Rural Livelihood Project (RRLP)—is to be initiated with the objective of increasing and sustaining the income of the poor, especially women, in the 17 selected districts.

As per World Bank requirements, an integrated environmental assessment study of the project is mandatory. Thus, the government of Rajasthan has appointed TERI as the consultant to undertake an environmental assessment study for the RRLP and to design a suitable EMF for the project. This report of the study contains the findings of the environmental assessment and the Environmental Management Framework (EMF).

1.2 Scope and objective of the study

The Environmental Assessment Study aims at understanding the environmental conditions, relevant policies and regulations; and preparing an EMF/Plan, including the simple sets of environmental guidelines to promote good practices, and help in minimizing the environmental impact. The scope of the study is detailed below;

1. To conduct an Environment Assessment: to study the environmental scenario for understanding the current state of environment in the 17 selected districts of Rajasthan in the context of the livelihoods of the poor, for identifying the environment livelihood linkages and the environmental issues currently impacting—or likely to impact—the sector(s) ;
2. To prepare Environmental Guidelines (EGs) for addressing the environmental issues in the investments expected to be promoted under the RRLP;
3. To develop EMF/Plan, as a system of simple procedures for ensuring environmental risk management during planning and implementation of all activities supported by the RRLP.

1.3 Methodology

1.3.1 Data collection and analysis

A significant portion of this study has been based on published secondary data from government (state and central) and other sources. (**Annexure 11** provides the list of secondary data collected and sources).

The environmental overview detailed in chapter 3 highlights the environmental issues of the state, in general; and the important aspects of environment issues associated with livelihood options, in particular. The livelihood activities envisaged under the RRLP were elicited through stakeholder consultations, and their environmental implications over the 17 project districts have been assessed on the basis of inherent characteristics of each activity, consultations with stakeholders, Focus Group Discussions (FGDs), and open interviews.

Multi-stakeholder consultations were one of the main activities in the Environmental Assessment study to gauge the environmental implications of the activities likely to be supported under the RRLP. The stakeholders include government officials, academicians, NGOs/CBOs and SHG/CIG members, among others. Experts from the World Bank were also consulted at various crucial study points. The detailed methodology for this study is as given below:

1. Secondary data collection and literature review

Both quantitative and qualitative secondary data were collected from government departments, World Bank documents, SHGs/CIGs, producer organizations, and so on. Literature review was also carried out to assess the current environmental conditions in the project area, and to ascertain the impacts of the activities with particular emphasis on each region's vulnerability to these impacts. The documents relevant to the EMF from DPIP Phase I were referred to particularly to understand the design of the EMF, its implementation and understand the lessons learnt **(detailed further in chapter 7).**

2. Review of policy and regulatory systems

Following a review of the environmental scenario, a comprehensive assessment of the policies and guidelines (of the government of India and government of Rajasthan), and the overall regulatory status of the project area were carried out. In addition, the safeguard polices of the World Bank were also referred to and reviewed.

3. Stakeholder consultations

The key stakeholders including SHGs, federations, NGOs, and line departments were consulted. The findings of the consultations have been incorporated into the final EMF report. Overall, three levels of consultation with stakeholders were held:

Field consultation: The key stakeholder consultations involved FGDs with identified stakeholders—mainly the SHG/CIG members of seven districts. In addition to these, open informal interviews were conducted with stakeholders during the course of the study. A total of 62 SHGs/CIGs were consulted across 31 villages in the seven selected districts.

Consultation meetings: Consultation meetings were held with the NGOs, research institutes, and federation to solicit their comments and suggestions on the structure of the EMF. These included interactive sessions with SRIJAN, PRADAN, Saheli Samiti, Jaipur Zilla Vikas Parishad and MNIT.

Consultation workshops: Two multi-stakeholder workshops were conducted at Jaipur and Sawai Madhopur, where representatives from inline departments, research and academic institutes, NGOs, federations, and SHGs were invited to provide their feedback and suggestions on the draft EMF report.

The draft final report was presented to the State RRLP Director and World Bank team, and their comments incorporated. Also, field testing of developed formats was conducted along with RRLP and Wold Bank team. The results have been presented in **Annexure 1** of this report.

1.3.2 Selection of sample districts

The RRLP is phased across 17 project districts, of which seven sample districts representing different agro-climatic zones were identified for the detailed study **(see Table 1.1 and Fig. 1.1 below).**

Table 1.1 Selected sample districts

Sl. No.	District	Location	Selection rationale
1.	Banswara	Humid southern plain	Represents the humid southern part of Rajasthan; has significant forest cover.
2.	Udaipur	Semi-humid southern plain	Represents the sub-humid southern plain of Rajasthan. The district has huge sources of minerals.
3.	Dholpur	Flood prone eastern plain	Floodprone eastern region of the state.
4.	Dausa	Semi-arid eastern plain	Semi-arid eastern district of Rajasthan; faces severe water scarcity throughout the year.
5.	Tonk	Semi-arid eastern plain	Situated in the semi-arid eastern part of Rajasthan. Pollution from marble industries and water scarcity are major concerns.
6.	Sawai Madhopur	Humid southern-eastern plain	This humid south-eastern district houses Ranthambore National Park; an important area of conservation of various animal species.
7.	Churu	Arid western plain	Represents the arid western region

One sample block from each of the above seven districts was identified for the study. A total of 31 villages in these seven blocks were covered. The study at each block comprised the following:

1. Identification and assessment of livelihood activities/subproject undertaken by SHGs/CIGs members. This included district-specific activities and activities that are common across all the 17 districts.
2. FGDs with 62 SHGs/CIGs from the seven blocks.

3. Interaction with four producer organizations/ federation, namely Jaipur Zila Vikas Parishad, Saheli Samiti, PRADAN and SRIJAN.

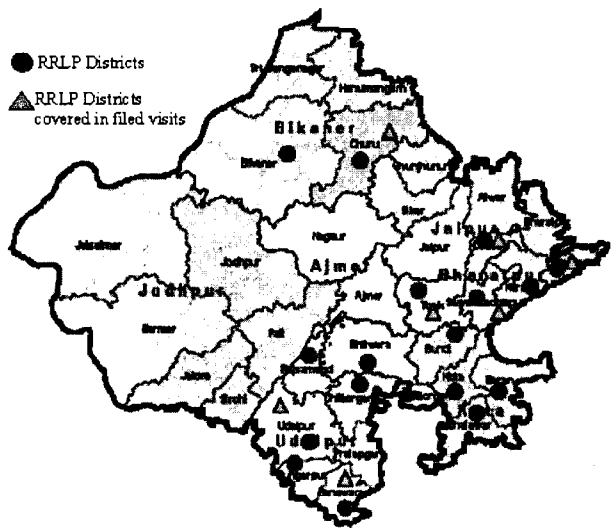


Figure 1.1 Location of RRLP districts and sample districts

1.4 Development of the EMF

The EMF lays down the set or procedures and guidelines to deal with adverse impacts of any activity at each level—right from the SHG to the level of larger operation—to prevent any threat to the environment. It comprises the set of procedures to assess any subproject[1] from environmental point of view, approve the same, and regularly monitor the adoption of preventive/mitigation measures. Thus, the EMF not only ensures adequate environmental safeguard into the appraisal process developed for scrutinizing and approving the subprojects, but it also ensures enhanced capacity amongst the officials and community organizations involved in the implementation of the RRLP.

[1] Subproject here refers to any livelihood activity to be taken up by the SHGs, and the livelihood support activities likely to be taken up by cluster development organizations (CDO), and producer organizations (PO).

Though the proposed RRLP has five components (as detailed in section 2.3 of Chapter 2), the developed EMF is directly applicable to two components of RRLP, namely, community investment support and climate change adaptation. The activities under the other 3 three components will support its implementation.

The development of the EMF was based on the following activities a) Review of EMF of the DPIP I b) Secondary research to identify environmental situation in the project districts and the likely environmental impacts from the project activities c) Review of legal and regulatory framework d) Field study and e) Stakeholder consultations. The processes involved in the same are detailed in the fig 1.2.

1.5 Consultation and disclosure process

Once the draft EMF report was ready, a presentation was made to RRLP and World Bank (WB) in Jaipur. Discussion was held with RRLP and WB to further enrich the EMF. Additionally, field testing of the developed ready-to-use formats were also conducted with RRLP and WB team at Dausa. The prepared draft EMF was revised and updated based on field experience and WB/RRLP suggestions.

Using the revised draft documents, two consultative meetings were held at Jaipur and Sawai Madhopur to elicit comments in order to further strengthen the EMF. The consultation included key stakeholders (representatives of existing producer organizations, and representatives from SPMU, among others), representatives of relevant line departments (departments of agriculture, forests, animal husbandry, and so on), and representatives from NGOs, universities, and research institutions. Also, all the relevant line departments were requested to provide detailed feedback on the draft EMF.

The process for disclosure also includes publication of the report for the public access by Department of Panchayati Raj and Rural Development, government of Rajasthan, and World Bank. This report will also be updated on TERI's website.

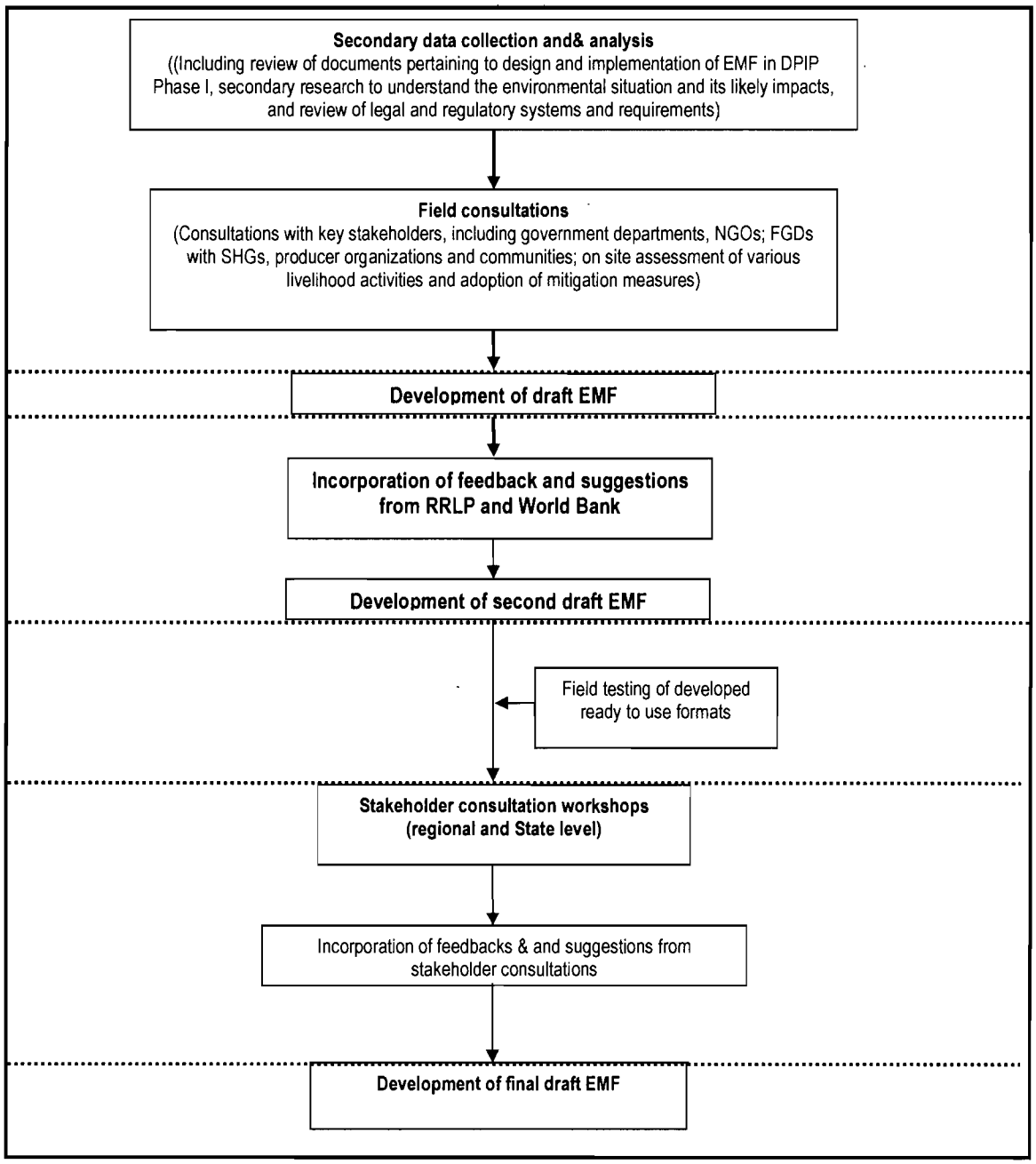


Figure 1.2 Flowchart for process of development of EMF

CHAPTER 2 Rajasthan Rural Livelihood Project (RRLP)

2.1 Introduction

2.1.1 Background

The Rajasthan DPIP was initiated to deal with the high levels of rural poverty in Rajasthan. Large proportions of the poor in the state live in resource-poor regions. Lack of productive assets, adequate livelihood skills or capacities due to illiteracy prevent them from asserting their rights to utilize available resource and services. Various anti-poverty programmes have been implemented by the state government. These have met with modest success, mainly due to poor targetting of beneficiaries and inefficient management of these programmes. With this background, the Rajasthan DPIP was conceived in response to the perceived shortcomings of anti-poverty efforts, and with a view to improve project effectiveness by developing a demand-driven approach in which the poor communities identify both actions and investment. This seven-year-long initiative provided a number of lessons for development projects, specifically on poverty alleviation measures.

To scale up the sustainable livelihood activities that were started under the DPIP (that came to an end in 2007), a second phase of the DPIP— termed as the Rajasthan Rural Livelihood project (RRLP)—is to be initiated with the objective of increasing and sustaining the income of the poor, especially women, in the 17 selected districts. The selection process of the 17 project districts, comprising a number of blocks in each, was made on the basis of the Human Development Index, contiguity for management efficiency, and a saturation approach to enhance impact. These selected 17 districts are Banswara, Baran, Bhilwara, Bikaner, Bundi, Chittorgarh, Churu, Dausa, Dholpur, Dungarpur, Jhalawar, Karauli, Kota, Rajsamand, Sawai Madhopur, Tonk, and Udaipur. Figure 2.1 below depicts the location of these districts.

2. 2 Goal and objectives

The main objective of RRLP is to increase and sustain income of the poor, especially women, in the selected 17 districts of Rajasthan. This would be achieved through social inclusion and community mobilization; building sustainable member-based organizations of the poor; creation of linkages between these organizations and financial institutions (banks and insurance organizations), and other service providers; and new livelihood strategies that are adaptable to climate change.

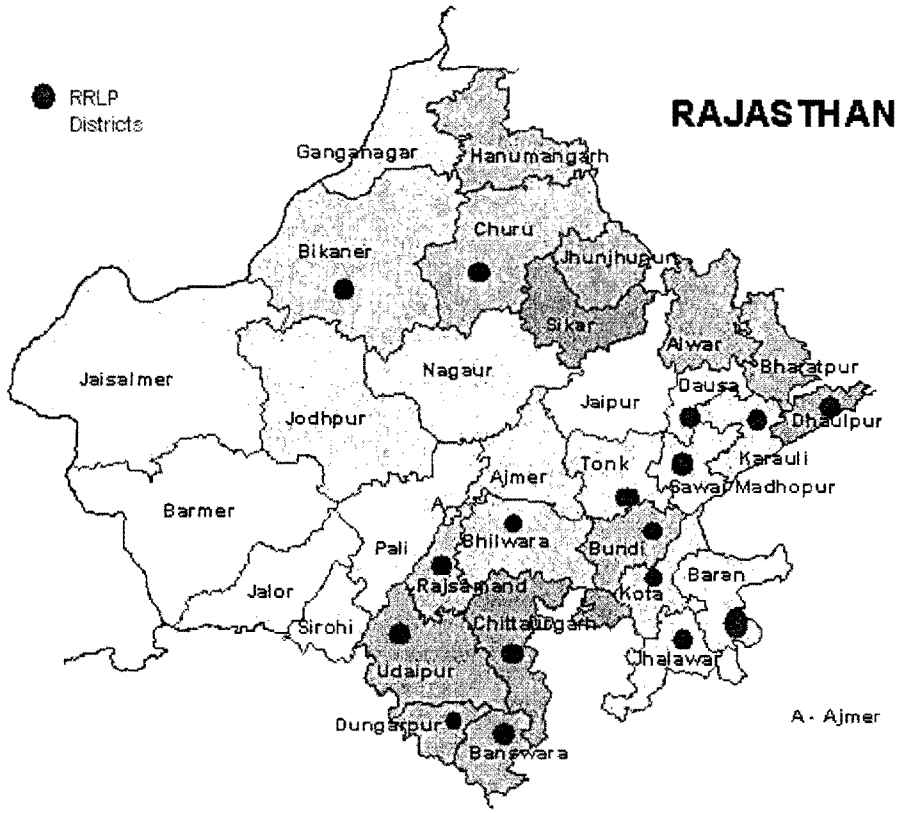


Figure 2.1 Location of RRLP districts

2.3 Key features of RRLP

The proposed RRLP project will have the following four components:

1. **Institution building and social empowerment:** The objective of this component is to help the poor mobilize themselves into SHGs, and gradually develop their own capacity to initiate and expand sustainable livelihood activities. The project would focus on facilitating the process of community mobilization and capacity building of the rural poor, and providing necessary technical expertise and financial resources. This component consists of the following subcomponents:

   a) Establishment of process facilitation teams (PFT) to support project implementation at the village level
   b) Community mobilization to assist the poor in organizing themselves into SHGs and taking up livelihood activities of their choice
   c) Capacity building through training to empower the paraworkers and community resource persons (CRPs) and enable them to provide SHGs with additional training
   d) Formation of federations to support Self-help Groups, in forming federations, producer organizations, village credit committees, and so on.

2. **Community investment support:** The objective of this component is to support asset creation by SHGs and their federations, and identify and support innovative approaches to improve livelihoods of the poor. The subcomponents involved are as follows:

   a) Livelihood investment fund: Financial support to SHGs — including seed capital funds - would be provided to SHGs for acquisition of necessary assets to initiate income generation. Federations would also be supported to acquire facilities, equipments, and other assets required to operate their business.
   b) Village investment fund: Allocation would be made to each village to support demand-driven public good activities (excluding rural roads and community centres).

c) Partnership development: Engagement with sector-support organizations would have to be facilitated to enhance viability of activities, linkage with banking sector, value chain development,
d) Innovation support fund: A fund would have to be set up to provide financing to innovative activities such as agro-processing agricultural insurance.

3. Skill development and employment promotion:

The objective of this component is to support activities that would enhance employment opportunities. It consists of the following subcomponents:

a) Skill development: To focus on identifying and providing training for livelihood activities linked with employment opportunities.
b) Employment promotion: To identify opportunities for youth employment and job placements.

4. Climate change adaptation: This component aims to offer significant opportunity to address the vulnerabilities of communities affected by climate variability and climate change in the state of Rajasthan. It will focus on:

a) Building knowledge and awareness among communities and stakeholders on the impact of climate change.
b) Undertaking community-based pilot adaptation activities to improve their resilience to climate change through farm and non-farm activities.

5. Project implementation support: This component is aimed at facilitating various implementation, coordination, learning, and quality enhancement efforts. It consists of the following three subcomponents:

a) Project management: To establish an efficient, effective, and responsive entity for successful project implementation.
b) Monitoring and evaluation: To develop and implement a system that will support project implementation.
c) Governance management and accountability: To develop and implement a framework to ensure that adequate and appropriate mechanisms are in place to monitor and support project implementation.

CHAPTER 3 Review of environmental status of the project area

3.1 Rajasthan: an overview

The state of Rajasthan is situated in the western part of India, which faces severe water scarcity, poor rainfall, and is classified as arid/semi-arid region. On the basis of climatic conditions and agricultural practices, Rajasthan has been divided into 10 agro-climatic zones ranging from arid western to flood prone eastern. As shown in table 3.1, Rajasthan is the largest state of India, comprising 10.4 % of the country's total area. Nearly 76% of the state's population resides in rural regions. The forest cover of the state contributes 4.19% to the national forest cover. As much as 62,94,000 hectare of land is irrigated in the state, which is 10.45% of the net irrigated area of India and 38% of net sown area of the state of Rajasthan. Rajasthan produces 5.49% of the nation's total food grains production and 21.31 % of its oil seeds. The state has 49 million livestock—mainly cows, buffaloes, and goats—comprising 10.13% of the country's livestock population.

Table 3.1 An overview of Rajasthan[2]

Sl No.	Indicators	Rajasthan	% of India
1	Area	3,42,000 sq. km.	10.4
2	Population	56.5 million	5.49
3	Rural population	43.2 million	5.8
4	Total forest cover	32,627 sq. km.	4.19
5	Gross cropped area	2,16,99,000 hectare	11.25
	Net sown area	1,68,36000 hectare	11.87
6	Net irrigated area	62,94,000 hectare	10.46
7	Livestock	49 million	10.13
8	Food grain production	1,14,45,000 tonnes	5.49
9	Oilseed production	59,64,000 tonnes	21.31
10	Rainfall	57.5 cm (annual average)	

3.2 Project districts

There are 33 districts in Rajasthan. The Rajasthan Rural Livelihood Project (RRLP) would be implemented in 17 eastern and southern districts of the state. Table 3.2 (below) provides details of the project districts. As shown in the table, the RRLP would cover around 5500 villages. The project area is spread into six different agro-climatic zones ranging from arid western plain (Bikaner, Churu) to flood prone eastern plain (Dholpur, Karauli).

Out of the 17 selected districts, seven were also covered in DPIP–I phase, while 10 districts are new to this project.

[2] Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp no. 1–23.

Table 3.2 Details of the project districts[3]

District	Agro-climatic zone	Total blocks	Total number of villages	Rainfall (mm)	Temperature (^{0}C)		Major crops		Type of soils	DPIP-I or not
					Max	Min	Kharif	Rabi		
Banswara	Humid southern plain	Banswara, Ghatol, Kushalgarh, Pipalkhunt, Garhi, Bagidaura, Anandpuri, Sajjangarh	1524	500–1100	39	7.2	Maize, paddy, sorghum	Wheat, gram	Reddish, well-drained calcareous, shallow on hills and deep in valleys	
Bhilwara	Semi-humid southern plain and humid southern plain	Baneda, Bhilwara, Maandal, Gangapur, Gulabpura, Jahajpur, Mandalgarh, Shahpura, Kotadi, Suwana, Hurda	1745	500–900	38.6	8.1	Maize, pulses, sorghum	Wheat, gram	Lithosolsat on foothills and alluvial in plain	
Bikaner	Arid western plain	Bikaner (N), Lunkaransar, Dungargarh, Nokha, Khajuwala	875	100–350	48.0	3.0	Pearl millet, mothbean, clusterbean	Wheat, mustard, gram	Desert soil, sand dunes, aeolin, loamy coarse, and calcareous	
Chittorgarh	Semi-humid southern plain and humid southern plain	Kapasan, Chittorgarh, Gangrar, Nimbaheda, Badi Sadri, Pratapgarh, Begu, Rawatbhata, Aranod, Chhoti Sadri, Bhaisarodgar, Bhupalsagar, Rashami, Bhadesar, `Dungala	2395	500–900	38.6	8.1	Maize, pulses, sorghum	Wheat, gram	Lithosolsat on foothills and alluvial in plain, reddish, well-drained calcareous, shallow on hills and deep in valleys	

[3] Vital Agriculture Statistics, Rajasthan, 2005-2006. Directorate of Agriculture, Directorate of Agriculture, Government of Rajasthan, Jaipur, p. no. 2.

District	Agro-climatic zone	Total blocks	Total number of villages	Rainfall (mm)	Temperature (^{0}C)		Major crops		Type of soils	DPIP-I or not
					Max	Min	Kharif	Rabi		
Churu	Arid western plain	Churu, Sardarshahar, Rajgarh, Ratangarh, Sujangarh	902	100–350	48.0	3.0	Pearl millet, mothbean, clusterbean	Wheat, mustard, gram	Desert soil, sand dunes, aeolin, loamy coarse, and calcareous	DPIP I
Dausa	Semi-arid eastern plain	Lalsot, Dausa, Bandikui, Sikrai, Mahuwa	1065	500–700	40.6	8.3	Pearl millet, clusterbean, sorghum	Wheat, Barley, Mustard, gram	Seirozens, alluvial, lithosols, brown soil	DPIP I
Dholpur	Floodprone eastern plain[4]	Dholpur, Rajakhera, Badi, Basedi	802	500–700	40	8.2	Pearl millet, clusterbean, groundnut	Wheat, barley, mustard, gram	Alluvial, prone to water logging, calcareous	DPIP I
Dungarpur	Humid southern plain	Dungarpur, Seemalwada, Saagwada, Bichhiwara, Aasapur	858	500–1100	39	7.2	Maize, paddy, sorghum	Wheat, gram	Reddish, well-drained calcareous, shallow on hills and deep in valleys	
Jhalawar	Humid southern-eastern plain	Aklera, Khanpur, Jhalawar, Pidawa, Bhavani, Mandi	1600	650–1100	42.6	10.6	Sorghum, soyabean	Wheat, mustard	Black in origin, alluvial, clay loam, groundwater salinity	DPIP I
Karauli	Floodprone eastern plain	Karauli, Sapotara, Mandrail, Hindon, Toda Bheem	798	500–700	40	8.2	Pearl millet, clusterbean, groundnut	Wheat, barley, mustard, gram	Alluvial, prone to water logging, calcareous	
Kota	Humid southern-eastern plain	Deegod, Kota, Itawa, Ramganj Mandi, Sangod, Ladpura	947	650–1100	42.6	10.6	Sorghum, soyabean	Wheat, mustard	Black in origin, alluvial, clay loam,	

4 However, no flood has been observed in these districts for the past two decades, but authors have taken the classification as per the Directorate of Agriculture.

District	Agro-climatic zone	Total blocks	Total number of villages	Rainfall (mm)	Temperature (^{0}C)		Major crops		Type of soils	DPIP-I or not
					Max	Min	Kharif	Rabi		
									groundwater salinity	
Rajsamand	Semi-humid southern plain	Bheem, Kumbhalgarh, Rajsamand, Nathdwara, Khamnor	1010	500–900	38.6	8.1	Maize, pulses, sorghum	Wheat, gram	Lithosolsat on foothills and alluvial in plain	DPIP I
Sawai Madhopur	Humid southern-eastern plain	Gangapur, Bamanbas, Banli, Sawai Madhopur, Khandar	800	500–700	40	8.2	Pearl millet, clusterbean, groundnut	Wheat, barley, mustard, gram	Alluvial, prone to water logging, calcareous	
Tonk	Semi-arid eastern plain	Tonk, Piplu, Niwai, Dewli, Uniyara, Maalpura, TodaRai Singh	1093	500–700	40.6	8.3	Pearl millet, clusterbean, sorghum	Wheat, barley, mustard, gram	Seirozens, alluvial, lithosols, brown soil	DPIP I
Udaipur	Semi-humid southern plain	Kotra, Jhadol, Salumbar, Dhariawad, Maawli, Vallabh Nagar, Girwa, Kherwara, Sarada, Bhindar, Gogunda, Badgaon	2633	500–900	38.6	8.1	Maize, pulses, sorghum	Wheat, gram	Lithosolsat on foothills and alluvial in plain, reddish, well-drained calcareous, shallow on hills and deep in valleys	

3.3 Climatic scenario of the project districts

Rajasthan is classified as arid/semi-arid zone with 57.5 cm annual rainfall as compared to national average of 120 cm. Table 3.3 depicts the average annual rainfall for three years i.e. 2005, 2006, and 2007 in the project districts. It is clear from Figure 3.1 that the districts observed significant deviation from normal rainfall during the period 2005–2007. The number of rainy days ranged from 16 to 43 in the months of June–September, i.e. south–west monsoon.

Table 3.3 Rainfall scenario in the project districts[5]

Sl No.	District	Normal rainfall (cm)	Average annual rainfall (cm)			Average number of rainy days in a year
			2005	2006	2007	
1	Banswara	95.03	79.15	180.5	127.85	38.9
2	Baran	87.38	83.91	82.98	65.66	42.1
3	Bhilwara	68.32	55.53	83.54	53.36	31.6
4	Bikaner	24.3	29.68	19.27	28.33	16.6
5	Bundi	77.34	58.87	61.92	60.89	35.4
6	Chittorgarh	84.15	80.85	125.02	74.22	33.6
7	Churu	35.47	35.5	29.72	40.52	19.4
8	Dausa	56.1	65.96	43.88	55.45	33.3
9	Dholpur	74.45	64.09	40.19	47.63	38.8
10	Dungarpur	72.89	53.11	140.45	76.85	34.7
11	Jhalawar	84.43	67.53	135.89	70.21	43.9
12	Karauli	67.07	61.1	42.58	55.57	
13	Kota	73.24	61.19	95.72	70.53	40.9
14	Rajsamand	56.78	77.6	79.4	61.59	21
15	Sawai Madhopur	87.34	81.41	50.04	57.84	35.5
16	Tonk	66.83	56.38	43.06	55.28	33
17	Udaipur	64.5	82.55	127.24	64.26	28.3

(Sources: Statistical Abstract, Rajasthan, 2009)

[5] Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 5–6.

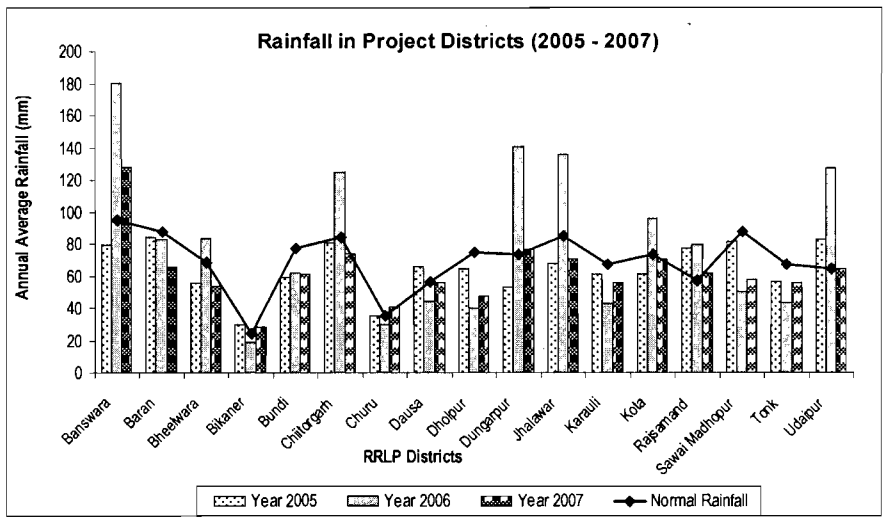


Figure 3.1 Normal and actual rainfall in the project districts for the years 2005–2007

Based on the observed normal rainfall, Bikaner and Churu are arid districts, while most other districts are classified as semi-humid.

In the project area, temperatures reach a maximum of ~46° C during summer, and in winter it falls between 0–5° C. Annual mean of relative humidity ranges between 45 and 60 % (Table 3.4).

Table 3.4 Annual temperature and humidity in the project districts[6]

Sl No.	District	Temperature (^{0} C)			Annual mean relative humidity (%)
		Maximum	Minimum	Annual average	
1	Banswara	45	9.5	27.5	58
2	Bikaner	46.9	0.6	28.1	43
3	Chittorgarh	45.8	5	26.1	61
4	Churu	47.1	-3.4	27.1	47
5	Dholpur	46.6	4	27.1	60
6	Jhalawar	46.6	7	27.3	59
7	Kota	47.2	8.6	27.9	45
8	Sawai Madhopur	46.3	9.3	26.3	54
9	Udaipur	44.6	5.3	25.7	51

(Sources: Statistical Abstract, Rajasthan, 2009)

[6] Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 4.

3.4 Water resources in the project districts

As shown in Table 3.5, the state of Rajasthan can be divided into 15 water basins. Out of these, the project districts are distributed in eight basins, mainly in Banas, Banganga, Chambal and Mahi.

Table 3.5 Basinwise distribution of project districts[7]

S No	Basin	District	Catchment area (sq. km.)	Tributaries
1	Banas	Dausa, Tonk, Bundi, Sawai Madhopur, Udaipur, Rajsamand, Bhilwara, Chittorgarh	45,833	Berach, Menali, Kothari, Khari, Dai, Dheel, Sohadara, Morel, Kalisil
2	Banganga	Dausa, Sawai Madhopur	8878	
3	Chambal	Chittorgarh, Bhilwara, Bundi, Sawai Madhopur, Tonk, Kota, Jhalawar, Baran, Dholpur	31,460	Alnia, Kalisindh, Parwan, Mej, Chakan, Parwati, Kunu
4	Gambhir	Dausa, Dholpur, Sawai Madhopur	4174	Sesa, Kher, Parbati
5	Luni	Rajsamand, Udaipur	37,363	Sukri, Mithri, Bandi, Khari, Jawai, Guhiya, Sagi, Jojari river
6	Mahi	Banswara, Chittorgarh, Dungarpur, Udaipur	16,985	Eru, Nori, Chap, Som, Jhakam, Moran, Anas, Gomti, Bhadar
7	Parbati	Dholpur, Sawai Madhopur	2388	Sairni, Bamni, Mendka
8	Ruparail	No RRLP district	3855	
9	Sabarmati	Dungarpur, Udaipur	4164	
10	Shekhawati	No RRLP district		
11	Sabi	No RRLP district		
12	West Banas	No RRLP district		
13	Sukli	No RRLP district		
14	Other Nala	No RRLP district		
15	Outside basin	Churu, Bikaner		

Source: Water Resource Planning for the State of Rajasthan, Main Report, Vol-2, 1998

[7] Report on Water Resources. Department of State Water Resources Planning, Jaipur

Since Rajasthan is an arid/semi-arid state, availability of water for various domestic and industrial purposes is limited.

3.4.1 Surface water resources

Table 3.6 shows the availability of surface water in all 15 basins. It is clear from the table that out of 25,931 million cubic metres (MCM) mean available water, only 60% i.e. 16,053.5 MCM is economically utilizable at 50% dependability. It is also clear from the table that no water is available for planning in the Parwati and Luni basins. Out of the 15 basins, maximum water for planning is available in the Chambal basin, which covers nine RRLP districts.

Table 3.6 Basinwise availability of surface water (MCM)

Basin	Mean availability [8]	Water availability at 50% dependability [9]	Unutilizable water at 50% dependability[10]	Economically utilizable water at 50% dependability [11]	Net water availability for planning at 50% dependability [12]
Shekhawati	221	160.7	56	104.7	14.98
Ruparail	210	201.5	22	179.5	77.86
Banganga	569	516.2	67	449.2	36.94
Gambhir	805	550.3	197	353.3	121.74
Parwati	226	182.1	44	138.1	-19.18
Sabi	268	223.3	55	168.3	60.65
Banas	4837	4039.3	0	4039.3	399.54
Chambal	11541	10053	4850	5203	2296.23
Mahi	3755	3149	0	3149	422.41
Sabarmati	960	799.9	0	799.9	599.81
Luni	1224	820.8	369	451.8	-684.86
West Banas	551	406.1	0	406.1	327.1
Sukli	190	111.7	0	111.7	67.41
Other Nala	91	31.6	0	31.6	31.6
Outside	483	468	0	468	459
TOTAL	**25,931**	**21,713.5**	**5660**	**16,053.5**	**4211.23**

Source: State Water Resources Planning Department

Table 3.7 lists the major lakes located in the project area. These lakes act as reservoirs and supply a substantial amount of water for various activities. Availability of water in these lakes largely depends on rainfall.

8 Total resource in the basin/region
9 Water available in the basin/region in a situation wherein 50% of the resource is being used/depleted
10 Water which is not potable in the basin/region wherein 50% of the total resource available is being used
11 Water available for the economic development and well being of the society when 50% of available resource is being used
12 Wherein 50% is used of the total available resource

Table 3.7 Major lakes in the project districts

Bhilwara	Ummed Sagar, Mandlis
Bikaner	Gajner, Anupsagar, Sursagar, Kolayatji
Bundi	Nawlakha
Churu	Chapartal
Dholpur	Talaabshahi
Dungarpur	Gauravsagar
Udaipur	Jaisamand, Rajsamand, Udaisagar, Fateh Sagar, Swaroop Sagar, Pichola

3.4.2 Groundwater resources

In the last few years, the water table in Rajasthan has retreated due to excessive and unplanned withdrawal of water. As shown in Table 3.8, almost in each project district the groundwater table is categorized as over exploited, except at Mahi, West Banas and Sabarmati where it is in critical/semi-critical stage. It is also indicated that there is no water available for any further irrigation projects.

Table 3.8 Basinwise availability of groundwater

Basin	Potential zone (sq. km.)	Net annual availability	Gross for irrigation	Gross for domestic/ industrial use	Gross for all use	Allocation for dom./indl use as on 2025	Net GW available for irrigation	Stage of GW development, %	Category	RRLP districts
Shekhawati	9495.20	503.8462	972.1902	111.5795	1083.7697	243.4481	-468.1225	215.1	Over exploited	None
Ruparail	942.30	347.3004	418.6182	55.2695	473.8877	72.2153	-143.533	136.45	Over exploited	None
Banganga	6593.35	605.8966	813.9884	90.2855	904.2739	143.8773	-351.969	149.25	Over exploited	Dausa, Sawai Madhopur
Gambhir	3615.57	349.2411	409.1767	46.7283	455.9051	73.2904	-133.2261	130.54	Over exploited	Dausa, Dholpur, Sawai Madhopur
Parwati	4879.94	153.5688	186.1281	18.0913	204.2194	28.6049	-79.2555	132.98	Over exploited	Dholpur, Sawai Madhopur
Sabi	400.48	426.1719	644.216	43.9114	688.1274	64.2581	-282.3022	161.47	Over exploited	None
Banas	41089.68	2290.853	2814.7422	389.1081	3203.8503	794.9698	-1318.859	139.85	Over exploited	Dausa, Tonk, Bundi, Sawai Madhopur, Udaipur, Rajsamand, Bhilwara, Chittorgarh
Chambal	27751.94	1921.567	1966.2914	135.399	2101.6905	280.2566	-324.9812	109.37	Over exploited	Chittorgarh, Bhilwara, Bundi, Sawai Madhopur, Tonk, Kota, Jhalawar,

Basin	Potential zone (sq. km.)	Net annual availability	Gross for irrigation	Gross for domestic/ industrial use	Gross for all use	Allocation for dom./indl use as on 2025	Net GW available for irrigation	Stage of GW development, %	Category	RRLP districts
										Baran, Dholpur
Mahi	12062.20	528.3994	439.3851	36 8787	476.2732	109.7902	-20.777	90.14	Critical	Banswara, Chittorgarh, Dungarpur, Udaipur
Sabarmati	1056.57	80.4701	65.7375	4.8663	70.6038	20.8108	-3.7772	87.74	Semi critical	Dungarpur, Udaipur
Luni	24547.64	1039.594	1567.0464	119.0169	1686.0633	234.9463	-762.3988	162.18	Over exploited	Rajsamand, Udaipur
West Banas	1186.74	75.5004	64.8149	3.4235	68.2385	6.7468	3.9385	90.38	Critical	None
Sukli	867.20	47.8323	53.0038	0.9764	53.9801	2.0709	-3.9517	112.85	Over exploited	None
Other Nala	1749.51	100.4201	249.778	8.8426	258.6206	15.7973	-165.1552	257.54	Over exploited	None
Outside	80329.77	2063.497	2317.3663	463.1662	2780.5325	688.9201	-942.7896	134.75	Over exploited	Churu, Bikaner

Source: State Water Resources Planning Department, Jaipur

Table 3.9 provides the list of project blocks in critical/semi-critical or over exploited category[13]. It is apparent from the table that most of the blocks fall under overexploited and critical category of groundwater. This will have implications on promoting tubewell for irrigation under RRLP.

Table 3.9 Categorywise groundwater status in the RRLP districts[14]

Sl No.	District	Semi-critical	Critical	Over exploited
1	Banswara	Anandpuri Baigdora Ghatol Kushalgarh Sajjangarh Talwara	Garhi	
2	Baran	Chhipa Barod	Anta	Atru Baran
3	Bhilwara		Kotri Sahada Shahpura	Asind Banera Hurda Jahazpur Mandal Mandalgarh Raipur Suwana
4	Bikaner		Dungargarh	Bikaner Nokha
5	Bundi		Talera K Patan	Hindoli Nianwa
6	Chittorgarh	Bhainsrorgarh		Arnod Bari Sadri Begun

[13] Over exploited: Groundwater development stage is more than 100%; Critical: Groundwater development stage is between 90% and 100%; Semi- critical: Groundwater development stage is between 70% and 90%

[14] Dynamic Ground Water Resources of India, 2006, Central Ground Water Board, Government of India, pp. 105–107.

Sl No.	District	Semi-critical	Critical	Over exploited
				Bhadesar
				Bhoopalsagar
				Chhoti Sadri
				Chittorgarh
				Dungla
				Gangrar
				Kapasan
				Nimbahera
				Pratapgarh
				Rashmi
7	Churu		Sujangarh	Raigarh
8	Dausa			Bandikui
				Dausa
				Lalsot
				Mahua
				Sikrai
9	Dholpur		Baseri	Dholpur
				Rajakhera
10	Dungarpur	Bichhiwara	Sagwara	
		Durgapur	Simalwara	
11	Jhalawar		Bakani	Manoharathana
			Dag	Pirawa
			Jhairapatan	
			Khanpur	
12	Karauli	Nadauti	Sapotra	Hindaun
				Karauli
				Todabhim
13	Kota		Sultanpur	Itawa
				Khairabad
				Ladpura
				Sangod
14	Rajsamand		Railmagra	Amet
			Rajasamand	Bhim
				Deogarh
				Khamnor
				Kumbhalgarh
15	Sawai Madhopur		Bamanwas	Gangapur
			Bonli	Sawai Madhopur
			Khandar	
16	Tonk		Deoli	Uniara
			Malpura	
			Newai	
			Todarai Singh	
			Tonk	
17	Udaipur		Kherwara	Badgaon
			Kotra	Bhinder
			Sarada	Dhariyawad
				Girwa
				Gogunda
				Jhadol
				Mavli
				Salumber

Implications for EMF: Since Rajasthan is classified as arid/semi-arid region,

1. The EMF needs to support rainwater harvesting, groundwater recharge, tank formation, and farm ponds to support livelihood activities like agriculture and animal husbandry.
2. Also the approval of tubewells in a particular village needs to be assessed for their cumulative impact on water resources. Digging of tubewell/well for irrigation purpose must not be promoted in the blocks where groundwater is in overexploited zone. In areas where ground water is in semi-critical/critical stage, farm ponds and rainwater harvesting should be promoted, and any tubewell/borewell should be sanctioned only when it is absolutely necessary.
3. Kund Bagwani is a proactive environmental project which should be promoted at a larger scale.
4. In addition, water conservation practices such as efficient irrigation means should be encouraged.

(Source: Dynamic Ground Water Resources of India, 2006, CGWB)

3.5 Land use

In Rajasthan, the pattern of land use has changed remarkably from 1956–57 to 2005–06. As shown in Figure 3.2, the area under forest, which was 14, 38,000 hectares (4.21%) in 1956–57 has increased to 26, 75,000 hectares (7.81%) by 2005–06. Land under non-agricultural uses, and barren and uncultivable land has decreased from 60, 02,000 hectares to 42, 62,000 hectares, with an increase in net sown area from 36.36% to 49.13%. Moreover, culturable waste land has also decreased from 21.44% to 13.40%. As shown in the figure below, area under permanent pastures and other grazing lands has not changed much (13,80,000 hectares in 1956–57 to 17,08,000 hectares in 2005–2006).

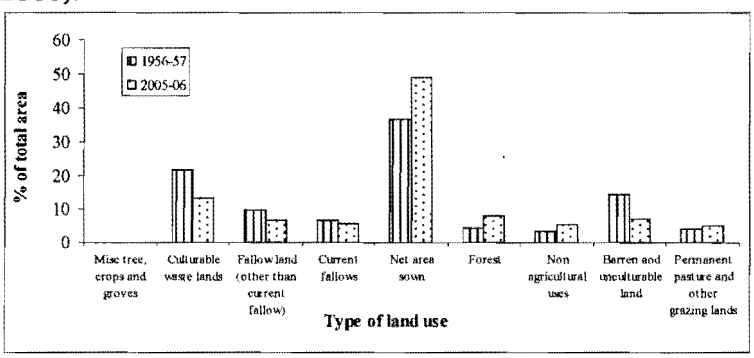


Figure 3.2 Land use pattern in 1956–1957 and 2005–2006[15]

Implication for EMF: As 49% of subprojects sanctioned in DPIP–I phase was related to animal husbandry and the same proportion is expected in RRLP as well, this will have implication on RRLP implementation as the pressure on pasture land and forest land may increase for fodder resources. The RRLP needs to promote development of community pasture land/grazing land and supplementary feed to small ruminants.

[15] 50 Years Agricultural Statistics of Rajasthan (1956–57 to 2005– 2006), 2008. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur. pp. 3.

3.6 Forest cover

Total forest cover in Rajasthan is 9.53%[16], which is low when compared to the national average of 20.6%. As per the State Forest Report 2005, the forest cover is 15,850 sq. km. i.e. 4.63% and tree cover outside forest area is 8379 sq. km. (2.45%). An area of 14 sq.km. is covered in very dense forest, 4456 sq. km. in moderately dense forest, while open forest covers an area of 11,380 sq. km. Rajasthan is characterized by three kinds of forest cover:
Tropical thorn
Tropical dry deciduous and
Central India subtropical hill

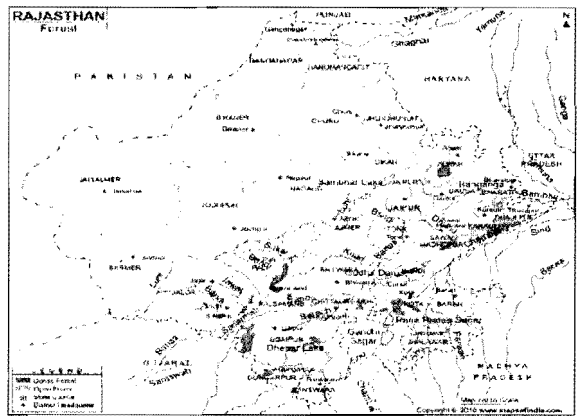


Figure 3.3 Map showing forest cover in Rajasthan

As shown in **Fig 3.3**, the forest cover is mostly confined in eastern and southern parts of the state. Nearly 2/3rd area of the state falls is occupied by the Thar Desert—one of the most densely populated deserts of the world. Table 3.10 shows the classwise forest cover in the project area. Out of the 17 project districts, five districts (Bikaner, Bhilwara, Churu, Dausa, and Tonk) have forest covers less than the state average. Of these, Churu has a forest cover of only 0.4% (Fig. 3.4). Banswara, Udaipur, Karauli, Baran, and Chittorgarh have significant forest cover and support forest-related livelihood activities. The most common bamboo species found in these forests is *Dendrocalamus strictus*. Fodder grass species include *Dichanthium annulatum, Aristida depressa, Heteropogon contortus, Schima nervosum*, and *Themeda quadrivalvis*. Important tree species known for their edible fruits or flowers near habitation areas in Udaipur and Banswara regions include

[16] Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur

mango, tamarind, aonla, bahera, mahua, Zizyphus species and *Phoenix sylvestris*. Other commonly collected NTFPs are tendu leaves (*Diospyrus melanoxylon*) used in beedi, cigarettes, puwar seed (*Cassia tora*), and honey and gum, among others.

Table 3.10 Forest cover in the project districts[17]

(Source: Statistical Abstract, Rajasthan, 2009)

Sl No.	District	Total area (sq. km)	Total forest cover area (sq. km.)	Reserved forest	Protected forest	Unclassified forest	% of total area
1	Bikaner	27244	1248.73		234.29	1014.44	4.6
2	Banswara	5037	1236.67		1236.67		**24.6**
3	Baran	6992	2231.71		2226.74	4.97	**31.9**
4	Bhilwara	10455	794.18	437.8	289.62	66.76	7.6
5	Bundi	5776	1524.15	803.45	706.65	14.05	**26.4**
6	Chittorgarh	10856	2766.53	1585.11	1180.96	0.47	**25.5**
7	Churu	16830	71.22	7.2	10.84	53.18	0.4
8	Dausa	2332	182.03	139.37	43.09	0.57	8.2
9	Dholpur	3053	638.95	597.78	7.92	32.75	21.1
10	Dungarpur	3770	694.08	251.29	433.25	10.44	18.4
11	Jhalawar	6219	1338.76	407.53	929.57	1.66	21.5
12	Karauli	5524	1935.21	170.71	1700.98	63.52	**35.0**
13	Kota	5217	1316.33	891.76	402.61	21.96	**25.2**
14	Rajsamand	3860	396.58	277.44	119.14		10.3
15	Sawai Madhopur	4498	858.98	719	113.66	26.32	19.1
16	Tonk	7194	331.94	101.42	226.93	3.59	4.6
17	Udaipur	13419	4587.17	2961	1621.43	4.74	**34.2**

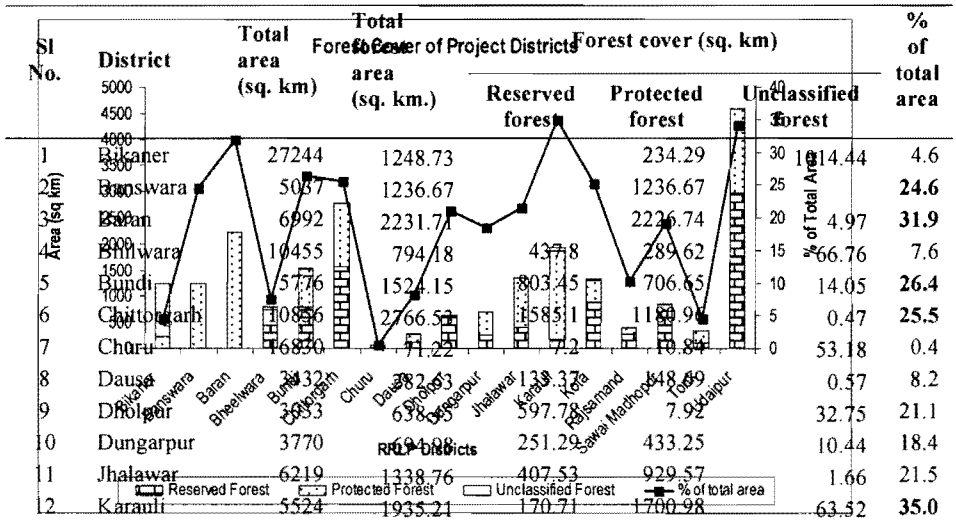


Figure 3.4 Districtwise forests cover in the project area

Rajasthan plays a prominent role in wildlife protection. The project area has one national park and 19 wildlife sanctuaries. As depicted in Table 3.11, Sawai Madhopur houses Ranthambore National Park, which is one of the major Tiger Reserves of the country. Figure 3.5 depicts the locations of national park and wildlife sanctuaries in Rajasthan. It can be seen from Fig. 3.3 that most of the forest cover of Rajasthan is confined to eastern and southern regions. Majority of the wildlife sanctuaries and national parks are also located in this forest-rich region of the state. The wild animal species found in the state include tiger, panther, chital, sambhar, chinkara, blue bull, jackal, jungle cat, wild boar, sloth boar, chital, and wolf, among others.

Table 3.11 List of national parks and sanctuaries in the project area[18]

[17] Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 203.

Sl No.	Park/Sanctuaries	Districts	Area (sq. km.)
National Park			
1	Ranthambore National Park	Sawai Madhopur	392.5
Sanctuaries			
1	Bassi WL Sanctuary	Chittorgarh	138.69
2	Bhensrodgarh WL Sanctuary	Chittorgarh	229.14
3	Darrah Game Sanctuary	Kota, Jhalawar	274.41
4	Fulwari ki Nal WL Sanctuary	Udaipur	492.68
5	Jaisamand WL Sanctuary	Udaipur	52.34
6	Jawahar Sagar WL Sanctuary	Kota	153.41
7	Keladevi WL Sanctuary	Karauli, Sawai Madhopur	676.40
8	Kesarbagh WL Sanctuary	Dholpur	14.76
9	Kumbalgarh WL Sanctuary	Udaipur, Rajsamand, Pali	608.57
10	National Chambal WL Sanctuary	Kota, Sawai Madhopur, Bundi, Dholpur, Karauli,	280
11	Ramgarh Vishdhari WL Sanctuary	Bundi	252.79
12	Ramsagar WL Sanctuary	Dholpur	34.40
13	Sajjangarh WL Sanctuary	Udaipur	5.19
14	Sawai Mansingh WL Sanctuary	Sawai Madhopur	127.76
15	Shergarh WL Sanctuary	Kota	98.7
16	Sitamata WL Sanctuary	Chittorgarh, Udaipur	422.94
17	Tal Chappar WL Sanctuary	Churu	7.19
18	Todagarh Rawali WL Sanctuary	Ajmer, Pali, Rajsamand	463.03
19	Van Vihar WL Sanctuary	Dholpur	25.60

(Source: Administrative Prativedan for 2008–2009, State Forest Department)

[18] Administrative Prativedan, 2008–2009. Department of Forests, Government of Rajasthan, Jaipur, pp. 88.

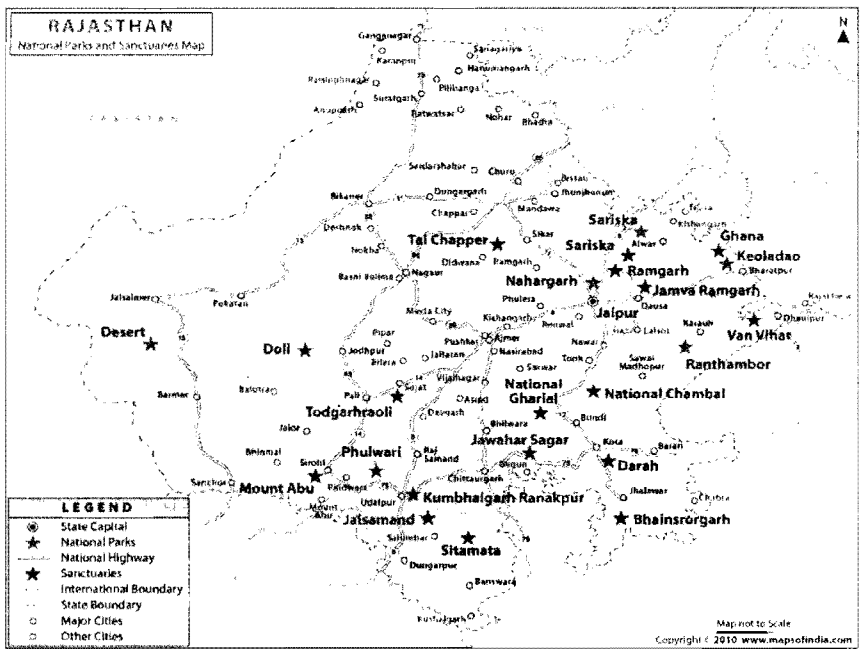


Figure 3.5 Map showing locations of national parks and sanctuaries in Rajasthan

Implications for EMF: As revealed from the information above, a number of the project districts have little forest cover. Hence,

1. The EMF needs to ensure that forest cover of the project area should not be degraded. The EMF is required to assess all forest-related subprojects for their impacts on forests.
2. As the project area also houses many wildlife sanctuaries and one national park, any livelihood activity should not disturb the protected area and conserved wild life.
3. Further sustainable practices to NTFP collection needs to be promoted.
4. All forest-related livelihood activities would be required to take requisite permission from the Forest Department and the gram panchayat.
5. The EMF also needs to include measures to safeguard the natural habitats and promote sustainable resource use. Plantation of fuel wood, fodder, NTFP species on degraded lands needs to be promoted to further enrich forest cover as well meet the requirement for sustainable livelihood activities.
6. As the forest cover also impacts animal husbandry related activities, community pasture land development should be promoted in RRLP districts. This will help in minimizing the pressure on forests.

3.7 Agriculture

Agriculture and animal husbandry are the two most common rural livelihood activities in Rajasthan. Agriculture contributes about 27% of the state's domestic product. Soil fertility and available means of irrigation are the critical parameters, which determine the sustainability of agricultural production. The following sections detail the salient features and constraints to agriculture in the project districts.

3.7.1 Soil fertility and fertilizer consumption

As demonstrated in Table 3.12, soil in the project districts is low in nitrogen (N), which is the main element that supports crops. The percentage of phosphorus (P) is medium. The area also has saline and alkaline soil ranging from 0.02% (Churu) to 12.48% (Dausa) of the total soil in the project area **(Fig. 3.6).**

Table 3.12 Fertility status and problematic soils in the project districts[19]

District	Fertility status			Problematic soil (Ha)		% of problematic soil to total area
	N	P	K	Saline soil	Alkaline soil	
Banswara	L*	M*	H*	2131	2130	0.84
Bhilwara	L	M	H	27950	13470	3.95
Bikaner	VL*	M	M	14134	14033	0.93
Bundi	M	M	H	6009	9229	2.62
Chittorgarh	L	M	H	17720	11397	2.81
Churu	VL	M	M		250	0.02
Dausa	L	M	M	4056	38437	12.48
Dholpur	L	M	M	5373	20121	8.47
Dungarpur	L	M	M	2819	3928	1.75
Jhalawar	M	M	H	7409	540	1.26
Karauli	L	M	M	7002	7200	2.81
Kota	M	M	H	2947	6223	1.76
Rajsamand	L	M	M	9922	6251	3.55
Sawai Madhopur	L	M	M	12530	20027	6.54
Tonk	L	M	H	18014	16593	4.82
Udaipur	L	M	H	5636	9493	1.03

* L = Low, VL = Very Low, M = Medium, H = High

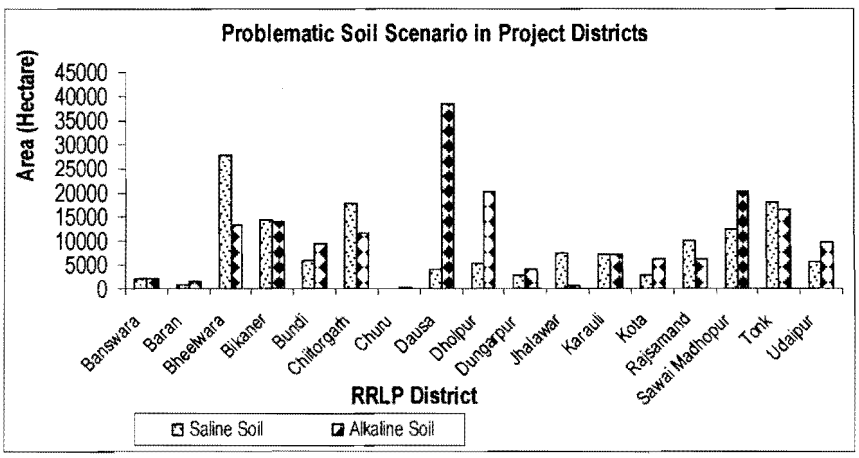


Figure 3.6 Districtwise problematic soils in the project area

[19] Vital Agriculture Statistics, Rajasthan, 2005–2006. Directorate of Agriculture, Government of Rajasthan, Jaipur, pp. 3

Table 3.13 Fertilizer consumption in the project districts[20]

S No	District	Fertilizers (tonnes)			Total NPK, (kg per ha)
		N	P	K	
1	Banswara	22628	2551	227	75.86
2	Baran	34877	6901	630	86.77
3	Bhilwara	16124	5515	654	37.01
4	Bikaner	17528	1172	156	13.79
5	Bundi	24856	4613	744	81.06
6	Chittorgarh	33711	11103	1447	68.77
7	Churu	2240	817	31	2.16
8	Dausa	130520	8761	711	399.9
9	Dholpur	11468	3611	260	71.95
10	Dungarpur	6174	809	75	38.46
11	Jhalawar	17830	5002	345	45.84
12	Karauli	12270	3836	133	51.65
13	Kota	36015	13653	2000	127.69
14	Rajsamand	1989	456	51	23.24
15	Sawai Madhopur	21305	8922	801	88.61
16	Tonk	19882	4838	538	41.51
17	Udaipur	15860	3090	317	57.4

(Sources: Vital Agriculture Statistics 2005–2006)

The project districts consume lesser fertilizers than the national average (90 kg per hectare), except Dausa and Kota which use 399.9 and 127.69 kg/hectare of fertilizers respectively (Table 3.13 and Fig 3.7). The overall total fertilizer consumption may be related to the percentage of problematic area in each district (Table 3.12 and Fig. 3.7). Extremely low application of fertilizers in Churu may be due to the lack of agricultural practices and less percentage of problematic area (0.02%). This observation is also supported by the fact revealed during consultations with stakeholders that the area has observed almost no rain in past decade. The appropriate N: P: K ratio in Indian soil is considered to be 4:2:1 (IFFCO). However, even in project districts with medium N status (Baran, Bundi, Jhalawar, Kota), the ratio is extremely skewed towards N.

[20] Vital Agriculture Statistics, Rajasthan, 2005–2006. Directorate of Agriculture, Government of Rajasthan, Jaipur, pp. 25–26

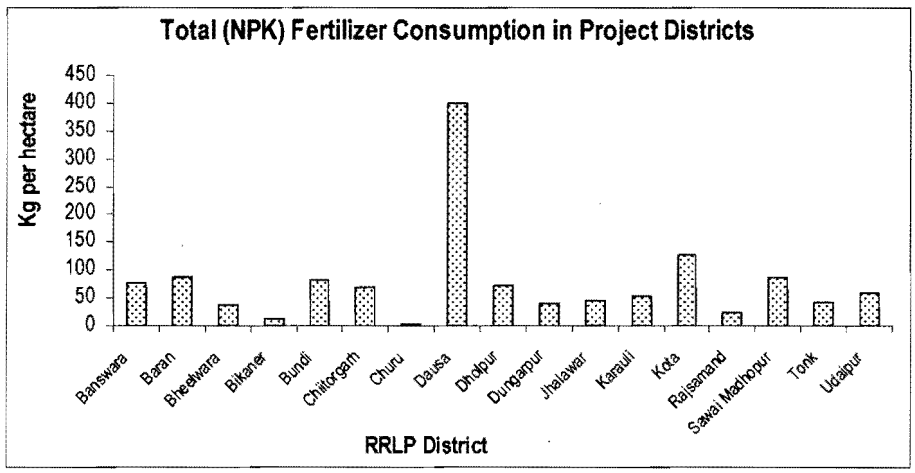


Figure 3.7 Total fertilizer consumption in the project districts

3.7.2 Pesticide use

Besides fertilizers, a total of 2547 MT[21] of pesticides were used in the state during 1999–2000 (Central Insecticide Board and Registration Committee). Consumption of pesticides is highest in cotton, followed by groundnut, jowar, maize, mustard, and gram. Consumption is casual in crops like wheat and barley, which are more resistant to pest attack. Kota and Baran record the highest pesticide consumption, while the use is lowest in the desert area (Churu, Bikaner) simply because these districts also observe lesser agricultural practices (Rajasthan Development Report). Table 3.14 lists the commonly used pesticides and their classification as per WHO guidelines.

[21] http://cibrc.nic.in/pestconsum.asp

Table 3.14 Commonly used pesticides and their classification as per WHO

Pesticide	WHO classification
Endosulfan	Moderately hazardous – Class II
Lindane	Extremely hazardous (Class Ia)
Methyl parathion	Extremely hazardous (Class Ia)
Alachlor	Slightly hazardous (Class III)
Carbaryl	Moderately hazardous (Class II)
Carbendazim	Unlikely to cause acute hazard
Carbofuran	Highly hazardous (Class Ib)
Chlorimuron ethyl	Unlikely to cause acute hazard
Dimethoate	Moderately hazardous (Class II)
Dinocap	Slightly hazardous (Class III)
Fluchloralin	Slightly hazardous (Class III)
Malathion	Slightly hazardous (Class III)
Metolachlor	Slightly hazardous (Class III)
Pendimethalin	Slightly hazardous (Class III)
Phosphamidon	Extremely hazardous (Class Ia)
Monocrotophos 36 WSC	Highly hazardous (Class Ib)
Mancozeb	Unlikely to cause acute hazards
Chlorpyrifos Methyl 20EC	Unlikely to cause acute hazards
Imidacloprid	Moderately hazardous (Class II)
Quinalphos 25 EC	Moderately hazardous (Class II)

Annexure 13 provides the list of pesticides, which are unlikely to present acute hazard during normal use. Those pesticides should be preferred.

3.7.3 Irrigation scenario

Table 3.15 provides details on sourcewise irrigated area in the project districts. The major source of irrigation common to all is tubewell/well, followed by canals. Tanks contribute significantly to irrigation in Bhilwara, Udaipur, and Chittorgarh districts. Overall, Rajasthan observes 70.52 % irrigation by well and tubewell, 26.22% by canals, 2.01% by tanks, and 1.25% by other sources.

Figure 3.8 compares the net irrigated area with net sown area. It is clear from the Table that only 13.4%, 4.6%, and 6.3% of total sown area is irrigated in Bikaner, Churu, and Rajsamand respectively, as these districts face severe water scarcity. Less than 50% of the total sown area is under irrigation in Banswara, Bhilwara, Chittorgarh, Dungarpur, and Udaipur. However, in all other project districts, more than 70–80% of net sown area is irrigated.

Table 3.16 lists the various ongoing irrigation schemes in the project districts. Additional irrigation potential created during 2002–2007 was 0.206 million hectares.

Table 3.15 Source wise irrigated area in the project districts (in hectares)[22]

District	Canal		Tank		Well / Tubewell		Other		Total gross irrigated area	Total net irrigated area	Net sown area	% irrigated area w.r.t net sown area
	Total	Net	Total	Net	Total	Net	Total	Net				
Banswara	48739	47009	6045	5909	16648	15541	16983	16180	88415	84639	239229	35.4
Bhilwara	24545	24528	28531	27893	133165	117271	2224	2084	188465	171776	417819	41.1
Bikaner	140548	95216	8	8	95871	59973	0	0	236427	155197	1160186	13.4
Bundi	136578	114852	398	363	105047	94938	3545	3488	245568	213641	253973	84.1
Chittorgarh	8077	7943	9064	8348	209990	193768	4062	3646	231193	213705	437415	48.9
Churu	0	0	0	0	65102	53828	0	0	65102	53828	1163648	4.6
Dausa	1376	1376	0	0	168918	162515	0	0	170294	163891	214199	76.5
Dholpur	9166	8838	146	146	97452	94630	0	0	106764	103614	148104	70.0
Dungarpur	7910	7447	4557	4049	25146	23495	2804	2504	40417	37495	127753	29.3
Jhalawar	14286	12302	1025	1013	199263	191056	569	564	215143	204935	322859	63.5
Karauli	7550	7539	1205	1205	105366	102699	955	954	115076	112397	191319	58.7
Kota	129597	121818	152	138	111446	104410	6104	6081	247299	232447	270751	85.9
Rajsamand	0	0	119	119	7414	6226	0	0	7533	6345	100263	6.3
Sawai Madhopur	18918	18918	2886	2883	169459	166980	2959	2959	194222	191740	260892	73.5
Tonk	76028	75737	7123	7113	144926	140251	9144	9088	237221	232189	413557	56.1
Udaipur	11378	11305	9474	9238	52003	49320	1530	1523	74385	71386	268918	26.5

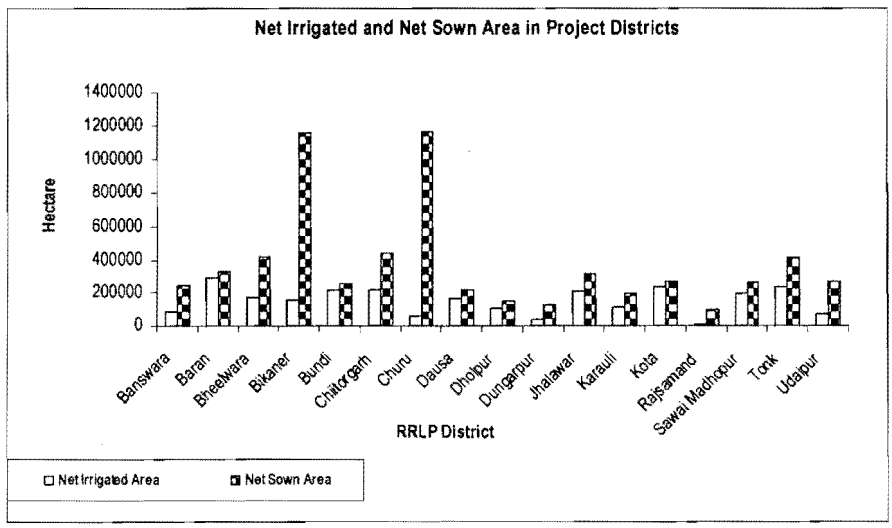


Figure 3.8 Net irrigated vs net sown area in the project districts

[22] District Statistical Abstract – for all 17 districts. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur.

Table 3.16 Districtwise various irrigation schemes

District	Name of scheme
Banswara	Bhikha Bhai Sagawara Canal, Beautification and development of Kagdi Nalla, Boriwan Garhi (TAD)
Bhilwara	Parwali Sagar
Bundi	Machali, Chakan, Garada
Chittorgarh	Bagdari, Singhpur, Bhanwar Semla, Jalsanagar, Pind,
Dasua	Diwanchali
Dungarpur	Bhawarana Canal, Beautification of Gap Sagar, Borka Bhatra
Jhalawar	Piplad, Gagrin, Kalikhar, Gulandi, Banskheri, Challia, Prithvipura, Kanwara, Rewa, Bhimani, Dobra
Karauli	Khoh
Kota	Takli, Lahasi, Balapura, Kishanpura
Rajsamand	Liki Feeder, Agaria
S.Madhopur	Raising Mansarowar
Udaipur	Do Nadi, Rohini, Hondakheda pickup Wier, Sabarmati, Marner, Ghoda Khoj

3.7.4 Cropping pattern

Of the total area under agriculture in Rajasthan, 70% is primarily rain fed. The mono-cropping system is very much predominant in the state. Fig 3.9 shows the crops grown in various regions of Rajasthan. Rajasthan practises legume-wheat-based cropping system. Soyabean-wheat cropping pattern is dominant in the south-eastern region (Kota, Bundi, Baran, Jhalawar, Chittorgarh, Banswara and others). Other cropping patterns are pearl millet-wheat (Tonk, Banswara), pearl-millet-mustard, maize-wheat (eastern Rajasthan). The major kharif crops in the project districts are pulses, maize, jowar, paddy, soyabean, groundnut and rapeseed and that are grown during monsoon (June–July). The major rabi crops in the area are wheat, mustard, barley and gram (grown from September till November end).

Information on irrigation scenarios, soil-fertility status, and fertilizer consumption throws light on the low yield of various crops (as shown below in Tables 3.17 and 3.18). These tables list the major food grains and pulses/oilseeds produced in the project area, along with their yield. Among all the crops grown, the project area observes highest yield of wheat ranging between 1703–3825 kg/hectare, while the state average production of wheat is 3024 kg/ha. Nine project districts (Baran, Bhilwara, Bundi, Chittorgarh, Dholpur, Jhalawar, Karauli, Kota, and Rajsamand) have a higher yield of wheat than the state average. All project districts produce jowar more than the state average production of 556 kg/ha. Gram yield, too, exceeds the state average yield of 863 kg/ha in all the project districts, except Tonk. There is no rice production in Churu and Dausa. Churu, with very low water availability, does not produce maize, either. The districts with higher yield of food grains are Dausa, Baran, Bundi, Kota, Jhalawar, and Chittorgarh, among others.

As shown in Table 3.18, the RRLP districts enjoy significant production of pulses and oilseeds. Dholpur has the highest yield for most of the pulses, as well as rapeseed and mustard. The yield of pulses and oilseeds is very low in Churu and Bikaner.

Other than pulses and food grains, the project area also produces sugarcane, (up to 1,13,523 kg/hectare in Karauli). Other crops like chillies, cotton, potatoes, and so on are also produced in the RRLP districts (Table 3.18).

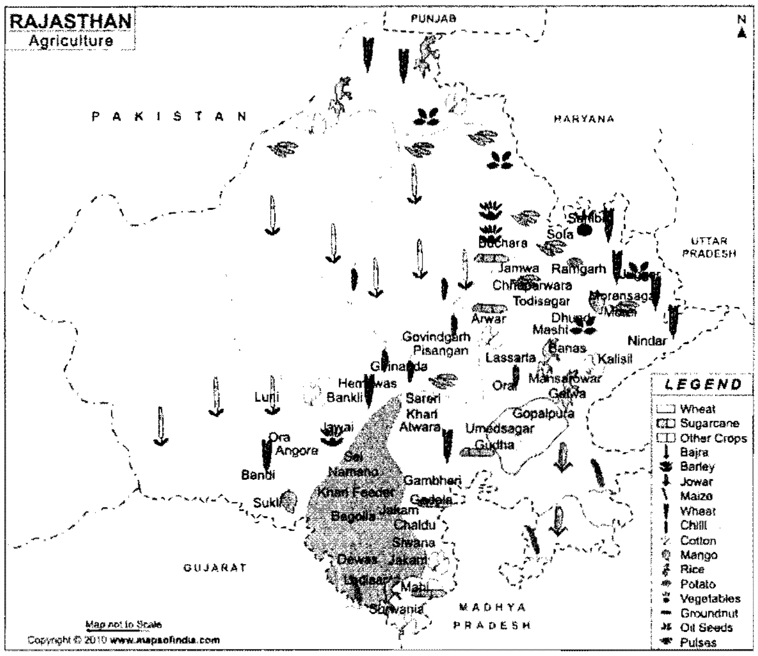


Figure 3.9 Map showing various crops grown in different part of Rajasthan

Implications for EMF: Lack of sufficient irrigation means and poor soil fertility are two major constraints to agricultural practices in Rajasthan. Following points should be considered in EMF for sustainable agricultural practices:

1. EMF needs to promote water conservation and water harvesting practices to reduce pressure on groundwater.
2. RRLP needs to coordinate with the agriculture department and Krishi Vigyan Kendra to converge with various government schemes in RRLP. Integrated Pest Management (IPM) and Integrated Nutrient Management (INM) need to be promoted for sustainable agriculture.
3. Coordination with academic institutions will ensure the required technical support.
4. Use of chemical pesticides belonging to Classes IA, IB and II, as per WHO guidelines, must not be promoted through the RRLP.
5. Producer organizations dealing with sale of seeds, pesticides, and fertilizers should obtain necessary registration and certification prior to conducting business.
6. The EMF needs to include guidelines on soil testing, adequate technical support on irrigation schedule, best cropping pattern, and promotion of organic manures and biofertilizers.

Table 3.17 Districtwise food grain production in the project area

District	Cereals																	
	Bajra			Jowar			Maize			Wheat			Barley			Rice		
	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)
Banswara	91	64	703	566	355	627	1,44,544	53,215	368	85,835	1,60,011	1864	1298	2383	1836	33,252	18,756	564
Bhilwara	2628	4527	1723	37,990	33,451	881	1,81,445	2,99,942	1653	1,23,813	38,9584	3147	19,985	50,013	2503	207	326	1575
Bikaner	1,71,921	26,093	152	529	294	556	3	3	1000	52,898	1,38,027	2609	2086	3460	1659	7	11	1571
Bundi	2198	2045	930	1309	871	665	30722	56,363	1835	1,11,575	4,05,515	3634	825	2101	2547	9421	16,208	1720
Chittorgarh	15	11	733	10,294	7939	771	1,61,243	2,70,936	1680	1,46,886	5,61,855	3825	5905	15,538	2631	608	958	1576
Churu	4,30,403	1,54,859	360	2	1	500	0	0	0	15,743	26,817	1703	4298	7130	1659	0	0	0
Dausa	1,11,351	2,05,268	1843	6787	7770	1145	1196	1836	1535	75,948	1,96,390	2586	6589	12,277	1863	0	0	0
Dholpur	67,478	1,14,031	1690	78	43	551	9	10	1111	47,649	1,59,087	3339	986	2491	2526	536	845	1576
Dungarpur	125	88	704	795	442	556	74,916	11,078	148	40,855	71,327	1746	1350	3438	2547	27,161	18,171	669
Jhalawar	21	15	714	7974	9354	1173	44,595	64,323	1442	72,456	2,35,175	3246	374	953	2548	720	1135	1576
Karauli	1,19,452	1,89,303	1585	768	662	862	239	259	1084	53,423	1,63,549	3061	463	1179	2546	1840	4327	2352
Kota	19	13	684	9488	9060	955	9277	9143	986	81,551	29,6388	3634	449	1144	2548	6505	17,751	2729
Rajsamand	523	366	700	7639	11,614	1520	62,656	81,596	1302	36,704	1,16,996	3188	7452	16,487	2212	105	165	1571
Sawai Madhopur	62,617	1,04,543	1670	2874	3601	1253	588	637	1083	42,351	1,18,521	2799	752	1032	1372	27	42	1556
Tonk	52,970	45,618	861	72,764	21,271	292	13,658	11323	829	63,430	1,63,346	2575	4174	8172	1958	0	0	0
Udaipur	27	19	704	5270	3305	627	1,88,466	1,49,858	795	88,904	2,17,207	2443	11,996	22,986	1916	6175	5725	927

Source: District Statistical Abstract – for all districts. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur; and Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 155–q168.

Table 3.18 District wise pulses/oil seeds production in the project area

District	Gram			Other Pulses			Arhar			Sesamum			Rape and Mustard			Sugarcane			Others: Other crops		
District	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)	Area (H)	Prod (T)	Yield (Kg/H)
Banswara	15,118	14,957	989.35	24,685	8504	344.5	7079	1714	242.12	569	185	325.13 2	88	107	1215.9	287	16,334	56,913	13,751	2769	2544
Bhilwara	24,532	22,860	931.84	56,730	21,334	376.06	5	1	200	26,942	6398	237.473	50,402	49,318	978.49	200	13,799	68,995	21,403	12,444	5124
Bikaner	1,25,791	1,33,339	1060	2,75,967	43,148	156.35	2	2	1000	2567	144	56.0966	60,588	74,288	1226.1	1	58	58,000	50,510	75,844	1943
Bundi	8967	9754	1087.8	7121	3176	446	7	6	857.14	6302	2880	456.998	1,03,746	1,29,154	1244.9	4398	2,21,042	50,260	808	1675	7533
Chittorgarh	27,302	25,910	949.01	15,307	2109	137.78	445	452	1015.7	8266	1565	189.33	92,885	1,43,989	1550.2	1375	78,526	57,110	36,524	29,710	10814
Churu	2,64,720	1,56,190	590.02	2,67,263	29,157	109.09	0	0	0	838	272	324.582	27,545	21,668	786.64	0	0	0	15,254	30,914	2396
Dausa	2434	2133	876.34	309	736	2381.9	36	26	722.22	4315	1495	346.466	84,512	1,02,680	1215	3	173	57,667	14,519	13,425	3999
Dholpur	1885	2637	1398.9	440	2476	5627.3	646	516	798.76	3829	2959	772.787	66,976	1,03,446	1544.5	172	5359	31,157	3359	35,045	15,565
Dungarpur	17,943	16,394	913.67	13,926	3522	252.91	2352	296	125.85	1093	355	324.794	727	884	1216	188	10,107	53,761	623	328	7288
Jhalawar	14,082	16,096	1143	15,022	9065	603.45	623	553	887.64	3348	1086	324.373	72,194	84,255	1167.1	31	1789	57,710	2272	3037	14,350
Karauli	5137	5695	1108.6	121	25	206.61	383	567	1480.4	8616	5849	678.853	89,427	1,12,724	1260.5	128	14,531	1,13,523	1876	1324	4424
Kota	3057	4241	1387.3	5334	2545	477.13	37	19	513.51	6913	2544	368.002	1,35,072	1,99,491	1476.9	28	1616	57,714	689	5377	21,057
Rajsamand	1655	1429	863.44	3122	1065	341.13	19	14	736.84	2913	538	184.689	4682	4300	918.41	373	26,914	72155	5266	4627	12,300
Sawai Madhopur	4905	4558	929.26	1797	1137	632.72	627	627	1000	9228	3581	388.058	1,79,885	1,87,437	1042	75	4329	57,720	7947	9173	6539
Tonk	6664	4959	744.15	44,095	13,469	305.45	2	1	500	9405	1721	182.988	1,75,589	1,45,210	826.99	97	4520	46,598	15,213	4005	4284
Udaipur	15,922	17,138	1076.4	17,480	12,945	740.56	3375	1967	582.81	3994	332	83.1247	20,525	18,851	918.44	490	36,712	74,922	6526	4931	73,804

Source: District Statistical Abstract – for all districts. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur; and Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp.155–168.

3.8 Pasture lands and fodder for livestock

Table 3.19 (below) lists the livestock resources available in the project districts, livestock density, and Adult Cattle Unit (ACU)[23]. As shown in the table, Udaipur has the highest number of cattle, buffaloes, and goats, which are a major source of milk production. Dholpur has the lowest number of cattle and goats, while Bikaner has the least number of buffaloes.

Rajasthan has nine cattle breeds, eight sheep breeds, six goat breeds, and four camel breeds. There are also thoroughbred horses in the state. The important breeds of cattle traded in Rajasthan are *Rathi, Kankrej, Nagour, Tharparkar, Haryana, Malvi, Gir, Sanchori,* and *Mehwati. Murrah* buffalo is the preferred breed, although *Surti* is also popular in the southern parts of Rajasthan.

Sheep occupy an important place in the animal husbandry sector of the state. The important breeds of sheep are, *Nali, Magra, Chokla* or *Shekkavati, Marwadi, Jaisalmeri, Malpuri, Sonari* or *Chanother, Pugal* and *Bagdi.*

The important goat breeds are *Jamnapari, Badwari, Alwari* and *Sirohi,* all of which are reared for milk and meat. *Lohi* and *Jhalwadi* breeds are especially reared for their meat.

As also revealed in Table 3.19, the RRLP districts have high livestock density ranging from 153 per sq. km. (Bikaner) to 907 per sq. km. (Churu) as compared to the national average of 143 per sq. km. The livestock density has been calculated by dividing the total number of cattle, buffaloes, sheep, goats and camels by the total grazing land of the district. The grazing land in a district includes its total forest cover, barren and unculturable land, permanent pastures and grazing land, culturable wasteland, other fallow land, and current fallow land. Further, it can be observed from the Table that though Churu has highest livestock density among the RRLP districts, the cattle/buffalo density is low (259) as compared to goat and sheep density (618). This may be attributed to scarcity of water and fodder in

[23] Adult Cattle Unit (ACU) is the number of cattle per hectare of grazing land. For the calculation purpose, 1 cattle = 1 buffalo=0.2 goat or sheep. This is calculated by dividing the total number of cattle (converting goat/sheep into adult cattle unit) by total available grazing land (including total forest cover, barren and unculturable land, permanent pastures and grazing land, culturable wasteland, other fallow land, and current fallow land. While grazing is not permitted in protected areas (national parks and wildlife sanctuaries), in the calculation of land available for grazing, all forest land (protected areas and otherwise) have been included to facilitate an estimate of grazing pressure.

western Rajasthan due to which small ruminants like goat and sheep are preferred for livelihood activity.

In rainfed (semi-arid) and arid areas, the recommended carrying capacities are 1 ACU (Adult Cattle Unit)/ha and 0.4 ACU/ha respectively. However, the arid project districts, namely Churu and Bikaner, have 4.13 and 0.71 ACU/ha respectively. Other eastern and southern districts also exceed the permissible carrying capacity. Except Baran, Karauli, Rajsamand, and Udaipur, all other RRLP districts exceed the recommended 1 ACU/ha by more than 100%. This situation has posed a problem of fodder availability in Rajasthan. Moreover, the use of pasture lands for agricultural purposes has aggravated the situation.

As per the Department of Forest, government of Rajasthan, the estimated current and projected requirement and availability/supply of fodder from forest and non-forest areas are provided in Table 3.20 (below). As shown in the Table, the availability of fodder that is already in short supply by nearly 36% is likely to worsen, considering the high growth rate of animal population in Rajasthan.

Table 3.19 Fodder demand and supply in the state of Rajasthan

Year	Demand (Million Tonnes)	Supply (Million Tonnes)
1980	61.2	28.5
1990	58.8	31.52
1995	67.47	44.7
2001	72.18	50.08
2006	76.51	56.08

(Source: http://rajforest.nic.in)

As per the report by the Central Arid Zone Research Institute (CAZRI), green fodder production varies from 2.5 tonnes to over 10 tonnes per hectare of forest lands. The estimation done by CAZRI reveals that average fodder biomass from forest areas, excluding core areas of PAN (Protected Area Network), is about 4 tonnes per ha. Excluding the core areas, a net area where animals graze or fodder is harvested by fringe communities, amounts to 2.8 million hectares. Thus, green fodder produced from the forests is around 11.20 million tonnes. Further, the estimated consumption per cattle is 5 kg dry fodder per day. As per their estimation, total fodder utilization from forest area amounts to 16.9 million tonnes per annum. Correlating the livestock population with the extent of forest area, the grazing pressure in terms of cow units is 4 units per hectare. In some areas, the pressure is as high as 12 units. Thus, the enormous grazing pressure adversely affects the regenerative capacity of forests.

Table 3.20 Districtwise livestock in the project area

District	Cattle	Buffaloes	Sheep	Goats	Camels	Total livestock density / sq. km.	Cattle buffalo density(/sq. km.)	Goat and sheep density(/sq. km.)	ACU/ha
Banswara	6,58,666	2,59,946	22,705	4,51,193	1552	546.0	359.8	185.6	3.98
Bhilwara	6,03,066	3,12,743	4,46,680	7,40,352	5951	375.1	162.9	211.1	2.06
Bikaner	6,08,597	1,32,732	9,28,892	6,86,507	61,861	153.2	47.0	102.3	0.71
Bundi	2,60,832	2,44,901	66,921	3,08,107	3742	307.1	175.6	130.2	2.03
Chittorgarh	6,94,048	4,08,618	1,04,751	6,37,965	4533	337.6	201.2	135.5	2.29
Churu	2,15,234	1,94,524	3,81,005	5,95,899	46,822	907.8	259.5	618.6	4.13
Dausa	1,21,781	3,81,533	57,371	2,56,049	6258	778.8	476.3	296.6	5.42
Dholpur	57,753	3,06,259	9515	96,413	748	346.2	267.7	77.9	2.84
Dungarpur	4,17,378	2,15,991	24,158	3,75,028	2861	444.3	271.8	171.3	3.07
Jhalawar	4,26,123	2,64,087	14,317	3,21,609	693	365.5	245.7	119.6	2.70
Karauli	1,04,732	3,59,224	36,857	2,52,303	5534	261.6	160.0	99.7	1.82
Kota	2,30,401	1,90,272	24,649	1,89,046	2678	294.5	194.5	98.8	2.15
Rajsamand	2,51,863	2,00,184	1,20,641	4,99,334	3815	325.0	136.6	187.3	1.75
Sawai Madhopur	1,26,115	2,30,790	74,496	2,65,093	4985	334.8	170.3	162.1	2.05
Tonk	2,19,582	2,28,914	2,25,430	3,26,056	2176	391.6	175.3	215.5	2.19
Udaipur	10,38,263	5,30,405	2,04,491	11,64,316	9125	284.2	151.3	132.0	1.79

Source: District Statistical Abstract – for all districts. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur; and Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 189–194.

Implications for EMF: Since livestock rearing is one of the most dominant livelihood activities in rural Rajasthan, it is likely to pose pressure on pasture lands/fodder resources of the project area.

1. The EMF needs to regularly assess the cumulative impacts of livestock-based livelihood activities.
2. EMF must ensure promotion of fodder-enrichment practices like chopping machine and addition of supplementary nutrients.
3. The CDO should encourage development of community pasturelands and homestead pasture lands.
4. EMF needs to lay down procedures for maintaining the hygiene of both animals and their milk.
5. Additionally, from the cluster development fund, RRLP may create community level facilities like fodder bank for better management of fodder.

3.9 Industrial scenario in the project districts

Table 3.21 shows the number of factories along with the number of people employed.

Table 3.21 Districtwise factories in project area[24]

District	Number of factories	Numbers of people employed
Banswara	56	6709
Bhilwara	377	33,017
Bikaner	201	5817
Bundi	40	1021
Chittorgarh	146	4342
Churu	13	599
Dausa	12	374
Dholpur	19	530
Dungarpur	12	2833
Jhalawar	13	1970
Karauli	0	0
Kota	91	6877
Rajsamand	110	1296
Sawai Madhopur	15	831
Tonk	24	2039
Udaipur	260	10,594

Source: Report on Annual Survey of Industries, 2004–2005

As shown in the Table, Bhilwara has the maximum number of factories, while Karauli does not have any listed factory. This wide variance can be attributed to factors such as availability or lack of raw materials, necessary resources, and means of transportation, among others.

Rajasthan is a leading mineral producing state of India. At present, about 44 varieties of major minerals and 22 varieties of minor minerals are being produced in the state. Tables 3.22 and 3.23 respectively depicts districtwise total production of major and minor minerals. Banswara, Baran, Churu, and Jhalawar do not produce any major mineral; while Chittorgarh has the highest production of 1,01,27,344 tonnes (Table 3.22). The major minerals produced in the project area are lead zinc, china clay, feldspar, soapstone, limestone, and rock phosphate.

[24] Report on Annual Survey of Industries, 2004–2005. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 8.

Table 3.22 Districtwise major minerals production in the project area[25]

District	Major minerals	Total Production (tonnes)
Banswara		
Bhilwara	Lead zinc, china clay, feldspar, mica, ochres, quartz, soapstone, cadmium	41,25,683
Bikaner	Ball clay, gypsum	27,55,745
Bundi	China clay, limestone, silica sand	4,92,630
Chittorgarh	China clay, feldspar, ochres, quartz, lime stone, silica sand	1,01,27,344
Churu		
Dausa	Soapstone, silica sand	23,476
Dholpur		
Dungarpur	Soapstone	31,347
Jhalawar		
Karauli	China clay, silica sand,	2,13,288
Kota	Limestone	18,05,295
Rajsamand	Lead zinc,feldspar, quartz, soapstone dolomite	8,07,089
Sawai Madhopur	Quartz	10,460
Tonk	Feldspar, quartz, silica sand	76,640
Udaipur	Lead zinc,ochres, quartz, soapstone, dolomite, barytes, calcite, pyrophyllite, rock phosphate	30,07,004

(Sources: Statistical Abstract, Rajasthan, 2009)

Tonk, Kota, and Chittorgarh produce large amount of minor minerals, while Dungarpur records the lowest production of such minerals. Minor minerals found in the RRLP area are mainly marble, masonary stone, *kankar bajri* and *murram* (Table 3.23).

[25] Statistical Abstract, Rajasthan, 2009. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur, pp. 214–229.

Table 3.23 Districtwise minor minerals production in project area

District	Minor Minerals	Total Production (tonnes)
Banswara	Kankar bajri, limestone, marble, masonary stone, brick earth	6,82,263
Bhilwara	Kankar bajri, limestone, marble, masonary stone, brick earth, sandstone, murram, granite, patti katla, Fuller's Earth	76,99,759
Bikaner	Kankar bajri, limestone, masonary stone, brick earth, sandstone, Fuller's Earth,	16,42,290
Bundi	Kankar bajri, limestone, marble, masonary stone, brick earth, sandstone, murram, slate stone	26,14,892
Chittorgarh	Kankar bajri, limestone, marble, masonary stone, brick earth, murram, chips powder	1,64,49,901
Churu	Marble, masonary stone, brick earth, sandstone	35,90,691
Dausa	Kankar bajri, marble, masonary stone, brick earth	24,89,775
Dholpur	Masonary stone, brick earth, sandstone	5,94,959
Dungarpur	Kankar Bajri, limestone, marble, masonary stone, patti katla, serpentine	3,25,689
Jhalawar	Kankar bajri, limestone, marble, masonary stone, brick earth, sandstone, murram, granite, patti katla, Fuller's Earth, slate stone, chips powder, serpentine, bantonite	44,63,764
Karauli	Kankar bajri,masonary stone, brick earth, sandstone, murram, bantonite, khariya stone, mill stone	10,90,738
Kota	Kankar bajri, limestone, masonary stone, sandstone, murram	1,35,33,781
Rajsamand	Kankar bajri, marble, masonary stone, granite,chips powder	42,06,769
Sawai Madhopur	Kankar bajri, masonary stone, murram, granite, patti katla	4,14,403
Tonk	Kankar bajri, limestone, masonary stone, brick earth, patti katla,slate stone	1,51,18,454
Udaipur	Kankar bajri, limestone, marble, masonary stone, serpentine	44,81,270

(Sources: Statistical Abstract, Rajasthan, 2009)

Most of the mining of minor minerals, which includes all construction-related minerals such as stones, are performed in an unorganized manner, usually at a small scale. Mining of many major minerals like quartz, feldspar, mica, (semi) precious stones, limestone and gypsum (essentially major minerals) is also generally carried out at a small scale in an unorganized manner. Small lease holders, mainly with the help of manual labourers, produce small quantities of minerals for local trading. The small-scale mining in Rajasthan is mainly engaged in:

- Slate/quartzite/phyllite mines for construction purposes
- Marble/limestone/granite mines at small scale
- Sandstone mines

- Quartz/feldspar/mica mining at small scale
- Quartzite mines for masonry work
- Gemstone mining (though major minerals, but there are no mines in the state for these to be operated at large scale)

There are nearly 20,000 instances of small-scale mining activities in Rajasthan[26]. The mining is generally carried out manually and is, thus, labour oriented. Of the workforce engaged in mining, 37% are women and 15% are children. They work as daily labour. Due to the unscientific manner of operations, these small-scale mining activities impose serious health threats to the women and children. As per study by R Sengupta (2005), nearly 200 labourers lose their lives every year. The main occupational health hazards include silicosis, tuberculosis and bronchitis due to inhalation of the fine dust generated during mining activity.

Besides the major factories and mineral industries, rural communities are also engaged in small-scale industries. These industries deal with leather, oil, blacksmithy, lime work, pottery, soap oil, pulses, bamboo stick, handmade paper, fibres, textile, lac bangles, plastic, electronics, fodder, matchbox, agarbatti and so on.

Implications for EMF:

1. Stone cutting and carving, nagina (gem) work and pearl drilling are livelihood activities promoted under DPIP–I. These activities have adverse impacts on the ambient air and directly affect human health.
2. EMF must promote provision of adequate amenities (like mask to cover nose and mouth, goggles to protect eyes) for use by workers.
3. Further, RRLP needs to coordinate with the State Pollution Control Board to provide relevant technical support.

[26] Sengupta, R. 2005. Report on ASM in Rajasthan.

3.10 Natural Calamities

Fig 3.10 shows the frequency of drought in various regions of Rajasthan. It can be inferred from the Figure that except Churu, all project districts observe drought once in a minimum of five year. However, in 2009, drought was declared in 27 out of the 33 districts in Rajasthan. Table 3.24 (below) provides details on the drought in project districts and the extent of loss. Out of the 17 project districts, only four did not face any drought.

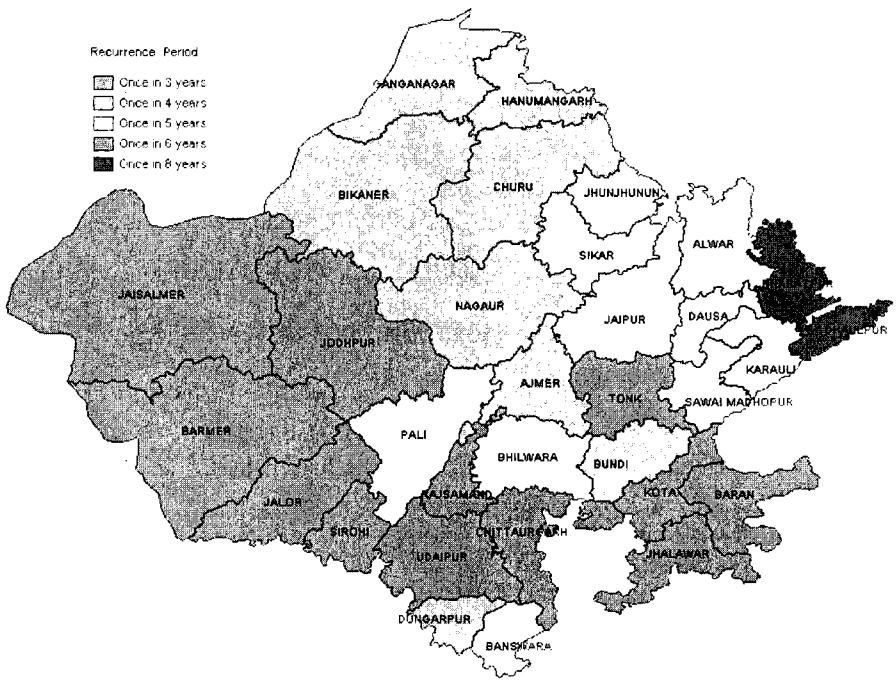


Figure 3.10 Map showing frequency of drought in different districts of Rajasthan

(Source: http://www.rajrelief.nic.in/dFreqmap.htm)

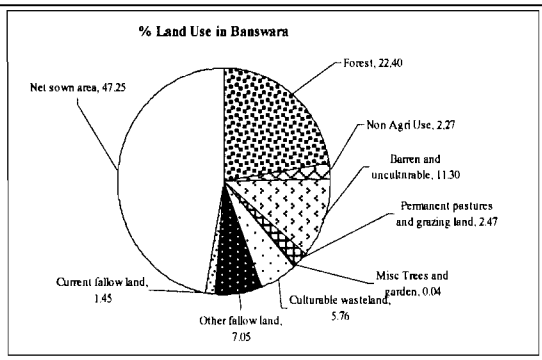
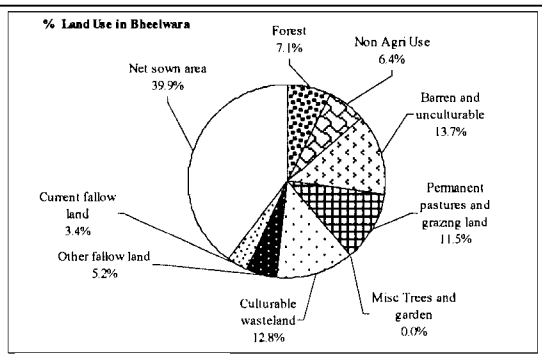
Table 3.24 Extent of scarcity due to drought in RRL districts (2009)

District	No. of affected villages	Value of damaged crops (Rs. In million)	No. of affected cattle (in million)
Banswara	1488	4599.723	1.347
Baran		NO DAMAGE	
Bhilwara	1845	2974.088	1.502
Bikaner	927	1066.336	2.488
Bundi	885	23510.920	0.941
Chittorgarh	1689	1759.015	1.348
Churu	912	3920.646	1.712
Dausa	1090	1616.280	9.40
Dholpur		NO DAMAGE	
Dungarpur	947	118.282	1.124
Jhalawar	791	7111.625	0.706
Karauli		NO DAMAGE	
Kota		NO DAMAGE	
Rajsamand	1072	616.058	0.931
S.Madhopur	352	622.6	0.268
Tonk	1177	7384.558	0.759
Udaipur	2496	6599.135	1.919

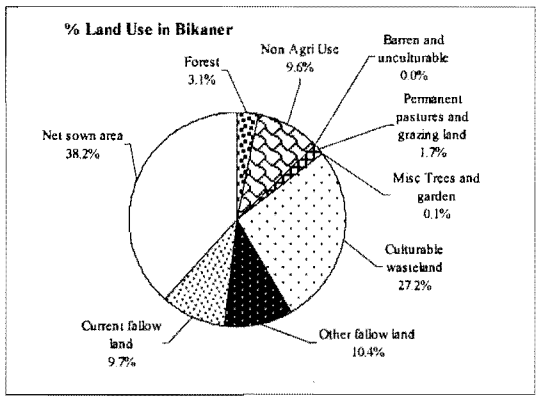
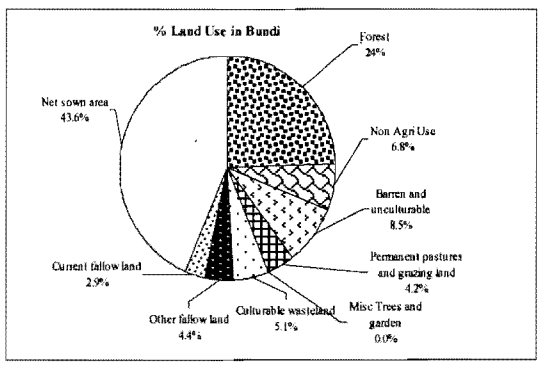
Implications for EMF: RRLP needs to invest in community-level infrastructure (utilizing the cluster development fund), which can lead to drought relief and managing the crisis. The infrastructure can include fodder/grain store room, cattle shed, and so on.

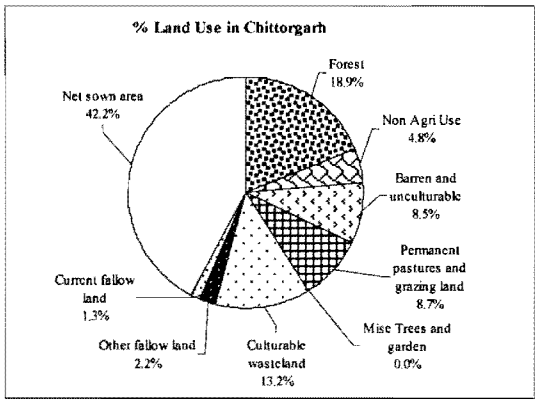
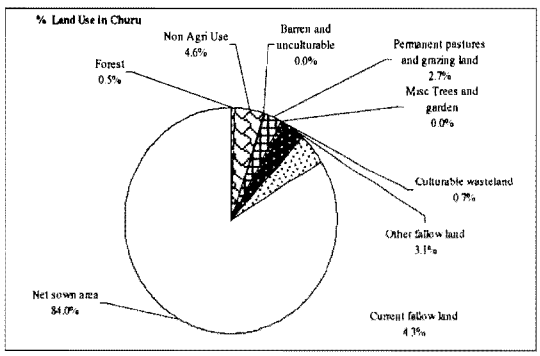
3.11 Environmental issues in the project districts

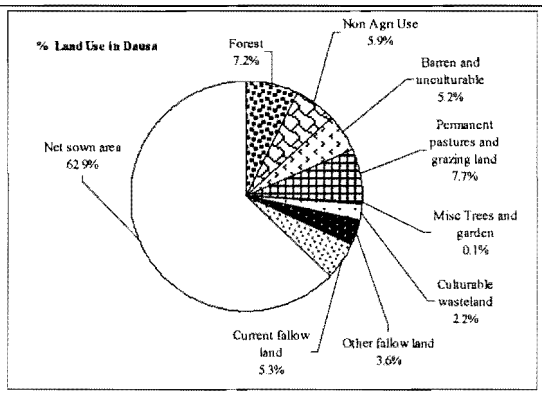
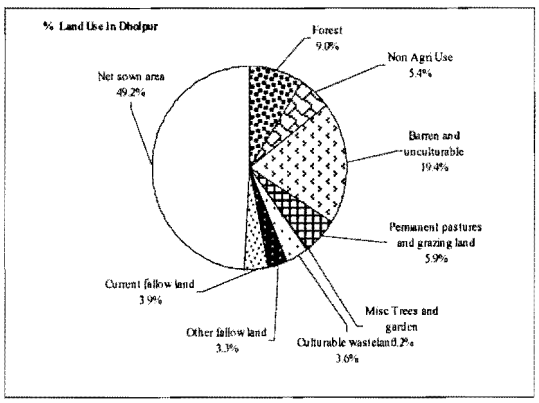
Though the project districts fall under different agro-climatic zones, the major livelihood activities are animal husbandry and agriculture. The following section provides a brief overview of the overall livelihood activities, and the environmental issues related to them.

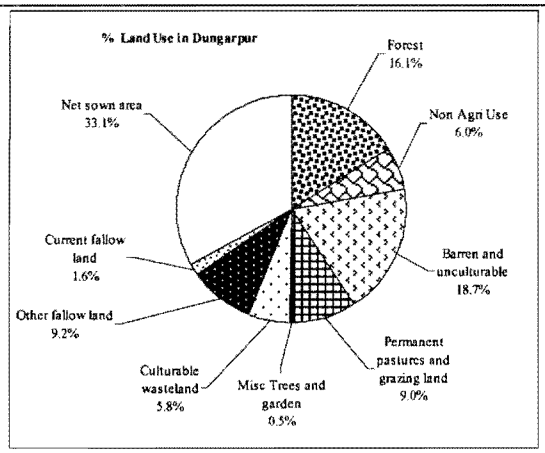
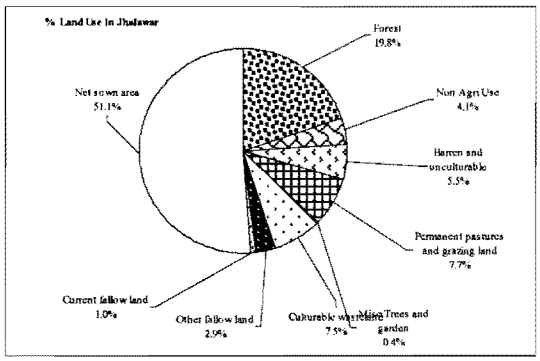
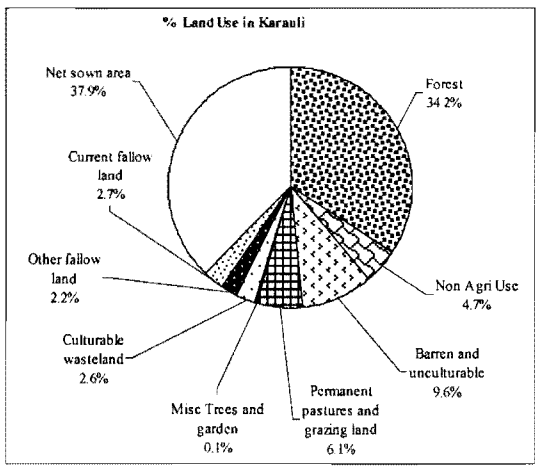
District	Environmental overview	Livelihood activities	Environmental issues
Banswara	 1. 22.4 % forest cover 2. Groundwater table in semi-critical stage 3. Major irrigation source: canals 4. Wheat, maize, rice, gram and sugarcane are the main crops 5. Very high livestock density (3.98 ACU[27]/ha)	• Agriculture • Dairy • Minor minerals production • Fisheries • Forest-related activities like making of bamboo based *moodas, tokris*, ropes, and so on.	• Water scarcity and depleting groundwater, thereby leading to very low irrigation as compared to the net sown area • Threat to groundwater due to unplanned extraction • Air pollution resulting from mir activities • Low nitrogen in soil • Pressure on forests
	 1. Poor forest cover 2. Groundwater in critical/ overexploited category 3. Major source of irrigation: well/tube well	1. Agriculture 2. Dairy 3. Industrial activities 4. Mining activities	1. Ummed Sagar lake pollution 2. Low nitrogen in soil 3. Saline and alkaline soil 4. Water scarcity and depleting groundwater leading to low irrigation as compared to net sown area 5. Pollution from Industries 6. Poor forest cover

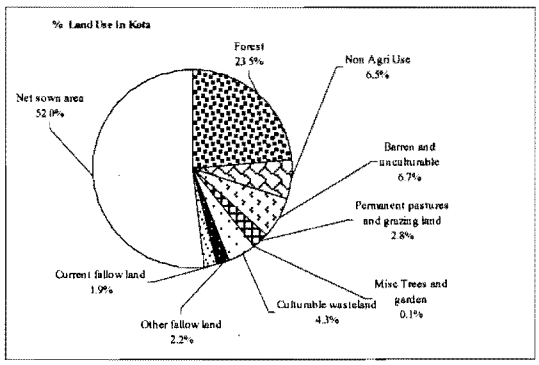
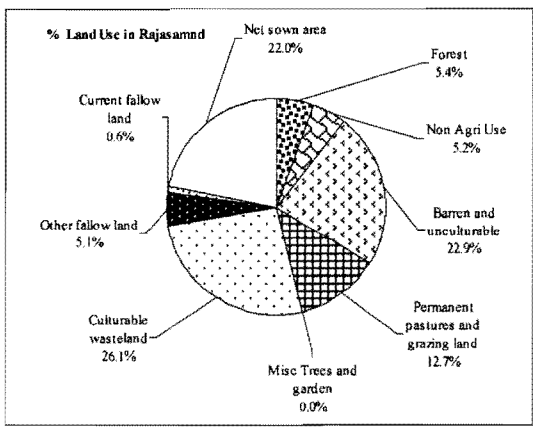
[27] Adult Cattle Unit (ACU) is the number of cattle per hectare of grazing land. For the calculation purpose, 1 cattle = 1 buffalo=0.2 goat or sheep. This is calculated by dividing the total number of cattles (converting goat/sheep into adult cattle unit) by total available grazing land (including total forest cover, barren and unculturable land, permanent pastures and grazing land, culturable wasteland, other fallow land and current fallow land. while grazing is not permitted in protected areas (national parks and wildlife sanctuaries), in the calculation of land available for grazing, all forest land (protected areas and otherwise) has been included to facilitate an estimate of grazing pressure.

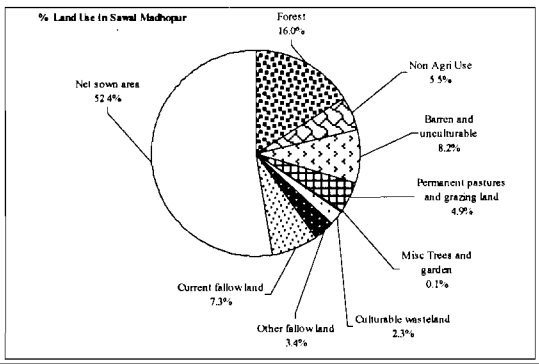
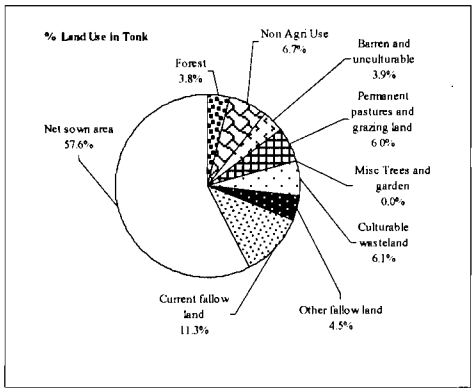
District	Environmental overview	Livelihood activities	Environmental issues
	4. Jowar, maize, wheat, barley, gram and other pulses are main crops 5. High livestock density (2.06 ACU/ha)		7. Non-availability of green fodder in summer
Bikaner	 1. Negligible forest cover 2. Groundwater in overexploited category 3. Major source of irrigation is canals 4. Bajra, Wheat, gram, rapeseed and mustard are the main crops 5. Mineral resources	1. Limited agricultural produce such as bajra, gram, pulses and wheat 2. Goat farming 3. Mining activities 4. Tourism 5. Industrial activities	1. Severe water scarcity 2. Desert soil with very low nitrogen does not support agricultural activities 3. Very poor rainfall 4. Very poor forest cover 5. Low availability of green fodder 6. Air pollution due to mining
Bundi	1. Good forest cover 2. Groundwater in critical and overexploited category 3. Major source of irrigation: canals and tubewells 4. Major crops grown are maize, wheat, rice, rapeseed, mustard, and sugarcane 5. Availability of mineral resources 6. Houses Ramgarh Vishdhari WLS, Jawahar Sagar WLS and National Chambal WLS 7. High livestock density (2.03 ACU/ha) 	1. Agriculture 2. Mining activities 3. Forest-related activities 4. Goat farming 5. Dairy	1. Groundwater salinity 2. Over exploitation of groundwater and poor irrigation 3. Alkaline soils 4. Air pollution due to mining 5. Poor availability of fodder

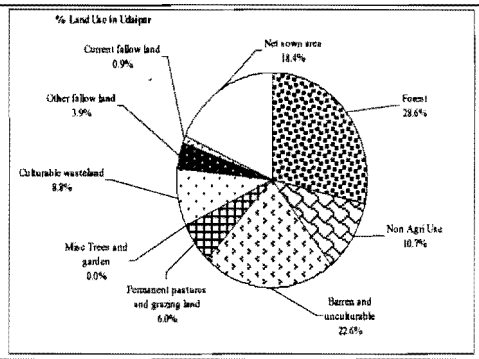
District	Environmental overview	Livelihood activities	Environmental issues
Chittorgarh	 1. Forest cover :19% 2. Groundwater in overexploited category 3. Major source of irrigation is tubewell 4. Major crops grown are wheat, maize, jowar, gram, pulses and sesamum 5. High livestock density (2.29 ACU/ha) 6. Houses Bhensroad, Jawahar Sagar and Bassi WLS	1. Agriculture 2. Dairy 3. Industrial activities 4. Tourism 5. Mining 6. Forest-related non timber products	1. Industrial pollution 2. Low nitrogen in soil 3. Poor irrigation due to water scarcity 4. Unplanned extraction of groundwater 5. Air pollution due to mining
Churu	1. Almost no forest cover 2. Groundwater in over exploited category 3. Major source of irrigation is tubewells 4. Major crops are bajra, gram, rapeseed, and mustard 5. Very high livestock density (4.13 ACU as against the recommended level of 0.4 ACU) 	1. Dairy 2. Goat farming 3. Agriculture	1. Desert soil 2. Almost no forest cover 3. Very poor rainfall and severe water scarcity leading to low irrigation (4.6 % of sown area is irrigated) 4. Depleting groundwater due to unplanned extraction 5. Soil very low in nitrogen 6. Non-availability of green fodder in summer
Dausa	1. Poor forest cover 2. Groundwater in overexploited category 3. Major source of irrigation: tubewells/wells 4. Crops cultivated: bajra, wheat, barley, lentil, rapeseed, and mustard 5. Very high livestock density (5.42 ACU/ha)	1. Dairy activities 2. Goat farming 3. Stone cutting and carving 4. Agriculture	1. Fluoride contamination of groundwater 2. Fast depleting groundwater (has reached the over exploited category) 3. Mining induced air pollution 4. Poor forest cover 5. Alkaline and

District	Environmental overview	Livelihood activities	Environmental issues
			saline soil 6. Poor availability of green fodder
Dholpur	1. Only 9% forest cover 2. Groundwater is in critical/over exploited category 3. Major source of irrigation is tubewells 4. Crops cultivated: bajra, wheat, rapeseed, and mustard 5. High livestock density (2.84 ACU/ha) 6. Houses four wildlife sanctuaries: National Chambal, Ramsagar, Vanvihar, and Kesarbagh 	1. Agriculture 2. Dairy activities 3. Mining activities	1. Soil low in nitrogen 2. Alkaline and saline soil 3. Mining-induced air pollution 4. Unplanned extraction of groundwater, and thereby depleting groundwater
Dungarpur	1. 16 % forest cover 2. Groundwater in semi-critical/critical stage 3. Major sources of irrigation are tubewells/wells and canals 4. Crops grown: maize, wheat, rice, gram, and other pulses 5. Very High livestock density (3.07 ACU/ha)	1. Agriculture 2. Dairy 3. Goat farming	1. Water scarcity leading to low irrigation (only 30% sown area irrigated) 2. Depleting groundwater table 3. Inadequate availability of green fodder

District	Environmental overview	Livelihood activities	Environmental issues
			
Jhalawar	1. Good forest cover 2. Groundwater in critical/over exploited category 3. Tubewells are the major source of irrigation 4. Crops grown: maize, wheat 5. High livestock density (2.70 ACU/ha) 6. Houses Darra WLS 	1. Dairy 2. Agriculture 7. Goat farming	1. Low availability of green fodder in summer 2. Water scarcity
Karauli	 1. Good forest cover 2. Groundwater in critical/over exploited	1. Agriculture 2. Dairy 3. Mining activities	1. Soil low in nitrogen 2. Mining-induced air pollution

District	Environmental overview	Livelihood activities	Environmental issues
	category 3. Major source of irrigation is tubewells/wells 4. Agriculture: bajra, wheat, rapeseed, and mustard 5. High livestock density (1.82 ACU/ha) 6. Houses Kailadeo WLS		
Kota	1. Forest cover is 23% 2. Groundwater is in over exploited category 3. Canals and tubewells are main sources of irrigation 4. Huge mineral resources 5. Agriculture: jowar, wheat, mustard 6. Industries: cement 7. High livestock density (2.15 ACU/ha) 8. Houses Jawahar Sagar, National Chambal, and Darra WLS 	1. Agriculture 2. Dairy 3. Mining activities 4. Industries	1. Groundwater salinity 2. Air (dust) pollution 3. Industrial air and water pollution 4. Availability of green fodder
Rajsamand	 1. Poor forest cover (5.4%) 2. Groundwater in critical and over exploited zone 3. Major source of irrigation is tubewells 4. Crops cultivated: maize, wheat, mustard 5. High livestock density (1.75 ACU/ha) 6. Houses Kumbhalgarh, Phulwar ki Nali, Tatgarh WLSs	1. Agriculture 2. Dairy 3. Goat farming 4. Industrial labour 5. Mining	1. Poor availability of water leading to low irrigation (only 6.3% of sown area is irrigated) 2. Soil low in nitrogen 3. Poor forest cover 4. Inadequate availability of fodder 5. Air (dust) pollution

District	Environmental overview	Livelihood activities	Environmental issues
Sawai Madhopur	1. 16% forest cover 2. Groundwater is in critical/over exploited zone 3. Major source of irrigation is tubewells 4. Agriculture: bajra, wheat, gram 5. High livestock density (2.05 ACU/ha) 6. Houses the famous Ranthambore National Park 	1. Agriculture 2. Tourism 3. Dairy 4. Mining	1. Soil low in nitrogen 2. Depleting groundwater 3. Air pollution (mining) 4. Poor fodder availability
Tonk	 1. Poor forest cover 2. Groundwater is in critical category 3. Major sources of irrigation are tubewells and canals 4. Agriculture: bajra, wheat, maize and other pulses 5. High livestock density (2.19 ACU/ha)	1. Agriculture 2. Dairy 3. Goat farming 4. Mining	1. Poor forest cover 2. Soil low in nitrogen 3. Alkaline and saline soil 4. Poor availability of water leading to low irrigation 5. Depleting groundwater 6. Poor availability of fodder
Udaipur	1. Good forest cover (28%) 2. Groundwater is in critical/overexploited category 3. Major source of irrigation is tubewells 4. Agriculture: wheat, maize, gram and lentil 5. High livestock density (1.79 ACU/ha) 6. Houses Seeta Mata, Jayasamad, and Sajjangarh WLSs	1. Agriculture 2. Tourism 3. Mining s 4. Industrial labour 5. Dairy 6. Goat farming 7. Non-timber forest products	1. Lake pollution 2. Depleting ground water 3. Poor availability of water leading to low irrigation 4. Air pollution (mining) 5. Soil low in nitrogen

District	Environmental overview	Livelihood activities	Environmental issues
			6. Low availability of green fodder in summer

Water resources: Over the years, there has occurred significant fluctuation in rainfall across all the project districts. The number of rainy days, too, has been steadily decreasing in the RRLP districts. This has led to depletion of groundwater sources because of overexploitation and unplanned excessive withdrawal of groundwater. Groundwater recharge also occurs at insignificant rates. The groundwater table has reached an 'over exploited' state in almost all the districts. Table 3.25 lists the number of blocks in different groundwater categories;

3.12 Environmental trends in the project districts

Over the years, availability of environmental resources has been changing in the RRLP districts due to variations in climate and weather, change in landuse practices and agricultural practices, and other socio-economic factors. This changing scenario has affected the livelihood activities and opportunities of the rural people. The following section outlines the impact on various resources.

Table 3.25 Blockwise groundwater status in Rajasthan[28]

S No	Particulars	1984	1994	2004
1	Total no. of blocks assessed	236	237	237
2	Safe	203	127	32
3	Semi-critical	10	35	14
4	Critical	11	14	50
5	Over exploited	12	60	140

It is apparent from the Table that 140 blocks have reached the over exploited category, as compared to only 12 in 1984.

[28] Environmental Management Guidelines and Action Plan for SWRPD, 2009. State Water Resources Planning Department, Government of Rajasthan, Jaipur.

Land use pattern: As revealed during the stakeholders' consultations and from available secondary data, no case of desertification has been observed in the recent past. The stakeholders were of the opinion that many patches of wasteland have been converted into arable land due to advancement in agricultural engineering, adequate supply of chemical fertilizers, and initiatives (like subsidies) by the government. This is also supported by the governmental data, which mentions nearly 13% increase in net area sown, 3.6% increase in forest cover, and 8% decrease in culturable wasteland in the state since 1956 (Agricultural Statistics, 2006). In some villages, the lands had been affected by an increase of salinity in the soil. This has caused a number of fertile patches to become barren, thereby reducing the overall crop yields.

Livestock: It is interesting to note that lack of water and green fodder has not resulted in reduction in livestock activities. On the other hand, with the rural communities increasingly opting for dairy activities, the number of cattle and buffaloes has increased. A 17.84% rise in livestock was observed between 2003 and 2007 (Rajasthan State Livestock Development Policy, 2009). This was attributed to increasing population and growing demand for milk. Goat farming is quite predominant in the project area. It was also noted that dairy activities sustain agriculture by providing dung as organic manure to enrich the soil. Table 3.26 below shows the rise in animal population in Rajasthan over the past 20 years.

Table 3.26 Growth in animal population in Rajasthan (in million)

Item	1951	1961	1972	1983	1992	1997	2003	2007
Cattle	10.782	13.136	12.47	13.504	11.666	12.141	10.854	12.410
Buffalo	3.045	4.019	4.592	6.043	7.745	9.77	10.414	11.542
Sheep	5.387	7.36	8.556	13.431	12.491	14.585	10.054	11.283
Goat	5.562	8.052	12.162	15.48	15.285	16.971	16.809	21.881
Camel	0.341	0.57	0.745	0.756	0.746	0.669	0.498	0.430
Other	0.399	0.372	0.353	0.436	0.482	0.519	0.507	0.353
Total	25.516	33.509	38.878	49.65	48.415	54.655	49.136	57.899

It is apparent from the Table that the number of buffalo, goat and sheep has grown significantly in the past 50 years. Steep rise in goat and sheep numbers may be attributed to the poor availability of fodder to sustain buffalo/cattle.

Forest cover: Forest status reports, based on satellite imagery survey conducted by the Forest Survey of India, have revealed an increase of 3478 square kilometers area under tree cover between 1987 and 2001 in Rajasthan. The rise is due to the various afforestation programmes and initiatives undertaken by the government (http://rajforest.nic.in/general_intro.htm).

However, during the stakeholder consultations, stakeholders opined that due to lack of water and maintenance, the afforestation programme has recorded a slower rate of growth.

Agriculture: Farmers are adapting to alternative agriculture practices in response to the changed climatic conditions. These include improved methods of irrigation like sprinkle irrigation. Further, desert crops are being grown at a much larger scale. However, due to lack of resources such as water, farmers in places like Dholpur have stopped growing crops like paddy, which was a major crop in the region just a few decades ago. Likewise, in Churu, farmers are shifting to hybrid seeds of many crops (bajra, sesamum, and so on) to adapt to the changing climatic pattern.

Rajasthan has 1.194 million hectares of common pasture land, of which over 40% have extremely low productivity or are unproductive due to excessive grazing and heavy soil erosion due to felling of trees and bushes coupled with utter neglect by the community. Besides these pastures, there are about 0.448 million hectares of barren and uncultivated lands, which are also in a state of neglect. Over the decades, these lands have lost their ability to facilitate regeneration of native grass and woody species. Encroachment of lands has also restricted access to some of these lands.

It was also observed that members from the below-poverty-line (BPL) families who have no agriculture land holding tend to migrate to the nearest urban settlements.

Annexure 12 deals with the climate change adaptation initiatives of government of India, as well as government of Rajasthan.

CHAPTER 4 Environmental regulations and legal framework

Laws and regulations are important instruments for protecting the environment. To put laws into effect, government agencies create and enforce regulations. The existing laws and regulations concerning environmental protection guide projects during the implementation stage. With relation to the proposed RRLP project, it is important that the Environment Management Framework (EMF) is responsive to the existing legal framework. This section presents a brief listing of the various Acts, rules and regulations of the government of India, the government of Rajasthan as well as the safeguard policies of the World Bank. The alignment of the proposed RRLP interventions with respect to these is also examined.

The important environmental laws, regulations, and policies that are relevant to the activities envisaged under the RRLP project (including the provisions of the Indian Constitution) are mentioned below.

Laws and Regulations

Environmental pollution

- Water (Prevention and Control of Pollution) Act, 1974
- Air (Prevention and Control of Pollution) Act, 1981
- Public Liability Insurance Act, 1991
- Environment (Protection) Act, 1986

Biodiversity, Forest and Wildlife

- Biological Diversity Act, 2002
- Wildlife (Protection) Act, 1972
- Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
- Indian Forest Act, 1927
- Forest Conservation Act 1980

Others

- The Mahatma Gandhi National Rural Employment Guarantee Act, 2005
- Right to Information Act, 2005
- Disaster Management Act, 2005

Agriculture

- Insecticides Act, 1968
- Seed Act, 1966

POLICIES

- National policies
  National Forest Policy, 1988
  National Water Policy, 2002

State policies

- Rajasthan Forest Policy, 2010
- Breeding Policy in Rajasthan for Cattle and Buffalo, 2006, 2007
- Rajasthan State Cattle Fairs Act, 1963
- Rajasthan Forest Produce (Transit) Rules, 1957
- Rajasthan Regulation and Control of Development and Management of Ground Water Bill, 2006 (Draft)

Safeguard policies of the World Bank

- Operational Policy (OP) 4.01: Environmental Assessment
- OP 4.04: Natural Habitats
- OP 4.09: Pest Management
- OP 4.10: Indigenous People
- OP 4.12: Involuntary Resettlement
- OP 4.36: Forests
- OP 4.37: Safety on Dams

Provisions under the Indian Constitution

The Indian Constitution is among the few in the world that contains specific provisions on environmental protection.

- The state's responsibility with regard to environmental protection has been laid down under Article 48-A of our Constitution, which reads as follows: *'The state shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country'.* Article 48-A of the Constitution falls under Directive Principles of State Policy.

- Environmental protection is the fundamental duty of every citizen of this country under Article 51-A(g) of our Constitution, which reads as follows: *'It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.'* Article 51 A(g) of the Constitution falls under Fundamental Duties.

- Article 21 of the Constitution is a fundamental right

which reads as follows: *'No person shall be deprived of his life or personal liberty except according to procedure established by law.'*

- The state's responsibility with regard to raising the level of nutrition and the standard of living and to improve public health has been laid down under Article 47 of the Constitution, which reads as follows: *'The state shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties and, in particular, the state shall endeavour to bring about prohibition of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health.'*

- The 42nd Amendment to the Constitution, brought about in 1974, makes it the responsibility of the state government to protect and improve the environment, and safeguard the forests and wildlife of the country. The latter, under Fundamental Duties, makes it the fundamental duty of every citizen to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures.

The subjects related to environment in the seventh schedule of the Constitution:

Union List

Entries	
52	Industries
53	Regulation and development of oil fields and mineral oil resources
54	Regulation of mines and mineral development
56	Regulation and development of inter-state rivers and river valleys
57	Fishing and fisheries beyond territorial waters

State List

Entries	
6	Public health and sanitation
14	Agriculture, protection against pest and prevention of plant diseases
18	Land, colonization, etc.
21	Fisheries
23	Regulation of mines and mineral development subject to the provisions of List-I
24	Industries subject to the provisions of List-I

Common or Concurrent List

Entries	
17A	Forests
17B	Protection of wild animals and birds
20	Economic and social planning
20A	Population control and family planning

The key features of the environmental laws, regulations, and policies that are relevant to the activities envisaged under the RRLP project are summarized below.

Laws, regulations and policies relevant to RRLP project

A. LAWS & REGULATIONS

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
ENVIRONMENTAL POLLUTION					
The Water (Prevention and Control of Pollution) Act *Amended:* 1988	To provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country.	G.S.R.58(E), [27/2/1975] - The Water (Prevention and Control of Pollution) Rules, 1975 and Central Board for the Prevention and Control of Water Pollution (Procedure for Transaction of Business) Rules, 1975; amended 1976	• Procedure for consent to operate • Laying down permissible limits/ standards of pollutants likely to be emitted • Collection of samples of effluent and analysis • Penalty provision	Rajasthan State Pollution Control Board	The Act is important in Rajasthan since it is a severely arid state with very limited water availability. From the perspective of the RRLP project, the following activities are relevant to the Water Act: ▪ Agriculture (non-point source) ▪ Dying and printing of textiles ▪ Brick manufacturing ▪ Generation of waste water from producer organizations (large-scale milk processing) The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
The Air (Prevention and Control of Pollution) Act, 1981 *Amended:* 1987, 1992, and 2003.	To provide for the prevention, control, and abatement of air pollution in India.	G.S.R.712(E), [18/11/1982] - The Air (Prevention and Control of Pollution) Rules, 1982	- Declaring air pollution control areas - Setting ambient air quality standards - Procedure for consent to operate - Penalty provisions	Rajasthan State Pollution Control Board	The following activities are relevant to the Air Act: • Small-scale mining and quarrying • Stone carving The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF
Public Liability Insurance Act, 1991 *Amended:* 1992	To provide for public liability—insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.	S.O.330(E), [15/5/1991] - The Public Liability Insurance Rules, 1991, amended 1993	- Relief in case of death, injury and damage from accidents - Insurance policies for persons dealing with hazardous waste	Rajasthan State Pollution Control Board	The following activities are relevant to the PLI Act: • Readymade garment industries • Soap and detergent making • Oil processing units • Brick manufacturing The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
The Environment (Protection) Act, 1986 *Amended:* 1991	To provide for the protection and improvement of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country.	1. S.O.844(E), [19/11/1986] - The Environment (Protection) Rules, 1986 2. S.O.470(E), [21/6/1999] - Environment (Siting for Industrial Projects) Rules, 1999. The power conferred by the EPA are also followed under these relevant heads: 1. Delegation of powers 2. Eco-sensitive zone 3. Environmental clearance—general 4. Environmental standards 5. Hazardous substances management 6. Loss of ecology 7. Noise pollution 8. Ozone layer depletion 9. EIA Notification, 2006 and 2009	▪ General powers of the Central Government ▪ Prevention, control, and abatement of environmental pollution	Ministry of Environment and Forests, Government of India; Department of Environment, Government of Rajasthan and Rajasthan State Pollution Control Board	The following activities are relevant to the EP Act: • Soap and detergent making • Manufacturing of bricks • Dying (textiles) • Tanning (leather work) • Milk processing by producer organizations The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
Noise Pollution (Regulation & Control) Rules, 2000	To regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise.	- S.O.50(E), [11/01/2010] - The Noise Pollution (Regulation and Control) (Amendment) Rules, 2010 - S.O.1569(E), [19/09/2006] - The Noise Pollution (Regulation and Control) (Amendment) Rules, 2006 - S.O.1088(E), [13/07/2006] - The Noise Pollution (Regulation and Control) (Amendment) Rules,2006 - S.O.1088(E), [11/10/2002] - The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002 - S.O.1046(E), [22/11/2000] - The Noise Pollution (Regulation and Control) (Amendment) Rules, 2000.	▪ Ambient air quality standards in respect of noise for different areas/zones ▪ Responsibility as to enforcement of noise pollution control measures ▪ Restrictions on the use of loud speakers/public address system ▪ Consequences of any violation in silence zone/area ▪ Complaints to be made to the authority ▪ Power to prohibit, etc., continuance of music, sound or noise	Rajasthan State Pollution Control Board	These rules have been framed under the EPA. However, certain RRLP activities are relevant to the noise control regulations, which are as follows: • Stone carving • Music bands • Diesel generator sets The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
Rajasthan Regulation and Control of the Development and Management	This bill deals with establishment of State Ground Water Authority with the powers to notify areas and uses for		The Act has not yet been passed.	Government of Rajasthan	Management of groundwater is highly relevant to activities such as agriculture, dairy, drinking water supply,

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
of Ground Water Bill, 2006 (Draft)	regulation and control of the development and management of ground water.				and horticulture. The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
Biodiversity, Forest, and Wildlife					
The Biological Diversity Act, 2002	To provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.	G.S.R.261 (E), [15/04/2004] - Biological Diversity Rules, 2004,	- Regulation Of access to biological diversity - Functions and powers of National Biodiversity Authority - State Biodiversity Board - Duties of central and state government - Biodiversity management committees	Ministry of Environment and Forests, Government of India; Rajasthan State Biodiversity Board	The act provides for constitution of biodiversity management committees by local bodies for conservation, sustainable use and documentation of local biodiversity. This provision is relevant for RRLP project areas in proximity of forests in the context of NTFP based livelihoods. The SHGs/VDCs/POs in convergence with the local bodies can focus on sustainable use and documentation of local NTFP species.

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
The Wildlife (Protection) Act, 1972 Amended: 1993 **and** No. 16 of 2003, [17/1/2003] - The Wild Life (Protection) Amendment Act, 2002	The Act provides for protection to listed species of flora and fauna and establishes a network of ecologically-important protected areas (PAs).	G.S.R.348(E), [18/4/1995] - The Wildlife (Protection) Rules, 1995.	- Empowers the central and state governments to declare any area a wildlife sanctuary, national park or closed area. - Blanket ban on carrying out any industrial activity inside these protected areas. - Provides for authorities to administer and implement the Act; regulate the hunting of wild animals; protect specified plants, sanctuaries, national parks and closed areas; restrict trade or commerce in wild animals or animal articles; and miscellaneous matters. - Prohibits hunting of animals except with proper permission for relevant reasons.	Department of Forest, Government of Rajasthan	The RRLP project encompasses one national park and 19 wildlife sanctuaries. It is also home to many endangered plants and animals. Hence, this Act is of great importance. It covers the following activities: • Livestock rearing and grazing – No grazing permitted in NPs; and regulated grazing in sanctuaries. • Collection of forest produce requires permission from Forest Department and has restricted access to forest dwellers. The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
Scheduled Tribes	The Act recognizes the	Scheduled Tribes and Other	The Act provides	Department of	This Act is particularly

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	rights of forest-dwelling Scheduled Tribes and other traditional forest dwellers over the forest areas inhabited by them, and provides a framework for recording the same.	Traditional Forest Dwellers. (Recognition of Forest Rights) Rules. 2007	three kinds of rights to Scheduled Tribes and Other Traditional Forest Dwellers: **Land Rights:** Right to continue cultivating land (less than or equal to four hectares) where they have been cultivating prior to 13 December 2005 **Use Rights:** Provides for rights to use and/or collect a) minor forest produce (*tendu patta*, herbs, medicinal plants) that has been traditionally collected, b) Grazing grounds and water bodies, c) Traditional areas of use by nomadic or pastoralist communities **Right to protect and conserve:** Gives the community the right to protect and manage the forest.	Forest, Government of Rajasthan	relevant, and will be applicable to the districts with large proportion of tribal population. The Act is relevant to the following activities: • Agriculture • Livestock rearing and grazing • Collection of NTFP The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
Indian Forest Act, 1927	To consolidate the law relating to forests, the	-	- Reserved forests	Ministry of Environment	Activities like cattle grazing and collection of

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
	transit of forest-produce and the duty leviable on timber and other forest-produce.		- Village forests - Protected forests - Control over forests and lands not being the property of government - Duty on timber and other forest-produce - Control of timber and other forest-produce in transit - Collection of drift and stranded timber - Penalties and procedure - Cattle-trespass	and Forests, Government of India; Department of Forest, Government of Rajasthan	forest produce require permission from the Forest Officer. The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
Forest Conservation Act 1980 Amended: 1988	To help conserve the country's forests.	- G.S.R.23(E) - Forest (Conservation) Rules, 2003. - G.S.R.719 - Forest (Conservation) Rules, 1981, amended 1992.	- Strictly restricts and regulates the de-reservation of forests or use of forest land for non-forest purposes without the prior approval of Central Government. - Lays down the prerequisites for the diversion of	Department of Forest, Government of Rajasthan	- Allows manual collection of forest produce (fodder grass, legumes); Use of mechanized vehicle will require permission of the Forest Officer - Prohibits the use of forest for any non-forest purpose like mining.

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
			forest land for non-forest purposes.		
Rajasthan Forest Produce (Transit) Rules 1957	Regulate the transit of forest produce into, from or within any area in the state of Rajasthan. Forest produce includes timber, lac, resin, mahua flower and seed, whether found in or brought from a forest. It applies to forest produce produced on private lands.		- Removal of produce - Passes - Fees - Means of transport - Checkpost - Marking - Stoppage in transit - Depots	Department of Forest, Government of Rajasthan	No forest produce (NTFP under RRLP project) can be moved into or from or within any area in Rajasthan without a pass issued by a Forest Officer or person duly authorized by the state by a Forest Officer or person duly authorized by the state government. However, no transit pass is required for the removal of any forest produce which has been extracted from the forest for consumption in exercise of any right or concession made by the state government. The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
OTHERS					
The Mahatma Gandhi National Rural Employment	To enhance the livelihood security of people in rural areas by guaranteeing 100 days of wage-employment	-	Provides a legal guarantee for 100 days of employment in every financial year	Ministry of Rural Development, GoI and	Specific schemes have been undertaken under this Act – convergence of such schemes (under this

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
Guarantee Act, 2005	in a financial year to a rural household whose adult members volunteer to do unskilled manual work.		to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage of Rs.100 per day.	Department of Rural Development, GoR	Act) with the proposed RRLP activities may be considered.
Right to Information Act, 2005	To provide right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority.	Rajasthan Right to Information Rules 2005	- Right to information and obligations of public - Constitution of the Central Information Commission and the State Information Commission - Powers and functions	State Information Commission	It is related to all those organizations and individuals who would like to secure information on the activities and schemes under the proposed RRLP project. It is relevant to maintaining transparency of project activities to be conducted under RRLP.
The Disaster Management Act, 2005	An Act to provide for the effective management of disasters.	–	- Powers and functions of National and State Disaster Management Authorities - Measures by the government and local authority for disaster management - National Institute	National Disaster Management Authority (NDMA) and Disaster Management and Relief Department, GoR	Rajasthan has faced various kinds of natural disasters including drought, flood, earthquakes, wind, and cyclone. The Act is particularly applicable to the drought-prone regions of the state.

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
			of Disaster Management		
		AGRICULTURE			
The Insecticides Act. 1968 *Amendment:* Insecticides (Amendment) Act, 1977 (24 of 1977)	To regulate the import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and for matters connected therewith.	GSR 1650, DT. 9-10-1971, Insecticides Rules. 1971	- To deal with distribution of insecticides to district agricultural officers - Registration, license and other rules & safeguards for handling insecticides by users	Department of Agriculture, Government of Rajasthan	- Applicability limited to prevention and regulation of pollution from insecticides handling, and disposal of outdated insecticides related to the RRLP subprojects - Producer organizations which are likely to be involved in storage, distribution, sale, promotion, and so on of pesticides are required to obtain licence and registration to function as dealers. The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
The Seed Act, 1966	To provide for regulating the quality of certain	The Seed Rules, 1966	- Central Seed Committee	Department of Agriculture,	- The Act will be applicable to all

Law / Regulation	Aim	Rules	Provisions	Enforcing authority	Relevance to RRLP
	seeds for sale, and for related matter		- Central Seed Laboratory and State Seed Laboratory - Regulation of sale of seeds of notified kinds or varieties - Certification agency and grant/revoke of certificate - Seed analyst, Seed Inspectors - Penalty	Government of Rajasthan	agriculture-related activities to be undertaken by producer organizations. - Producer organizations should deal with certified seeds only - The relevant provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.

B. Policies

Policies	Provisions	Relevance to RRLP
	NATIONAL POLICIES	
National Forest Policy 1988	To ensure environmental stability and maintenance of ecological balance (direct economic benefits being considered). • Area under forests • Afforestation, social forestry, and farm forestry • Management of state forests • Rights and concessions • Diversion of forest lands for non-forest purposes • Wildlife conservation • Tribal people and forests • Shifting cultivation • Damage to forests from encroachments, fires and grazing • Forest-based industries • Forest extension • Forestry education • Forest survey and database • Legal support and infrastructure development • Financial support for forestry	Highly relevant for all forest-based activities like NTFP collection and cattle grazing in PAs
National Water Policy, 1987 and 2002	To ensure that planning, development, and management of water resources are governed by national perspectives.	- Highly relevant for the RRLP project as the groundwater level in most of the blocks are in over-exploited/critical stage - Applicable to the activities related to agriculture and animal husbandry - Rainwater harvesting (RWH) and artificial groundwater recharge are considered as proactive environmental initiatives under the RRLP project—it has applicability in this Policy that aims at promoting RWH to further increase the utilizable water resources.
	STATE POLICIES	
Rajasthan Forest Policy, 2010	The forest cover of Rajasthan is only 9.56% of the total geographical area of the state. The principal aim of the forest policy is ensuring environmental stability and ecological security through increase in vegetal cover, which will lead to reduction in soil erosion, and consequently, dust particles in the upper stratosphere. The reduction in stratospheric temperature is likely to increase the possibility of rains.	The project area covers forest land. The Policy states that alternate livelihood options of the forest-dependent communities will be given importance through formation of SHGs. Skill development of these groups through capacity building and encouraging them to start micro-enterprises for income generation by providing them seed money will be undertaken.
Breeding Policy in Rajasthan for	The Policy is aimed to help improve the cattle and buffalo wealth of the state and socio-economic status of the farmers through increased productivity of their	The major livelihood activities envisaged under the RRLP project are dairy and agriculture. This policy is, therefore,

Policies	Provisions	Relevance to RRLP
Cattle and Buffalo, 2006, 2007	animals.	highly relevant to help improve the socio-economic status of the people--the project beneficiaries.
Environmental Safeguard Policies of the World Bank		
Operational Policy (OP)/Bank Procedure (BP) 4.01: **Environmental Assessment**	The purpose is to improve decision making, ensure that project options under consideration are sound and sustainable, and that likely-to-be affected people have been properly consulted. This is considered to be the umbrella policy, which among others include: Natural Habitats (OP 4.04), Forests (OP 4.36), Pest Management (OP 4.09), Physical Cultural Resources (OP 4.11), and Safety of Dams (OP 4.37).	**Triggered** The present Environmental Assessment study includes the development of an EMF for the proposed RRLP.
OP 4.04: **Natural Habitats**	The Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats.	**Triggered** The project districts have one national park and 19 wildlife sanctuaries. The relevant safeguards/provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
OP 4.09: **Pest Management**	In Bank-financed agricultural operations, pest populations are normally controlled through integrated pest management approaches such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to pests. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.	**Not triggered** Agriculture-related interventions supported through producer organizations may involve input support for pesticides. The relevant safeguards/provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
OP/BP 4.11: **Physical Cultural Resources**	The Bank does not finance projects that will significantly damage non-replicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage. The project areas do not involve sites having archaeological (prehistoric), paleontological, historical, religious, and unique natural values.	**Not triggered** The project activities are not likely to involve any construction or excavation at culturally significant sites.
OP/BP 4.36: **Forests**	The Bank does not finance projects that would involve significant conversion or degradation of critical forest areas or related critical natural habitats. The Bank may finance harvesting operations conducted by small-scale landholders or by local communities under community forest management.	**Triggered** The project districts have one national park and 19 wildlife sanctuaries. Out of the 17 RRLP districts, 14 have reserved forests. The relevant safeguards/provisions have been included in the Environmental Guidelines for RRLP-supported activities that are part of the EMF.
OP 4.37: **Safety on dams**	Small dams are normally less than 15 meters in height. This category includes farm ponds, local silt retention dams, and low embankment tanks. For small dams, generic dam safety measures designed by qualified engineers are adequate.	**Not triggered** The safeguard on dam safety is not triggered since the project does not involve the construction or rebuilding of any large dam. There may be some construction related to small structures – water harvesting structure and fisheries ponds. Project personnel who are fully qualified to design and oversee the construction will supervise all such works.

Legal requirements of producer organizations

Board Activities	Applicable Acts, regulations and policies	Legal requirements
Agriculture	Insecticides Act, 1968	- Compliance with registration, licence and other rules and - safeguards for handling insecticides by users - Producer organizations are required to obtain licence and registration to function as dealers - Safeguards have been included in EGs
	Seed Act, 1966	- Producer organizations must use certified seeds for sale and handling. Seeds should be certified by proper certification agencies.
Dairy	EIA Notification, 2006	Producer organizations must obtain relevant clearance from the State Pollution Control Board.
Forestry	Wildlife (Protection) Act, 1972	Relevant permissions are to be taken from the State Forest Department for trade or commerce in wild animals or articles made out of animal parts. Hunting of animals, except with proper permission for relevant reasons, is prohibited. There is a blanket ban on any industrial activity in the protected areas.
	Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	The issue of forest rights for Scheduled Tribes and other traditional forest dwellers vests with the gram sabha—necessary approvals are required for forest-related activities.
	Indian Forest Act, 1927	Approval from the state forest department for extraction of forest resources.
	Forest Conservation Act, 1980	Approval from the state forest department for extraction of forest resources.

CHAPTER 5 Livelihood activities under RRLP and their screening

5.1 Activities/subprojects under RRLP

It is expected that the activities/subprojects which were taken up by the Common Interest Groups (CIGs) under DPIP–I will continue, and the SHGs in DPIP–II (RRLP) will take loans for conducting similar livelihood activities. As shown in Figure 5.1 (below), most of the sub-projects financed under DPIP–I were broadly categorized into non-farm (27%—gem cutting, carpet weaving), animal husbandry (49%—mainly cattle, buffalo and goat rearing), natural resource management (14%—like forestry, pond construction) and agriculture (10%) related livelihood activities.

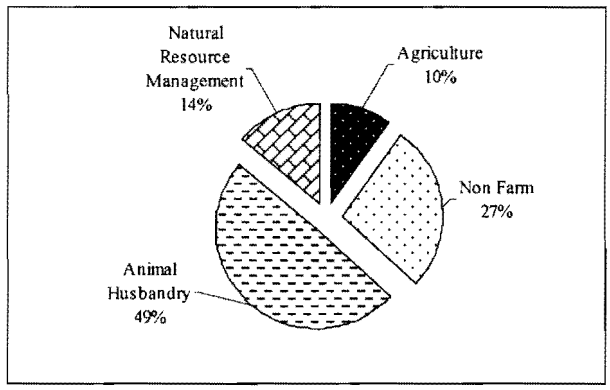


Figure 5.1 Livelihood activities supported in DPIP–I

Another study by Centre for Microfinance, New Delhi also reported that the loan taken by Self Help Groups (SHGs) in Rajasthan was mainly used for the debt repayment, agriculture and animal husbandry purposes (Figure 5.2)

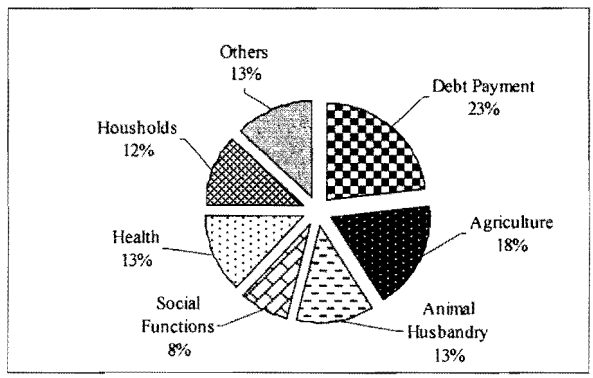


Figure 5.2 The purpose of loan utilization by SHG members (Rajasthan Microfinance Report–2007[29])

[29] Singh J., and Agarwal, P. 2007. *Rajasthan Microfinance Report.* Centre for Microfinance. New Delhi: Naveen Printers

During phase I of DPIP, the concept of CIGs or common interest groups was introduced into the livelihood framework. A common interest group would typically have 10 to 15 members and an interest in one particular activity. Self-help groups (SHGs), on the other hand, can have similar number of members but with varied interests. The SHG members typically would receive a seed loan in the early stage of the SHG formation, which will be used for meeting consumption needs. This seed loan is followed by a substantial loan for the livelihood plan. Environmental appraisal is applicable only for the loans to initiate any livelihood activity, and not for the seed loan. The major differences in DPIP–I and DPIP–II (RRLP) are highlighted in the following Table.

Key features	DPIP–I	DPIP–II (RRLP)
Nature of beneficiary groups	Common Interest Groups (CIGs) consisting of 10–12 members and interested in single common livelihood activity	Self-help Groups (SHGs) consisting of 10–12 members, and may be interested in multiple or single livelihood activity
Nature of support to SHGs/CIG members	Grant	Loan
Support for investing in mitigation measures	The provision and support to adopt mitigation measures is included as part of the grant	The adoption of mitigation measures to be made as a part of loan or financed through own resources

As shown in the Table, the support from RRLP to adopt mitigation measures may be in the form of a loan. This can enhance the loan burden on the SHGs who may show reluctance in adopting mitigation measures. Therefore, it is important that (a) mitigation measures are low-cost, and that (b) convergence with other governmental programmes is fully explored to support implementation of mitigation measures. Sectorswise details of the activities are provided below:

5.1.1 Livestock rearing

This category includes buffalo, cow, sheep, and goat rearing. The state of Rajasthan possesses 11% of the total animal population of India and yield almost 9.16% of the total milk production, 30% of goat meat production, and 39% of the total wool production including 35% of draught power. Animal husbandry alone contributes to about 13% of the state's economy.

Table 5.1 Livestock population of Rajasthan (Census 2003)

Species	Population
Cattle	1,08,53,512
Buffalo	1,04,13,834
Sheep	1,00,54,102
Goat	1,68,08,520
Camel	4,98,024

Animal husbandry is a major economic activity, especially in the arid and semi-arid areas of the state, due to lack of water and the consequent reduction in agricultural practices. A large share of families' assets and wealth is represented by livestock. Income from livestock accounts for 30–50% of the rural households' total income, with wide variations occurring between regions and households. The average number of livestock per household varies from 1–3 buffaloes or cows, and 8–10 goats (1:9 male: female ratio).

Activities in sheep/goat rearing

Sheep and goat rearing play a major role in the livelihoods of small farmers, women. Sheep and goat rearing is more prominent in western Rajasthan where there is acute scarcity of water and fodder. Goats and sheep are reared primarily for their milk and meat. Other uses include use of their fur and skin.

Goat meat *(chevon)* is one of the preferred meats in the Indian market, constituting about 35% of the total meat consumed. Milk from goats is also sold but has a very little demand accounting for only 3.5% of the total supply of milk in India. Breeds such as the *jamunapari* can produce up to 200 to 250 litres of milk per year, whereas the smaller *changthangi* and *chegu* varieties produce lesser volumes. Manure is also an important byproduct of goat rearing. An adult goat produces around 0.5kg to 1 kg of manure per day.

Sheep and goat rearing is a preferred livelihood activity amongst the poor farmers. It requires very little initial capital investment and infrastructural development. Most importantly, it entails less water and fodder as compared to rearing other larger ruminants. The floor space requirement per adult animal is just about one square metre.

Resource requirement and environmental issues

After West Bengal (18.8 million), Rajasthan, with 16.8 million, has the second highest goat population in India. As a result, the overall demand for both fodder and water are high. Food

requirement of goats is met by partly by fodder from crop residues grown and purchased by farmers. Goats rely largely on open grazing. Although around 5.84% of the total land in each district is under permanent pasture and grazing land, illegal encroachment on these lands decreases the availability of fodder. Tree species such as neem and babul are also fed to the animals. Other species of fodder include cactus, *Ziziphus nummularia, Acacia leucophloea, Acacia nilotica* and *Prosopis cineraria*. *Prosopis juliflora* is another important tree species with bimodal pod production i.e., concentrated growth around April/May and October/November. In order to avoid scarcity and mismanagement of fodder, goats are bred in such a way that the kids are born in October/November when the fodder and water availability is better.

Dry fodder in the form of crop residues is available throughout the year, except during the 2-3 months of pre-monsoon when dry fodder is purchased. Dry fodder is bought at about Rs 5–6/kg and mixed with green fodder before it is fed. Goats typically require anywhere between 1.5 and 6.0 kg of green fodder per day, depending on the animal's weight and size. Also, up to 500 gm of concentrate mixtures are required. This, too, depends on the weight and size of the animal.

Water required for small ruminants also differs with the size of the animal. However, constant access to drinking water must be provided for good nutrition. Typically, an adult goat drinks 2.8L–5.6L of water every day.

Activities in dairy

Dairying is the foremost economic activity in Rajasthan generating around 30–50% of income. The economic value of cattle includes meat, dairy products, and manure. It is a regular source of income, unlike agriculture which is seasonal and prone to be adversely affected by droughts. It plays an important role in improving the socio-economic condition of villagers and provides livelihood security. Dairying is mainly a woman-oriented activity, where cattle are usually looked after by the women. Buffalo-rearing is quite popular, with the average number of buffaloes per household varying between one and three.

In Rajasthan, since almost 60% of all cattle and about 80% buffaloes belong to the ordinary breed, they have low milk productivity and work output.

The other important factors contributing to low productivity are small land holdings and dwindling common grazing lands. As a result, there is a considerable difference between the demand and supply of fodder.

Resource requirement and environmental issues

Every year, around 25 million metric tonne of fodder is required to feed the cattle/buffalo in Rajasthan. A typical diet for cows and buffaloes should include roughage such as grass, legumes, and straw in order to increase their milk production.

Dry fodder requirement of buffaloes is between 8–10 kg, while concentrate requirement is 2 kg for maintenance (daily activities). Dry fodder like sorghum, maize, wheat straw, and rice straw are suitable for buffaloes, but other straws require additional treatment as they are of inferior quality. In addition, growing, breeding, lactating, and pregnant buffaloes must be on different diets for maximum productivity. Feed scarcity and a poor diet lead to lower milk productivity in females, and lesser reproductive capability in male animals.

Generally, buffaloes drink around 15–25 litres of water per day. Water required for washing the animals depends on the relative size of the animals and availability of water in the respective region. In most districts, water requirement for livestock is met by tubewells/borewells or handpumps installed for community drinking water purposes. Availability of fodder becomes a problem, especially during the pre-monsoon months (February–June). Thus, dependence on purchased fodder is high during this period. The degraded pasturelands and illegal encroachment of community grazing land aggravate the fodder problem, especially for small ruminants like goat and sheep.

DPIP Phase–I experience

- Goat and buffalo rearing were the major activities funded in districts like Dausa, Dholpur, Churu and Tonk.
- Fodder scarcity and water scarcity were directly correlated.
- DPIP–I provided financial assistance for buying goats and buffaloes, but not for water and fodder; and this need should be addressed.
- Dairy accounts for 45% of all activities within animal husbandry groups.

- For fodder, in some villages in Dausa, trees (neem, babul) are bought at the rate of Rs 100 –150 per tree while in Dholpur fodder is bought at Rs 5/kg.

Mitigation measures required

Different mitigation measures can be implemented at all organizational levels, viz. the individual, SHG, and village levels.

At the *individual level,* cleaning and upkeep of the animal shed should also be ensured in order to avoid spread of diseases and contamination. Use of chaff-cutter, water and feed troughs can also be promoted as a good management practice. Feed and water troughs should be of proper material like rubber, plastic, concrete, and so on so that they do not rust and cause injury to the livestock. Before feeding, animals should be separated based on their size and age group, to avoid their being over- or under-fed. Farmers can cultivate fodder crops depending on availability of land and water. This will reduce the need for purchase of fodder. Villagers can also adopt fodder-enrichment methods like addition of urea and molasses to provide essential nutrients to livestock. Proper hygienic practices must be followed while milking the animals and transferring the milk into containers. Vessels containing milk must be covered and refrigerated as soon as possible. In addition, hands must be washed and disinfected before milking the animals. Composting livestock manure will provide free source of compost for the small agricultural fields.

At the *SHG level,* efficient fodder management can be practised. Chaff-cutter machines can be bought by the SHGs to turn coarse fodder into a form that is more palatable and easily digestible by the livestock. The group can also collectively buy dry fodder, to avail of discounts on bulk purchase and minimize the transportation cost.

At the *village level*, livestock welfare cooperative society can be formed and necessary support can be sought from the RCDF. Each society focuses on different aspects like sanitation, health, and food requirements of the livestock; protection and regeneration of grazing lands and so on. Another concern of these activities is the animal carcasses, which can have a negative impact on the environment, if not properly disposed. At the village level, adequate carcass disposal management can be practised. Carcasses should be disposed of within 24 hours by adopting proper methods like burial or incineration. Disposal near surface water is not advisable.

Mitigation measures already being implemented

Currently, a number of good practices and mitigation measures are being followed in the villages of Rajasthan. Fodder enrichment by adding *khali*, *kakra*, molasses, and salts and the mixing of green fodder is being undertaken. Crop waste (straws, husk) is used as fodder and the mustard 'oil cakes' (after oil extraction) are used as fodder, as well. Chaff-cutting machines are being used to cut the fodder and make it more palatable for the animals and also to facilitate easier digestion. Waste management is also being performed with cattle and goat dung waste being used as manure as well as cooking fuel. As a source of additional income, the dung is being sold to neighbouring villages and farms by those who do not own agricultural land.

Case study

District: Dausa	**Block:** Dausa
Village: Maheshwara	**Group name:** Jagadish Saman Ruchi Samuh
In Dausa, the *Jagadish Saman Ruchi Samuh* shared information on how integrated livestock management can have a positive impact on livestock productivity, as well as on the environment. The group rears about 30 goats. The housing facility for the animals is an outhouse shed, located behind the house. For fodder purposes, trees (neem, babul) are bought at the rate of Rs 100–150 per tree (one canopy), mainly during periods of scarcity (April–June). The farmers have increased soil productivity by adding dung as manure. In addition, the dung is sold by the members who do not own agricultural land at the rate of Rs3000 per trolley of dung. It takes about a year for them to collect one-and-a-half trolley full of dung. Due to encroachment of community pastureland, open grazing is a restricted activity.	

5.1.2 Agriculture

About 2/3 of the people of Rajasthan depends on agricultural activities for their livelihood. Primary crops grown in the state include mustard, rapeseed, gram, pulses, wheat, bajra, jowar, and barley. The western zones of the state are predominantly desert lands which fall in the semi-arid category. On the other hand, the floodprone eastern part of the state has many rivers and enjoys more rainfall. Hence, in these regions, agricultural activities dominate.

Rajasthan has two principal cropping seasons, namely, rabi and kharif. Rabi crops, or winter crops and are sown in October and November, and are harvested in March and April. The principal rabi crops are barley, wheat, gram, pulses and oilseeds. The major oilseeds are rapeseed and mustard. Kharif crops are grown during monsoon and are sown in June and July. They are harvested in September and October. This class of crops includes bajra, pulses, jowar, and maize.

Some areas of Rajasthan are rich in black soil, which is ideal for major cash crops like cotton. Other crops include tobacco, potato, and sugarcane.

Activities

Agriculture-related activities form the backbone of any agro-based economy. These activities for which SHGs are likely to take loans range from irrigation (minor), hand pumps, crane/thresher, horticulture, engine and pipe set, and Kund Bagwani. As much as 70% of the state observes rain-fed agriculture. Many of the project districts like Dausa, Bikaner, and Churu grow one crop a year, during the monsoon season.

Resource requirement and environmental issues involved

Primary natural resources required for all these activities are water for irrigation, and soil rich in nutrients and organic matter. Since the state of Rajasthan is classified as arid/semi-arid region, where nearly 70% of the irrigation is dependent on tubewells, agricultural activities have environmental impact. The major source of water in western Rajasthan is extracted groundwater, while in eastern and southern Rajasthan it is canals.

DPIP Phase–I experience

- Major activities funded under the DPIP Phase–I districts were engine and pipe set, and irrigation well.
- Engine sets induce fast depletion of groundwater.

- A need was felt for proper fencing for all horticulture activities.
- Kund bagwani was one proactive project promoted during DPIP–I and had favourable impacts on the environment and livelihood activities.

Mitigation measures required

Different mitigation measures can be implemented at all organizational levels, viz. individual, SHG, and village levels.

Overall mitigation required for this activity is better use and management of water resources. As the groundwater level has already dropped down to the 'over exploited' category in many blocks, any project for tubewell/irrigation well should be approved only when absolutely necessary. Further, no tubewell/irrigation well should be approved without the provision of rainwater harvesting and efficient irrigation practices like drip and sprinkle irrigation.

At an *individual level*, better use and management of water should be practised. Soil conservation measures such as bunding, contour ploughing, and so on could also be adopted. Also, judicious use and efficient application of agro-chemicals is suggested. No pesticide classified in WHO Class Ia, Ib and II should be applied. Farmers should practise integrated pesticide management (IPM) and integrated nutrient management (INM). Compost from vermi-composting activities should be used because it is a very rich and wholesome fertilizer.

At the *SHG level*, improved varieties of seeds (resilient to climate and resistant to various pest attacks) could be purchased by the members with small shared investment. Construction of godowns can also be a useful measure, since storage of food grains is essential in increasing the economic output for farmers. To prevent the entry of rats and other insects, there should not be any unnecessary opening or duct at the grain storage houses. Moisture and temperature must be regulated within the godown in order to avoid rotting of grains. There should be appropriate ventilation arrangement inside the godowns to prevent moisture accumulation. Additionally, godowns should be oriented in such a manner that they receive minimum sunlight.

At the *village level*, construction of farm ponds should be encouraged in RRLP as an alternative means of irrigation. Also, rainwater harvesting and formation of water harvesting tanks will aid in reducing the usage of other sources of water for horticultural activities. Moreover, organized land use planning should be undertaken at the village level. Krishi Vigyan Kendra should be contacted to gather technical information on IPM, INM, soil testing, and irrigation schedule.

Mitigation measures already being implemented

As the availability and frequency of water are diminishing, farmers have adapted to the prevailing conditions by switching to alternate (seasonal) crops. This helps the farmers grow crops and generate income the whole year around. An example is provided in the case study below.

Case study:

District: Sawai Madhopur	Block: Sawai Madhopur
Village: Mou	Group: Luv-Kush Swayam Sahayata Samuh
In the district of Sawai Madhopur, the Luv-Kush Swayam Sahayata Samuh has adapted to the changing agricultural patterns. This was done by growing more mustard in contrast to the gram and jowar that were favoured previously. The group also practises efficient irrigation measures like sprinkle irrigation. Groundnut is sown after monsoon as the moisture left in the soil is sufficient for the crop. All SHG members use dung to fertilize the agricultural fields. This has improved the overall soil quality.	

5.1.3 Forest products

As mentioned earlier, Rajasthan is largely arid and semi-arid. About 9.5 % of its total geographic area is under forest cover, with most of it being confined to the eastern and southern parts of the state. Half of these forests are distributed primarily over hilly areas such as in Udaipur, Rajasamand, Kota, Baran, Sawai Madhopur, Chittorgarh, Sirohi, Bundi, Alwar, Jhalawar, and Banswara districts. The forests can be classified into three main types:

(1) Tropical thorn forests: Main species found in these forests are *Acacia nilotica, Acacia leucophloea, Prosopis cineraria, Capparis aphylla, Zizyphus spp.*, among others. These forests are found in western parts of Rajasthan, namely Jodhpur, Pali, Jalore, Nagaur, Churu, Bikaner, and so on.

(2) Tropical dry deciduous forests: Species such as *Anogeissus pendula, Acacia catechu, Terminalia tomentosa, Boswellia serrata,* and *Lanea grandis* are found around the northern and eastern slopes of Aravalli ranges, mostly in Alwar,

Bharatpur, and Dholpur.

(3) Central India sub-tropical hill forests: Found in the Sirohi district of Rajasthan. These forests have mainly semi-evergreen and some evergreen species.

Activities

Forest products include all goods as well as services derived from forest or land under similar use. The resources derived from the forests include timber, fuel wood, fodder (direct forest products); and bamboo, fruits, tendu leaves, honey and so on (non-timber forest products). Other potential NTFPs that are also collected include tree bark for medicinal purpose, lac dye, leaves for making *pattal dona*, gum, and so on. Activities derived from these forest resources include bamboo products, bow and arrow making, *pattal dona* making, fruit selling, honey collection and sale. According to the Government of Rajasthan, Department of Forests, the total contribution of NTFP works out to approximately Rs 520 million annually. Pandey (1996)[30] mentions that major tree species include *Mangifera indica* (aam), *Madhuca indica* (mahua), *Zizyphus mauritiana* (ber), *Phoenix sylvestris* (khajur), *Butea monosperma* (khakhra), *Tamarindus indica* (imli), *Syzygium cumini* (jamun), *Diospyros melanoxylon* (tendu), *Ficus benghalensis* (vat), *Ficus religiosa* (pipal), *Dendrocalamus strictus* (bamboo), *Lannea coromandelica* (godal), *Azadirachta indica* (neem), *Soymida febrifuga* (rohan), *Derris indica* (karanj), and *Annona squamosa* (sitaphal). Shrubs include *Vitex negundo* (negad), *Cassia auriculata* (awal), and *Zizyphus nummularia* (jharberi). The indigenous species of grass found include *Apluda mutica, Sehima nervosum, Eragrostis tennela*, and *Dicanthium annulatum*. These grow on steep slopes and are also resistant to canopy closure. Women collect fallen and dead wood from the forest and agricultural lands and use these as fuel.

Resource requirement and environmental issues involved

NTFP production depends on the overall health of forests in the respective region. RRLP districts have one national park and 19 wildlife sanctuaries as protected area. NTFP collection should be carried on in a sustainable manner without causing any harm to the forest cover. For activities like bamboo stool making, villagers can utilize their own bamboo. The environmental impact of these activities ranges from negligible to low. Low

[30] http://www.iifm.ac.in/databank/jfm/rajcase.html

impact includes over-extraction from forest, water consumption and green plant waste, leftover during and after the stool-, basket- and rope-making activities. Making of bows and arrows, on the other hand, has a significant impact on the environment and also affects the health of the workers. Making and selling bows and arrows has a direct impact on illegal hunting of wildlife. Since the bamboo (for the bows) needs to be pre-cooked, there is heating involved, which emits smoke and particulate matter. Other components requiring heating (fire) are the melting and shaping of the metallic arrowheads.

Mitigation measures required

At the individual level, possible mitigation measures could be avoiding use of illegally extracted raw materials, to use recycled water for cooking the bamboo sticks for stool- and rope-making. Also, leftover bamboo material could be used as fuel.

At the SHG level, a joint effort could be made to reduce the impact on forests, and activities could be undertaken to purchase saplings and plant them in the surrounding areas. The SHG should promote plantation to increase forest cover. SHG should also ensure that required permission has been taken from the forest department. Activities like bow and arrow making should not be promoted as these products are used for hunting.

At the village level, better management practices of NTFPs can be initiated. These would include preparation of inventory of non-timber resources, preparation of management plans, as well as improving storage and transport facilities and identifying appropriate marketing strategies. Cluster Development Organization (CDO) should contact the forest department for technical inputs and other support on NTFP collection. Overall, sustainable harvesting practices should be promoted.

Case study

District: Banswara	Block: Ghatol
Village: Bhuvasa	Group name: Sharda Swayam Sahayata Samuh, Parvati Swayam Sahayata Samuh
The two SHGs are involved in making bamboo baskets, which accounts for their major source of income. The preparation time is four hours and they sell the final product for Rs 80, which enables them to earn a profit of Rs 20 per basket. There is no impact on the forest as bamboo is grown specifically for this activity.	
	
Figure 1: Bamboo basket products	Figure 2: Members of Sharda Swayam Sahayata Samuh

5.1.4 Handicrafts

Possible activities

The activities within this category include *nagina* (gem cutting) *udyog* and pearl drilling.

Resource requirement and environmental issues involved

Requirement of natural resources for these activities is relatively low. Minimal amounts of water are needed for *nagina* and pearl drilling. However, generation of dust is a major issue, as it affects the health of the workers.

Mitigation measures

Recommended measures to mitigate these impacts include the use of mouth/nose masks by all workers. Appropriate eye protection must also be provided and used by workers dealing with pearl drilling and *nagina udyog*.

5.1.5 Construction-based activities

Possible activities

The activities within this category include land levelling and reclamation, godown construction, RCC shuttering, iron welding, and brickmaking from marble slurry.

Resource requirement and environmental issues involved

The requirement of natural resources for conducting these activities is not of a significant amount. RCC shuttering requires the maximum amount of water for cement strengthening. Brickmaking from marble slurry uses reasonable amounts of water. The major environmental issues involve in these activities are water and air pollution.

Godown construction requires clearing of land and construction material (cement, bricks, supporting beams, and water). The godowns must have good ventilation, waterproof roofs and walls, and minimum exposure to sunlight.

DPIP Phase–I experience

- The major activities funded at the DPIP phase–I districts were stonecutting and carving.
- Problems included health hazards from stonedust and suspended particulate matter.
- Fine limestone dust from stonecutting machines is of major concern since this dust, upon entering the lungs, can cause serious respiratory problems.
- It was observed that lot of slurry is generated during stone processing, which can be used for roads or other construction purposes.

Mitigation measures required

Recommended measures to mitigate these impacts include the use of mouth/nose masks by all workers. Also, SHG members should sprinkle water to suppress generated dust at the stone carving areas.

Case study:

District: Dausa	Block: Dausa
Village: Sikandra	Group: Shiv Saman Ruchi Samuh Ganpati Saman Ruchi Samuh Bajrang Saman Ruchi Samuh
Stonecutting and carving are flourishing in Sikandra village in Dausa. Discussions with workers revealed that they were very satisfied with the work. The main concern amongst all group members was that they needed further training on protection from stonedust. According to them, after 5–7 years of working at stonecutting, most of the people suffer from TB and related lung diseases.	

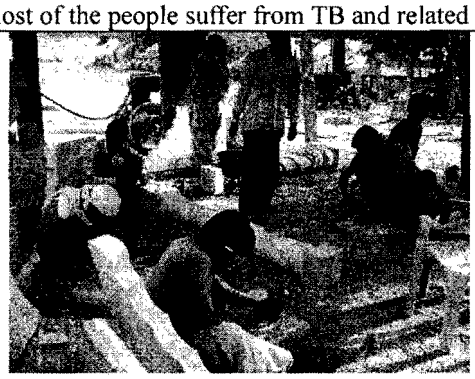


Figure 3: Stone carving by hand

Figure 4: Dust emanating from stone polish machine

5.1.6 Service-based activities

Possible activities

Service-based activities are those that provide general facilities to people. These activities include establishments such as a dhaba (restaurant), music band, retail trading, and tent house/light decoration.

Resource requirement and environmental issues involved

No specific natural resource is required for these activities, except in case of the dhaba, which needs adequate water and firewood for cleaning and cooking. It was observed that a dhaba has a low polluting impact. This is due to the poor solid waste disposed at the back of the premises, and also due to lack of basic water treatment/pit.

Mitigation measures required

Possible mitigation measures can include better measures of solid waste management at the dhaba site, separating the dry and wet wastes, and use of fuel efficient cook stoves. Wastewater from drains could be led into a pit, where it would then be naturally filtered by soil. For the general stores, solid waste management is also recommended, especially with packaging waste. The music band activities will have to adhere to noise pollution regulations. For example, using the loudspeaker at odd hours and close to public places such as schools and hospitals should be discouraged.

Mitigation measures already being implemented

Leftover food is being fed to animals, instead of these being disposed of.

Case study:

District: Tonk	Block: Uniyara
Village: Sahadat Nagar	Group: Jay Hanuman Samaan Ruchi Samuh

This dhaba (small restaurant) is a good example of a service-based activity. Discussion with members revealed that it was a successful enterprise with the group earning Rs 3000 per month. Negative impact on the environment is avoided by feeding leftover food items to animals. However, solid waste and waste water need to be better managed and treated.

Figure 5: Solid waste around the dhaba at Sahadat Nagar, Tonk.

Figure 6: Waste water disposed into the fields located behind the dhaba premises. Effluent contains detergent, oils, and other contaminants.

5.2 Impact assessment and screening of the livelihood activities

The list of activities acquired from DPIP-I was filtered, and activities selected based on their frequency and potential adverse impact on the environment. The list has been screened further, and divided into four categories: negligible, low, medium or high category of environmental impact based on the decision tool and criteria presented in **Annexure 2.** These criteria have been developed based on the potential environmental impact of the livelihood activities, lessons learnt during DPIP–I, and stakeholder consultations. The impact areas included water, air, noise, soil/land, forestry, and solid

waste. Based on the categorization of activities, a list of the subprojects, which should not be supported under RRLP (in view of high environmental impacts and legal requirements) have been prepared **(Annexure 3)**. This list of activities will be communicated by the SPMU to the SHGs through DPMU, PFT, and CDO.

Annexure 4 lists activities likely to be supported, along with their categories. As depicted in Annexure 4, most of the activities are likely to be categorized under 'negligible' or 'low' impact categories. There are few activities, which fall under 'medium' impact category that may cause long-term cumulative environmental impacts and hence require focussed attention during internal monitoring and evaluation.

CHAPTER 6 Proactive environmental subprojects

6.1 Overview

Keeping in mind the field records, feedback received from various Self-help Groups in the RRLP districts of Rajasthan and secondary research, certain proactive subprojects, which would bring about an increase in the income of the SHG members, are suggested. These environment-friendly subprojects, when implemented, would help the communities to manage their natural resources and environment in a sustainable manner.

This chapter provides an overview of the selection of activities/practices/ technologies that have been tried and tested in Rajasthan. These environment-friendly subprojects would help the communities to manage their natural resources and environment in a sustainable manner, while simultaneously providing livelihood benefits. The selection is based on secondary research as well as field consultations with SHG members. The strategy for promoting these activities/practices/ technologies within the RRLP has been outlined in chapter 7.

According to the 'Review of environmental status' in Chapter 3, major environmental issues in the project area of the RRLP are related to water, livestock, and agriculture. Hence, the choice of activities/practices/ technologies presented in this chapter focus on these areas.

6.2 Rainwater harvesting

Due to escalating population, the demand for water is increasing day by day. Sources of water are rapidly depleting due to irregular and scanty rainfall, over exploitation of groundwater, and lack of surface water. Rainwater harvesting can be one of the options to manage water resources in an affordable manner and ensure water supply. Rainwater can be collected in underground or above the ground tanks, tubs or barrels. These vary in capacity from a few tens of litres to about 500 or more litres. Harvesting of the run-off can be done on the ground, in the open fields or atop slopes and roofs. Because water is the key limiting factor for most of the livelihood-generating activities, harvested rainwater can be used for several purposes such as water for livestock and life-saving irrigation for horticulture activities.

6.2.1 Rooftop rainwater harvesting

6.2.1.1 Description of practice

Rooftop rainwater harvesting is a technique of collecting rainwater from the roof catchments. The rainwater is then stored in reservoirs. Pipes and drains are installed atop roofs and along the slopes (for a sloped roof). These pipes are then channelled down into the rainwater collection tank, which can be an underground construction or a plastic tank located outdoors near the house.

The volume of rainwater harvested would depend on the annual rainfall, roof surface and runoff coefficient. To calculate the rainwater yield from any rooftop rain water harvesting system, the following equation is used:

Roof area (m^2) × Annual rainfall (mm) × Runoff coefficient.

Runoff coefficient depends on the type of roof material used. The efficiency of rainwater collection depends on the material used, construction, maintenance, and total rainfall in the area. According to the Census 2001, most households in Rajasthan have stone-laden roofs with a run-off efficiency of 80%. For example, in Dausa, a roof area of 16sq.m. with 554.5 mm of annual rainfall can yield 7097.6 litres of water on an annual basis. If 100% of the rainwater is harvested every year, it can meet the drinking requirement of a buffalo for the entire year.

Table 6.1 Number of census houses by predominant material of roof in Rajasthan

S.No.	Material of the roof	Total number of households
1.	Grass, thatch, bamboo, wood, mud, and so on	19,50,562
2.	Plastic, polythene	29,751
3.	Tiles	23,89,654
4.	Slate	2,02,770
5.	G.I., metal, asbestos sheets	4,34,728
6.	Brick	3,80,072
7.	Stone	62,38,912
8.	Concrete	12,38,924
9.	Any other material	72,360

Source: Rajasthanstat.com

The following points should be kept in mind, while designing a rooftop rainwater harvesting system:

- In order to avoid contamination of rainwater, it is necessary to keep the roof clean by sweeping it on a daily basis during the rainy season.
- The first shower of rain should not be collected as the water is contaminated with dust and dissolved gases (such as CO_2, SO_2, NO).
- The roof should have a steep inclination for the rainwater to flow downward into the pipes.
- The storage tank should be clean and covered in order to prevent growth of algae and bacteria and also to reduce losses due to evaporation.
- Maintenance and upkeep of rainwater harvesting systems should be conducted on a regular basis.

6.2.1.2 Advantages of practice

The average annual rainfall in Rajasthan is 57.5 cm. Although the volume is low, proper collection and channeling throughout the year can prove to be useful. Hence, there is a need to promote rooftop rainwater harvesting in order to tap rainwater and use it for household purposes as well as to meet the water requirements of livestock. Following are the advantages of installing rooftop rainwater harvesting systems:

- Simple to construct
- Easy to operate and maintain
- Water is not wasted and can be used for various purposes
- Leads to self-sufficiency in water supply
- Stopping soil erosion in the area surrounding the house by preventing water streams from eroding the terrain
- Less expensive technique
- Reduces the cost involved in pumping of groundwater

Availability of sufficient water may enable villagers to adopt other income-generating activities, and thus lead to further sustainability in their livelihood activities and lifestyle.

6.2.1.3 Investment required

A small-scale individual installation could cost anywhere between Rs 10,000 to Rs 300,000, depending on the roof area and slope direction. Large-scale community setups would cost more. Assuming brick wall with RCC roof, maintaining roof slope of 1:100 and PVC built storage tank, the cost of rooftop rainwater harvesting structure will include the following:

Table 6.2 Estimated cost of rainwater harvesting components

Sl. No.	Description	Qty	Rate	Amount
1	110mm. x 6m. RWH pipe	1	350.00	350.00
2	75mm. RWH pipe	2	1400.00	2800.00
3	90mm. right-angled adopters	4	95.00	380.00
4	90x45 deg. bend	2	100.00	200.00
5	L-clamps	5	150.00	750.00
6	U-clamps	10	35.00	350.00
7	75mm. right-angled adopters	2	75.00	150.00
8	Solvent cement	1	400.00	400.00
9	Control valves	1	750.00	750.00
10	Anchor bolts and nuts	6	15.00	90.00
11	90 mm. Tee	4	130.00	520.00
12	75 mm. Tee	2	85.00	170.00
13	90x75 mm. reducer	1	130.00	130.00
14	75 mm. coupler	1	40.00	40.00
	Total			7080

6.2.1.4 Case example

There have been successful implementations of rooftop rainwater harvesting systems in Rajasthan through the 'Akash Ganga' project implemented by 'Sustainable Innovations', a non-profit corporation. This project was implemented in six villages of Rajasthan to provide drinking water to around 10,000 people. In 2006, the project won the World Bank's Development Marketplace Award. In Raila village of Rajasthan, the first pilot project was implemented. Almost all households are equipped with rainwater tanks, which help in setting up small kitchen gardens, thus improving their nutritional and food requirements.

Similarly, in Tilonia, Rajasthan, a model approach to rooftop rainwater harvesting has been developed by the Barefoot College. They modified the roofs of schools and community buildings to collect the infrequent rainwater and channeled it into underground tanks or unused or dry open wells. The channelled rainwater is used for drinking (after treatment) and sanitation to purposes. The Barefoot College architects applied traditional knowledge and community skills in the construction process, thereby lending the community a sense of ownership.

6.2.2 Kund bagwani

Description of practice

Kund bagwani is an innovative proactive environment subproject that was promoted during the DPIP phase–I, as well. This subproject allows collecting rainwater in a concrete tank/*kund*, which can then be used for horticulture in arid areas like Churu and Bikaner. Many SHGs showed keen interest in adopting this practice. The following steps are involved in Kund bagwani:

1. Construction of kund: The area of the *kund* relies on availability of rainwater. Generally, 90% of annual rainfall is enough for kund formation. The kund should be made of concrete and its flooring must be waterproof.
2. Identifying the suitable crops: The decision in this matter will be taken after consultation with local agriculture/horticulture department/Krishi Vigyan Kendra. The crops grown should be resilient, requiring minimum water, high yielding and fast growing. Many seasonal vegetables or flowering plants can be grown.

Advantages of practice

This practice allows optimal use of rainwater for livelihood generation. However, as rainwater is available only for 3–4 months, alternative livelihood subprojects should also be promoted.

Investment required

The cost involved is approximately Rs 35,000, which includes Rs 10,000 for kund formation and remaining Rs 25,000 for tubewell. The activity generates an income of Rs 1500 per day.

Case example

During the stakeholder consultation and field visit, an example of Kund bagwani was observed and visited in Jharia village of Churu district. The project has been taken up by Kunnu SHG that comprises 11 members. The kund, made of concrete, collects rainwater during monsoons, while groundwater (using a borewell) is stored and used during non-rainy months. The area under cultivation is 5500 sq.m. The major crops grown are lemon, moosambi, cucumber, pomegranate, eggplant and water melon. A commendable practice observed was that the water channels from kund to crop area were coated with plastic sheet and dung. This prevents water loss due to seepage through the sandy subsurface. Pictures of the activities are provided in Annexure 1.

6.2.3 Farm ponds

6.2.3.1 Description of practice

Farm ponds can be ideal options for sustainable use and conservation of local water resources of a village. Creating a farm pond involves various steps that assess the topological, hydrological, economic, and ecological feasibility of the structure.

The topography should be favourable to collection of water without undertaking any additional engineering. Hence, a pond in a valley would be the best choice since it will have a large catchment area. Typically, clay and silt should form the bed of the water body, since they have very low hydraulic conductivity, and will prevent water from seeping back into the ground. On the other hand, sand and other loosely packed material will drain well and not retain water. Thereafter, the exact depth and surface area of the pond must be determined, according to the need of the owner(s), and the existing diurnal temperatures and other climatic conditions. For instance, a pond that is too shallow will not sustain water in the dry areas, since losses due to evaporation will be very high.

The overall area required for construction of the pond will depend entirely on 1) area of land that needs to be irrigated; 2) feasible depth to which the pond can be dug, which in turn will depend on the geological subsurface features; 3) storage losses; and 4) volume of water in the watershed of the pond (annual water yield). These factors will vary between farmers, villages and agro-climatic regions.

6.2.3.2 Advantages of practice

Creating farm ponds in village areas can serve a multitude of purposes directly linked to sustainability of livelihoods. Water from the ponds can be pumped or channelled during drought as irrigation water. This water could also be used for growing orchards and other agro-forestry activities.

Besides direct storage of rainwater in farms for irrigation, when the channelled rainwater collects in the pond, it can help in augmenting recharge. Although most of the water in the farm pond is retained by impermeable layers of clay and silt, fractional hydro-geological.

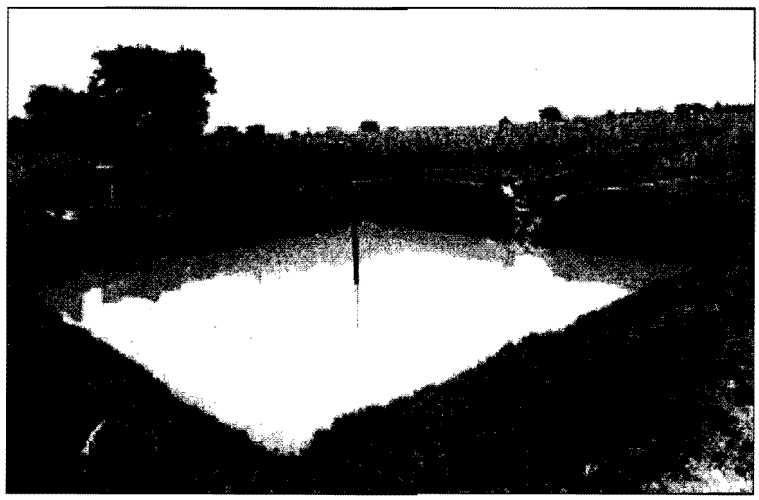


Figure 6.1 An example of a farm pond in Rajasthan

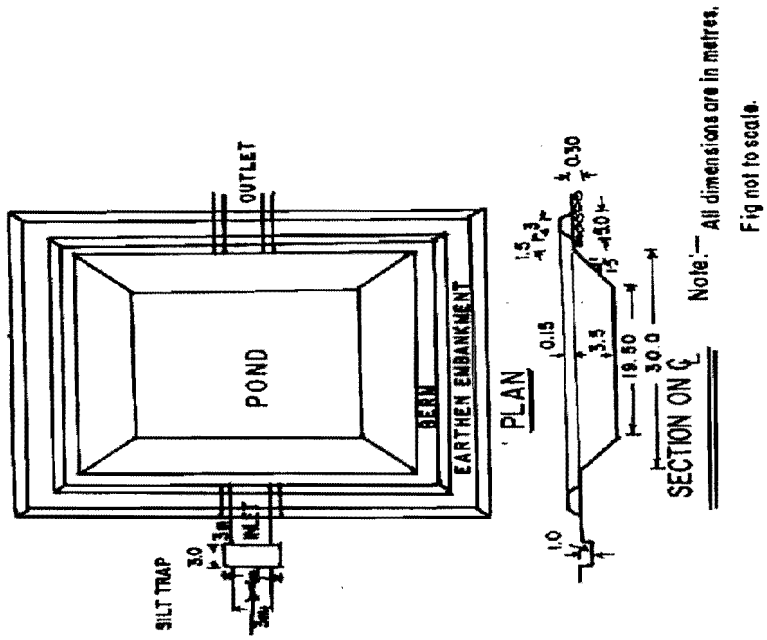


Figure 6.2 Line diagram showing the design of a dug-out farm pond

seepage leads to an increase in the local groundwater table. This results in an increase in recharge in the surrounding bore wells, which is the main source of water in Rajasthan.

Water needs of livestock (washing, drinking, and so on) can also be met with the construction of such farm ponds. Other benefits include the provision of wage employment to agricultural

labour, and an added aesthetic beauty to the area along with a sense of security for the villagers, who become aware of the existence of a waterbody in the area, which is both accessible and reliable after the rainy season. Additionally, these ponds check soil erosion in the surrounding areas.

6.2.3.3 Investment required

The cost of construction of a farm pond depends on various factors such as rainfall in the region, area of the pond, depth to dig, and resource availability of water i.e., how easily water can be channelled into the pond. Overall the cost varies between Rs 5,000 and Rs 80,000 per pond. For a single farm and for use in irrigating a field with a volume of 10m × 10m × 2m = 200 m^3 (200 × 10^3 L), a cost of Rs. 8000 has been estimated.

6.2.3.4 Case example

There are various examples of sound practices in water resource management, and many of them are farm ponds.

In the Rajsamand district, *nadis* or ponds used to serve as the primary source of drinking water. However, due to rapid silting (sand and silt), these structures were rendered unusable. In order to tackle the situation, the Mewar Krishak Vikas Samiti (MKVS) has helped the locals in constructing about 25 *nadis* over an area of 500 ha in the villages of Lambodi, Gudlia, Kharasan, Hakiawas, and Bhairu Das ka Kheda. Spillways and silt traps were also constructed as supporting structures, which helped in the de-silting and filtration of water before it entered the *nadis*. The overall cost of construction ranged between Rs. 2500 and Rs 10,000, using material and land that were already owned and were locally available.

Another good instance of implementation is from Alwar, where the Tarun Bharat Sangh (TBS) inspired the regenerating and construction of more than 4000 *johads* (earthen bunds or check dams to conserve rainwater) in 100 villages. The costs involved were borne almost entirely by the villagers. The impacts of this 'catalytic' intervention by the TBS were felt in the form of increased food production, better soil conservation, and increased biomass productivity. Even the Aravari and Ruparel rivers have benefited from this endeavour.

6.3 Fodder development

6.3.1 Fodder cultivation

6.3.1.1 Description of practice

Proper practices regarding fodder feeding and management are imperative when it comes to productivity and longevity of livestock. Better feeding alone can result in a 30% increase in milk production.

Fodder cultivation involves growing plants and crops that would serve as feed for livestock. These plants are termed 'green' fodder and have a much higher nutritional value than dry fodder. Since the green fodder can be mixed with dry straw, it can be rationed.

Grasses for fodder include species of hybrid Napier and Guinea grasses. They are known for their high yields, and their new varieties produce good quality fodder. Being perennial and high yielding in nature, these grasses are very useful. Shrubs and smaller trees including *Gliricidia*, *Desmanthus*, *Leucaena*, and *Sesbania spp.* are rich sources of protein.

6.3.1.2 Advantages of practice

The primary advantage of self-cultivation of fodder is independence from markets and self-reliance. Nutritional requirements of ruminants are also met adequately with grown fodder. Fodder crops provide critical elements like highly digestible protein, carbohydrates, fats, and minerals. Green fodder is an important source of b-carotene.

In addition, the nutritional value from green fodder is considerably more cost effective than that from other concentrates and substitutes. Moreover, fodder scarcity can be prevented by storing leftover fodder in the form of silage or hay for the dry season.

6.3.1.3 Investment required

An approximation suggests that for an average of 100 small ruminants (goat/sheep), 5 acres of land need to be cultivated for fodder. The cost per season for two acres of land would be about Rs 3000 for such ruminants.

6.3.2 Fodder enrichment

6.3.2.1 Description of practice

The feeding strategy for livestock in dry regions should aim to optimize efficiency of consumption of available feed resources. Adequate diet should be given to the livestock in order to increase production of milk and enhance fertility. Following methods can be adopted for fodder enrichment:

- Approximately 2 kg of fertilizer grade urea to be mixed with 10 litres of water and 10 kg of molasses. This mixture should be sprayed over the straw and should be allowed to remain in the sunlight for a few hours. The treated straw can then be fed to animals.
- Straw can also be soaked in common salt solution and then dried in the sun.
- Straw can be treated with alkaline compounds like ammonium hydroxide, sodium hydroxide or calcium hydroxide mixed with molasses.
- Feed composed of *Prosopis juliflora* pods and barley can be offered as feed to goats.

In addition, *stall feeding* can help increase productivity of groups that rear livestock for meat production. In such feeding, animals are given high quality fodder, which makes them healthier and fit for meat production.

6.3.2.2 Advantages of practice

Enriched fodder provides essential nutrients to enhance the physiological functioning of the animals and their productivity. After feeding goats with *Prosopis juliflora* pods and barley, higher conception rates are observed. Moreover, there are fewer chances of late conceptions, thereby leading to earlier sales and quicker return. Also, it improves milk production and milk fat content.

6.3.2.3 Investment required

This practice requires investment in purchasing supplements like urea, molasses, ammonium hydroxide, sodium hydroxide or calcium hydroxide to improve quality of fodder. According to the rates provided by Rajasthan Cooperative Dairy Federation (RCDF), the cost of one urea molasses brick is Rs.31 and that of mineral mixture is Rs 825 for 25 kg.

6.3.2.4 Case example

BAIF Development Research Foundation, Pune and Natural Resources Institute, UK performed on-farm trials on goats belonging to poor people in Bhilwara and Udaipur districts of Rajasthan. During the dry season, when fodder scarcity is acute, the breeding does were fed a mixture of *Prosopis juliflora* pods and barley for ten weeks on a daily basis. This mixture is considered a high quality livestock feed containing 17% protein and 20% sugar. It was observed that mature does had higher conception rates. Also, the incidence of twinning was higher, thus producing more kids. Breeding 10 does resulted in three extra kids on an average. The market rate of a newly born kid was around Rs 300, thus leading to a total income of Rs 900.

6.3.3 Use of chaff-cutter

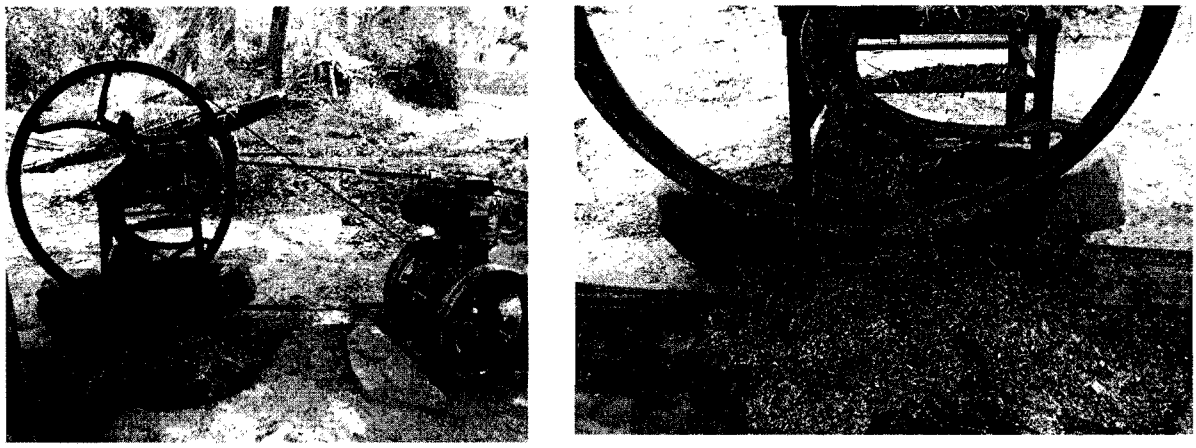


Figure 6.3 Image of chaff-cutter (left) and the cut fodder product (right) in village Badoli, Dausa, Rajasthan.

6.3.3.1 Description of practice

A chaff-cutter is an agricultural instrument for chopping hay or straw into half-inch lengths to be used as food for animals. Fodder cutting involves chopping of fodder, to make it easier to digest and more palatable for the livestock. There are several categories of machines, including hand-operated chaff-cutter machines, cutting machines, agricultural chaff-cutter machines, single-phase chaff-cutter machines, electric chaff-cutter machines and chaff (fodder) cutter machines.

6.3.3.2 Advantages of practice

The major advantage of the chaff-cutter is that it permits the fodder to be thoroughly mixed with more nutritive and palatable food, thus preventing the animal from rejecting or wasting any part of it. By using the chaff-cutter, animals are, therefore, fed optimum amounts of fodder with their food, which not only improves the health and nutrition of the stock, but also saves time in feeding.

6.3.3.3 Investment required

The investment required for cutting fodder involves purchase of a chaff-cutter and safety gear for safe operation of the machine. Chaff-cutters are available at various price ranges depending on features and ease with which the machine can be used. The average cost of a chaff-cutter would range from Rs 2000 to Rs 6000.

6.3.4 Community pasture land development[31]

6.3.4.1 Description of practice

Many rural livestock-keepers tend to be small or marginal farmers (or landless people) who do not have sufficient land to grow fodder crops (the limited land owned by them is used to grow food crops and cash crops). For them, common lands are the main source of forage. Fodder may be either grass (consumed primarily by large ruminants) or tree fodder (consumed mainly by goats) obtained from village pastures and forests. Degradation and loss of pasture land *(Charagah)* by overgrazing and encroachment is a widespread problem. It is estimated that 60% of Rajasthan's 1.2 million ha of community pasture lands are unproductive due to excessive grazing and heavy soil erosion. Development agencies in Rajasthan have been working to reverse the degradation of these lands by fencing off areas of Charagah, planting fodder trees and improved fodder grasses and legumes, and applying soil and water conservation measures.

6.3.4.2 Advantages of practice

- Improvement in the natural capital of the area, increasing biomass production (for example, grass yields have increased by a factor of 2 to 8) and biodiversity.
- Support livelihoods of the people who use the biomass resources of the area to be developed: (a) by increasing the flow of natural products that they are able to harvest; and (b) by off-site benefits, such as reduction of any problems cause by soil erosion, and by increased groundwater recharge.

6.3.4.3 Investment required

Enclosure and development of charagah requires the granting of a lease for this purpose by the panchayat. These leases are usually for three or five years duration. Apart from the cost of the lease, there are costs of constructing the boundary wall and the soil and water conservation structures, and of planting trees and grasses. The costs vary considerably. In 2002 the cost per ha was around Rs. 13785 (for initial works alone – not including the cost of the lease and maintenence costs).

6.3.4.4 Case example[32]

[31] Czech Conroy and Viren Lobo. 2002. *Silvi-pasture Development and Management on Common Lands in Semi-arid Rajasthan.*

[32] N.G. Hegde. 2006. *Livestock Development for Sustainable Livelihood of Small Farmers.* Souvenir of the 39th Annual General Meeting and 48th National Symposium on Energising Rural India. A Challenge to Livestock Industry. Compound Livestock Feed Manufactures Association of India (CLFMA), Manesar, Haryana. August 26, 2006: 50-63. http://www.baif.org.in

BAIF Development Research Foundation with the support from Swiss Development Cooperation launched a programme for community pasture development through community involvement at Kavlas in Asind block of Bhilwara district. BAIF motivated the local community to persuade their temple trust to permit the development of the pasture land owned by the Trust. The local communities extended full cooperation including their voluntary labour and BAIF undertook the responsibility of coordinating the project. The programme involved motivation of people, awareness about the need for conserving the pastures, formation of a Pasture Development Committee, survey of the area, fencing of the boundaries, soil and water conservation measures on pasture lands, introduction of forage and shrub species and providing protection. The programme was introduced in a meeting of the Gram Sabha. Initially there was resistance from the landless and small farmers as they felt that their access to common land would be prevented. After identifying the problems, BAIF suggested to the Gram Sabha to nominate their representatives on the Pasture Development Committee. The Committee met regularly to discuss various issues and developed a plan of action, which was shared with the villagers at the Gram Sabha. The work was initiated as per the plan. Fencing on the boundary and soil and water conservation measures provided employment for the landless and small farmers. Greenery was evident a few weeks after sowing of local forage seeds. Thus, the villagers took more interest and started asking details about the project. They further demanded reconstitution of the Pasture Development Committee, by nominating their own representatives who were close to them. The reconstituted Committee had two members from each of the 10 castes with a Convenor from BAIF. This indicated their interest in the programme. There was complete cooperation from the villagers to provide voluntary labour and protect the pasture from stray animals. The community also participated in collection of forage seeds and harvesting of forage. They also saved some money from the sale of seeds and fodder and established a corpus, needed to maintain the pasture after the project period. BAIF replicated the programme in 15 villages with the support from Sir Dorabji Tata Trust. The Government of Rajasthan provided additional support to replicate this programme in 75 villages under the SGSY Special Programme. Under this programme, there was an investment of Rs.10,000-14,000 per ha spread over a period of 3 years which resulted in annual production of grass worth Rs.4,000-5,000 per ha, demonstrating its economic viability and technical feasibility.

6.4 Efficient Irrigation

6.4.1 Drip irrigation

6.4.1.1 Description of practice

In Rajasthan, since water levels are going down every year, adopting efficient irrigation practices is a necessity. Drip irrigation is an irrigation technique with efficiency rate of 90% or higher, thus helping in conservation of water, especially in desert regions. In this method, water is supplied slowly and directly to the plant's roots. The two main factors which contribute to its higher efficiency are – a) water gets soaked directly into the soil, thus there is negligible evaporation or run-off; and b) rather than flooding the entire field with water, it is only applied to the roots of plants, where it is needed the most.

6.4.1.2 Advantages of practice

Drip irrigation can reap rich returns by using minimum quantity of water. It improves the irrigation uniformity on the field, as well as the crop yield. Fertilizers can be directly applied to the root system, thereby reducing leaching losses.

6.4.1.3 Investment required

The cost of drip irrigation systems is approximately Rs 100,000. Hence, it is not an affordable option for a small-scale farmer. However, the state government also helps farmers in meeting the cost of installing a drip irrigation system.

6.4.1.4 Case example

IDE[33] (India)'s Drip irrigation programme was initiated in 1997 to address the irrigation problems of small and marginal farmer families belonging to water-scarce regions of India. Drip irrigation is a water-saving technology, which enables slow and regular application of water directly to the roots of the plants through a network of economically designed plastic pipes and low-discharge emitters. It maximizes crop productivity through increase in the crop yield and also the area for cultivation, and protects the

33 http://www.ide-india.org/ide/drip.shtml

environment through conserving soil, water and fertilizer resources, thereby increasing the farmer's income. IDEI has suitably adapted this technology to meet the needs of poor farmer families by making the technology simpler and affordable. As part of this adaptation process, IDEI came out with ADITI (Affordable Drip Irrigation Technology Intervention) in the form of simple and ready-to-use packaged kits that can be broadly classified as bucket kit, drum kit, easy drip, and customized kit. ADITI kits have been designed for a range of crops and are quite suitable for small and marginal farmers of the semi-arid regions of India. Also, these kits are applicable to a wide range of plot sizes varying from 20 sq.m to 1000 sq.m, with prices ranging from Rs 250 to Rs 4000. IDEI-promoted drip irrigation kits cost almost 80% lesser than conventional drip kits. Drip irrigation has been rigorously tested with sericulture farmers in south India, watershed projects in south India, cotton farmers in Madhya Pradesh, vegetable growers and agri-input dealers in Himachal Pradesh, and small farmers and landless women in Madhya Pradesh and Rajasthan. Currently, IDE (India) is promoting drip irrigation kits in Gujarat, Rajasthan, Maharashtra, Karnataka, and Uttaranchal.

6.4.2 Sprinkler irrigation

6.4.2.1 Description of practice

Sprinkler, or overhead irrigation involves water being piped to multiple locations within a field and then distributed via overhead high-pressure sprinklers. This system is also referred to as a solid-net irrigation system. Sprinklers can be classified into rotors and guns. Rotors, as the name suggests, have a rotating mechanism, whereas guns eject the water at a much higher pressure (40–130 PSI).

Other types of sprinkler systems include gravity-fed under-tree systems, normal under-tree systems, permanent and small overhead systems, low pressure systems, intermediate pressure systems, and high pressure systems.

6.4.2.2 Advantages of practice

Sprinkler irrigation method (SIM) has various advantages. Primarily, it saves up to 50% of water, as compared to the surface irrigation method and increases productivity by approximately 15–25 %. Sprinklers provide efficient coverage of both small and large areas, and are, thus, suitable for use on all types of lands. Since sprinklers with a wide range of pressures

and discharge capacities are available, the system is also adaptable to nearly all types of irrigable soil (with low or high seepage).

The costs of labour are also reduced since irrigation is automatic. The erosion of soil cover (which occurs due to flood and surface irrigation) can be avoided by using sprinklers.

6.4.2.3 Investment required

The unit cost of sprinkler irrigation systems depends on the cost of components required for the system. These components include:

a) location of the well or water source,
b) type of sprinkler,
c) discharge (volume and pressure),
d) area of land holding,
e) cropping pattern,
f) topography and the total head.

The overall initial cost of installing a sprinkler irrigation system is greater than other surface irrigation methods. However, the gains in terms of efficient use of water, higher yield and less labour more than make up for the initial high costs.

6.4.2.4 Case example

According to Acharyna et. al. (1993), a study using experimental data was carried out in Udaipur on the economic feasibility of SIM for maize and wheat. The results revealed that the average incremental yield in maize and wheat was 4.45% and 6.95% respectively as compared to regular flood irrigation method (FIM). In addition, saving of water due to SIM was 14.48% and 16.89% respectively for maize and wheat.

6.5 Organic farming

6.5.1 Classical composting

6.5.1.1 Description of practice

Rajasthan's large livestock population of 49.136 million is a significant source of organic manure in the form of dung. Composting is an efficient way of disposing animal waste. This compost, when used in agricultural fields, increases soil fertility, thereby decreasing dependency on chemical fertilizers. When preparing compost, fresh animal faeces should be dried to reduce moisture content to 55–60%. This can be done by drying

it naturally under the sun. The material is then piled into a heap and turned over every 3–4 days to allow circulation of air. This leads to aerobic fermentation. The compost with 40–50% moisture is ready in two weeks. Part of this compost is used as manure in agricultural fields, while the rest is kept as 'seed compost' for the next cycle of composting. For this next cycle, a fresh volume of animal dung is added to the seed compost in such a manner that the moisture level does not exceed 55–60%. It is then subjected to aerobic fermentation for two weeks.

6.5.1.2 Advantages of practice

Organic manure has the ability to improve soil conditions for producing high yields and good quality crops. Following are the benefits accrued:

- Improves growth and physiological activities of plants
- Increases water-holding capacity of soil
- Plants become more resistant to diseases
- It reduces the need for other agricultural inputs
- Organic products (fruits, vegetables, pulses, and so on) are free of toxic chemicals and have a high demand in cities

6.5.1.3 Investment required

This kind of composting requires no major investment since the input required is waste material from livestock.

6.5.2 Vermi-composting

6.5.2.1 Description of practice

Farmers using chemical fertilizers in their fields can switch to vermicompost, which is an environment-friendly as well as cost-effective option to manage waste and increase soil fertility. It is a simple biological process of composting, in which earthworms are used to augment the process of waste decomposition and produce a useful end-product. The time taken for production of vermicompost can take weeks or even months. The materials required to prepare vermicompost are crop residues, vegetable waste, leaf litter and any other biodegradable organic matter.

It must be noted that different worm species can be used for wastes with different physico-chemical compositions. The temperature and moisture of waste mixture also play a major role in the composting process. It is recommended that for worms to adapt and multiply, initially, they must be added to a small amount of waste, following which the layers of waste can be gradually increased. This will result in a well-mixed and well-composted end-product.

6.5.2.2 Advantages of practice

Vermicompost is rich in all essential plant nutrients and helps in increasing plant growth via nutrient enrichment. It also enhances water-holding capacity of the soil. From the farmers' viewpoint, vermicomposting is a cheap, simple, and time-efficient method to convert waste material into high-quality compost.

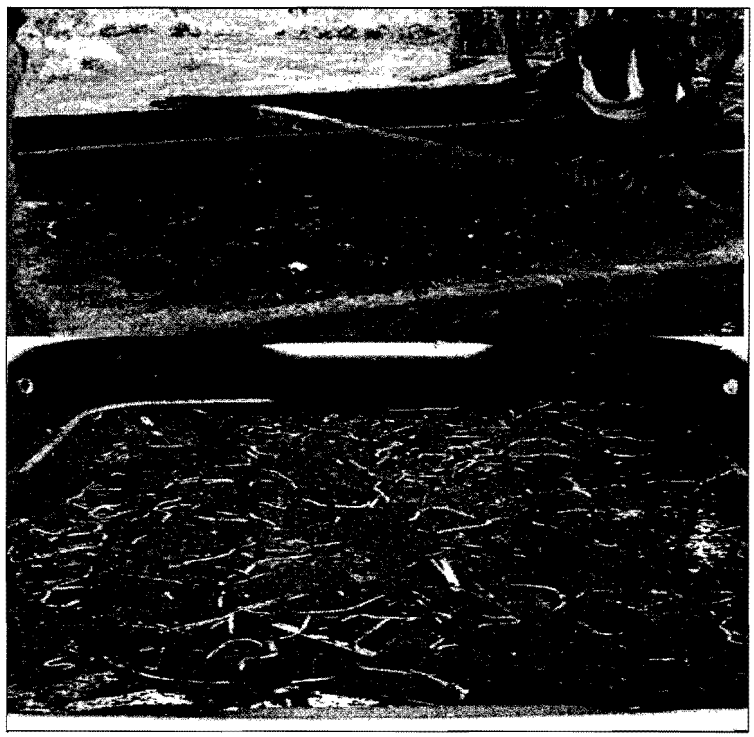


Figure 6.4 Two kinds of vermicompost pits

6.5.2.3 Investment required

The cost involved in vermicomposting depends on the quality of the earthworms and type of covering material used. For the initial underground setup, an investment of approximately Rs 2500 per family is required. For the above-ground pit, if plastic container is used then an investment of around Rs 3000–4000 per family is required. However, water is an important input for vermicomposting - the amount of water will depend on the volume of compost and size of pit. Typically, about 5.7–8.5 litres of water would be needed for approximately 1.8–2.7 kg of bedding.

6.5.2.4 Case example

There are many successful examples of vermicomposting in India. In Jhunjhunu (Rajasthan), Subodh Singh Meena set up a vermicomposting activity in his farm. It turned out to be a huge success. Every kilo of compost Meena harvests, at a cost of about Rs 7, is sold at Rs 40 per kg in cities. The fertile compost from earthworms is also sold to nearby villagers. Not only has the productivity of the crops increased but also the shelf-life of vegetables and fruits improved after using this manure.

6.6 Renewable energy

6.6.1 Biogas plant

6.6.1.1 Description of practice

Rajasthan has abundant energy requirement. However, the state's rural population chooses to use conventional sources of energy such as burning firewood and cattle manure (*kande*).

Since generation of organic waste from activities like cattle rearing and farming is high, this waste can be easily converted into a renewable source of energy.

Biogas is a clean and efficient fuel. It is produced from cattle dung, human excreta, and other organic matter in a sealed biogas plant through a process called 'digestion'. Biogas typically comprises about 60% methane (a highly inflammable gas) and 40% carbon dioxide, nitrogen, hydrogen and water.

A sample design for a biogas plant is provided in Figure 6.5. It consists of an inlet leading to a large underground tank (~ 1–6 m^3 in volume) for storing and 'digesting' organic matter. As the gas is produced, it rises and escapes into a second, smaller tank (overflow tank) from where it can be released and regulated as required. Certain technical details must be kept in mind when constructing such a tank. Most importantly, there should be no leakage in the tank or pipes. For this reason, metallic tanks and pipes must be avoided and concrete ones should be used instead. This also eliminates the possibility of rust destroying the piping system.

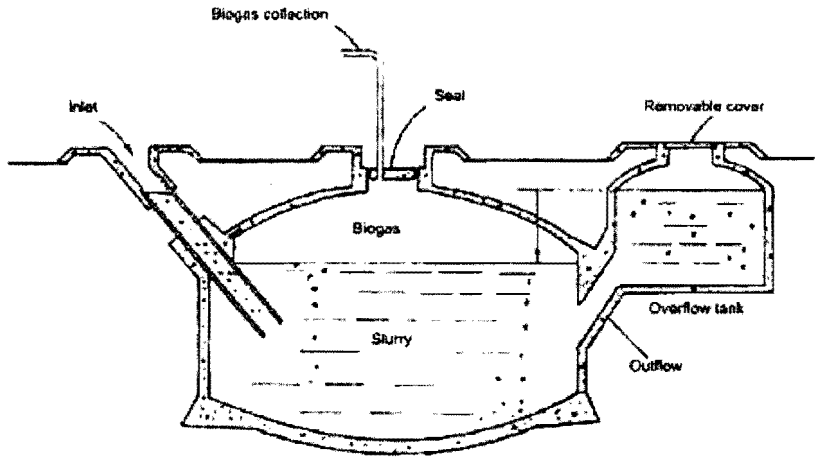


Figure 6.5 Design of a biogas plant

6.6.2 Advantages of practice

It is a zero-waste technology because its by-products like biogas and digested slurry can all be utilized. The stored methane or biogas can be used for multiple tasks such as cooking, lighting of gas lamps, and can also replace diesel by up to 80% in duel fuel engines. The digested slurry, which is rich in nitrogen, phosphorous, potash, and humus, is used as manure in agriculture and horticulture.

6.6.3 Investment required

Overall investment will include costs incurred on a gas holder and frame, piping and a stove for cooking; and the basic engineering costs on construction of the tank, inlet, and outlet. All these would amount to a total expense of Rs 5000 to Rs 10,000.

6.6.4 Case example

Prakratik Society, an NGO based in Sawai Madhopur, Rajasthan, has installed around 250 biogas digesters in villages on the outskirts of Ranthambore National Park. Earlier, villagers used to extract fuelwood from inside the park boundary in an illegal manner, thereby adversely affecting the park's trees. Now, after the setting of biogas digesters, villagers make use of cattle dung to generate biogas, which reduces their dependence on fuelwood. It was estimated that a family of six saves approximately 2.4 tonnes of fuelwood per year, after installing the digester. Around 600 tonnes of wood per year was saved after installing the 250 biogas digesters. The total cost of installing a biogas plant is approximately Rs 5000, out of which villagers contributed to the tune of Rs 1000.

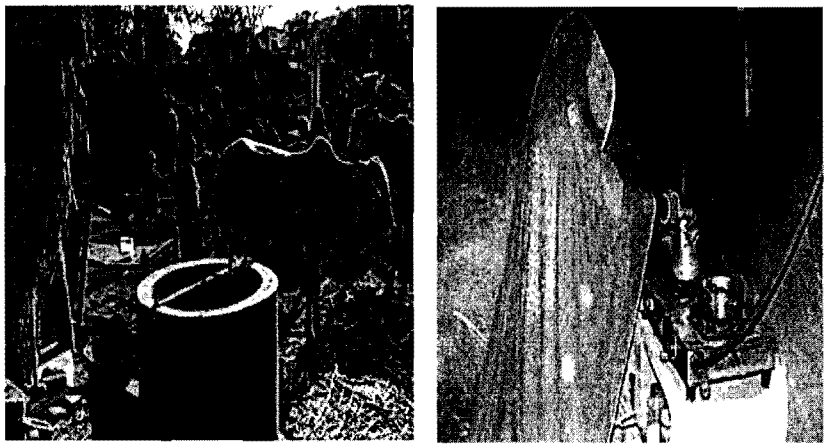


Figure 6.6 Biogas installation in village Padli, near Ranthambore (left); and cooking using biogas in village Chauhanas Vas near Ranthambore (right)

6.7 Expertise

There are several organizations with expertise in: water, agriculture, natural resource management, and community management of common property resources; knowledge sharing and information dissemination; development of non-farm livelihoods, and policy. Since there are numerous such institutions in Rajasthan, the following list does not attempt to be comprehensive, but represents the range of approaches taking place in the state. Organizations are listed according to their relevance to the RRLP.

Table 6.3 List of organizations experts in the implementation of proactive subprojects

Sl. No.	Name	Type	Location	Area of expertise
1.	Barefoot College	Academic and research institute	Tilonia-305816, Village: Madanganj District: Ajmer, Rajasthan, India Email: bunker_roy@yahoo.com and barefootcollege@gmail.com	Rainwater harvesting, capacity building, knowledge dissemination, solar technology
2.	Wells for India	Non-government organization	1135, Sector No. 4, Hiran Magri, Udaipur—313002 Rajasthan, India Tel: + 91 294 2464617 and 2464618 Mob: 098280 43406	Rainwater harvesting
3.	M R Morarka-GDC Rural Research Foundation (MRRF)	Not-for-profit voluntary organization	Vatika Road, Off Tonk Road, Jaipur-303905 Tel.: 0141-2771100, 2771101 Fax : 0141 2770031 Email: info@morarkango.com	Rainwater harvesting

Sl. No.	Name	Type	Location	Area of expertise
4.	HUMANA – People-to-people movement	International non-government organization	**Community Development Project Alwar** Opp. of the Karan Singh Yadav (MP) Residence Sri Krishna Colony, Behror Dist. Alwar, Rajasthan, India Tel.:- 01494-512061 **Community Development Project Virat Nagar** C/o Kanhaia Lal Pansari Virat Nagar, Jaipur Rajasthan, India Tel.:- 01422-234240 **Community Development Project Dausa** Behind Manpasand Hotel Thodi ka Bas, Mandawar- Mahuwa Dist- Dausa, Rajasthan, India Tel.:- 07461-260643	Rainwater harvesting
5.	Association for Rural Advancement through Voluntary Action and Local Involvement (ARAVALI)	Non-government organization	Patel Bhawan, HCM RIPA, Jawahar Lal Nehru Marg, Jaipur - 302017 Rajasthan, India	Rainwater harvesting, policy research, health, NRM
6.	Mewar Krishak Vikas Samiti (MKVS)	Non-government organization	Village and Post Office - Lambodi Village- Charbhuja Rajsamand Dist. -313333 Rajasthan, India	Rainwater harvesting
7.	Tarun Bharat Sangh	Non- government organization	Tarun Ashram, Bheekampura- Kishori Thanagazi, Alwar- 22, Rajasthan, India Tel.: 01465 - 225043	Rainwater harvesting, agriculture
8.	Jal Bhagirathi Foundation	Non-government organization	D-66 (B), Sawai Madho Singh Road, Jaipur 302 016, India Email: jal@jalbhagirathi.org, Tel.: 91-141-2280964, 4025119 Fax: 91-141-4025119	Rainwater harvesting
9.	Seva Mandir	Non- government organization	Old Fatehpura Udaipur - 313004 Rajasthan, India Tel: +91 294 2450960 / 2451041/ 2452001 Fax: +91 294 2450947 Email:info@sevamandir.org smandir@bom4.vsnl.net.in	Rainwater harvesting, agriculture, natural resource management, regeneration of pastureland

Sl. No.	Name	Type	Location	Area of expertise
10.	Sustainable Innovations	Non-government organization	Email: info@sustainableinnovations.us Website: www.sustainableinnovations.us	Rainwater harvesting
11.	BAIF Development Research Foundation	Non-profit public charitable trust	Dr Manibhai Desai Nagar, Warje, Pune - 411 058 Tel: 91 - 20 - 25231661 Fax: 91 - 20 - 25231662 E-mail: baif@vsnl.com	Fodder management
12.	Irrigation Management & Training Institute	Government organization	Dadabadi, Kota (Rajasthan) - 324009 Tel: 0744-500682, 500642, 500970, 500190 Fax:0744-427029 Email: dirimti@jp1.dot.net.in	Irrigation practices
13.	International Development Enterprises	Not-for-profit enterprise	C 5/43, Safdarjang Development Area (1st and 2nd Floor) New Delhi - 110016	Irrigation practices
14.	Krishi Vigyan Kendra	Government organization	V/P Tankarda, Chomu Dist. Jaipur – 303702 Tel. 01423- 235133 Fax: 0141- 2332874	Agriculture, NRM
15.	Rajasthan Gosewa Sangh	Voluntary Association	Tonk Road, Durgapura Jaipur - 302 018 Telephone / Fax: +91-0141 - 254 5954, 254 9903 , 255 1310	Livestock, composting
16.	Action for Food Production (AFPRO)	Not-for-profit enterprise	Mr P K Dutta, Unit Manager, AFPRO Field Unit III, Udaipur 1185, Hiran Magri Sector 11, Udaipur - 313002 Rajasthan Phone: 91-294-2583506 Fax: 91-294-2489109 Email: afu03@afpro.org afproraj@sancharnet.in	Agriculture, NRM, livestock, capacity building
17.	Central Arid Zone Research Institute (CAZRI)	Government organization	Central Arid Zone Research Institute Jodhpur - 342003, Rajasthan Phone : +91 291 2786584, Fax : +91 291 2788706	Agriculture, forests
18.	Foundation for Ecological Security (FES)	NGO	Post Box No. 29, At: Jehangirpura, P.O.Gopalpura, Vadod – 388 370 Dist. Anand Gujarat Tel : 02692-261303 (O), 261417 (R) Fax : 02692-262087 / 262196	JFM, pasture land development, capacity building
19.	National Bank for Agriculture and Rural Development (NABARD)	Government organization	National Bank for Agriculture and Rural Development, Rajasthan (Jaipur) Shri K Muralidhar Rao Chief General Manager	Agriculture, NRM, water shed development

Sl. No.	Name	Type	Location	Area of expertise
			Rajasthan Regional Office 3, Nehru Place, Tonk Road Post Box No. 104 Jaipur – 302 015 Tel: (91) 0141 2740821 Fax: (91) 0141 2742161 Email: jaipur@nabard.org	

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14. <http://www.crida.ernet.in/naip/NW-Sessions/TS-2/RN%20Adhikari.pdf>
15. <http://www.cropinfo.net/drip.htm>
16. <http://www.downtoearth.org.in/dte/userfiles/infographics/green_fodder/green_fodder.htm>
17. <http://www.downtoearth.org.in/node/793>
18. <http://www.downtoearth.org.in/node/802>
19. <http://www.downtoearth.org.in/node/804>
20. <http://www.ecs.co.sz/env_articles_eiaagric.htm
21. <http://www.indiangoatfarm.com/goat_farming_india/nutrient_goat_require.html>
22. <http://www.indorebank.org/source_agri3.htm>
23. <http://www.infobridge.org/asp/documents/2637.pdf>
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26. <http://www.rajasthankrishi.gov.in/web_applications/..%5Cdepartments%5Cagriculture%5Cmain.asp?t=rnd_top.htm&p=organicfarming.htm>

CHAPTER 7 Environmental Management Framework (EMF)

7.1 Need and objectives of the EMF

With the development objective, "to increase and sustain income of poor, especially women, in select districts of Rajasthan", the RRLP focuses on supporting several income-generating activities ranging from the SHG level to a larger level of operations in 17 selected districts of southern and eastern Rajasthan. As per the Census (2001), nearly 76% of the population of Rajasthan resides in rural areas, where livelihoods mainly depend upon agriculture/dairy and related activities. The state is situated in the western part of India, which faces severe water scarcity, poor rainfall and is classified as arid/semi-arid region. On the basis of climatic conditions and agricultural practices, Rajasthan has been divided into 10 agro-climatic zones, each one having characteristic environmental settings that support specific livelihood activities. Further, these poor rural communities are highly vulnerable to climate change because most of the livelihood activities are directly dependent on natural resources. Since RRLP's strategy includes promotion of livelihood support activities at larger level of operations as well, the activities may impact the natural resources and overall environmental health of the project districts. Hence, it is imperative to develop an Environmental Management Framework to address the likely adverse impacts of the promoted livelihood activities (individual or cumulative) and their prevention/mitigation.

The EMF essentially lays down a set of procedures and guidelines to deal with adverse impacts of any supported livelihood activity.

The specific objectives of the EMF are:

1. To ensure that all promoted/supported activities meet the regulatory requirements (laws and regulations of the governments of Rajasthan and India, as well as the safeguard policies of the World Bank)
2. To mitigate any possible adverse environmental impacts of the proposed activities
3. To enhance any likely environmental benefits of the activities
4. To promote environment-friendly livelihood projects
5. To build capacity of the community institutions as well as the RRLP- project functionaries to enable them to efficiently implement the provisions of the EMF.

7.2 Scope of the EMF

The proposed RRLP project has five components:

1. Institution building and social empowerment
2. Community investment support
3. Skill development and employment promotion
4. Climate change adaptation
5. Project implementation support

The developed EMF is directly applicable to two components of RRLP, namely, community investment support and climate change adaptation. The activities under the other three components will support its implementation.

7.3 Approach towards the EMF development

The Environmental Management Framework for RRLP has been developed based on the review of the EMF of DPIP–I, learnings from the EMF of DPIP–I, strengthening of the EMF for RRLP (DPIP– Phase II), and stakeholder consultations. Details of the same are furnished in this section.

7.3.1 Review of EMF of DPIP–I

The civil engineering department of the Malaviya National Institute of Technology (MNIT) was appointed as the environment agency for the full duration of the project. The EMF of DPIP phase–I is summarized in the following subsections.

Environmental appraisal: The environmental appraisal in the EMF of the DPIP phase–I required that each subproject (implemented by Common Interest Groups or CIGs) be appraised in two steps, namely, screening and assessment. The assessment level was further subdivided into three possible categories–first of which requires minimum environmental review (ER), the second category requires medium level impact assessment (Limited Environment Assessment, or LEA), while the third category entails detailed environment assessment. MNIT developed a list of potential impacts and mitigation guidelines for 25 activities identified as requiring ER; and over 10 activities requiring LEA. The field teams were responsible to screen every subproject using a system of numeric scoring. The scoring system was revised at a later stage after it caused field teams

to underestimate the environmental impacts and avoid LEA. MNIT also conducted the detailed assessment of the third category of subprojects.
Monitoring of EMF implementation: Environmental monitoring of a sample of subprojects was conducted by the external agency (MNIT) at regular six monthly intervals.

Training on EMF: MNIT organized intensive training at the state level for key NGO personnel. It also provided training inputs to community facilitators (CFs) at the state and district levels.

External audits: Two externals audits were conducted in the EMF during the project.

Overall, a sound EMF was planned under DPIP phase–I. However, most of the responsibilities of ensuring implementation of EMF were given to the MNIT.

7.3.2 Learning from EMF of DPIP–I:

The EMF of DPIP phase–I facilitated improvement of the environment and benefited livelihood activities. The following section outlines the lessons learnt from the EMF of DPIP phase–I.

1. The major activity taken up by CIGs in DPIP–I was animal husbandry. As part of the EMF, purchase of superior breeds of buffaloes was promoted, which led to increased stall feeding as well as an increase in income of the engaged CIGs. Also, the number of goatery subprojects declined over time, due to increased awareness among beneficiaries about the adverse environmental impacts of such initiatives.
2. As nearly 12% of the sanctioned subprojects in DPIP phase–I was involved in extraction of groundwater, the EMF paid greater attention to sustainable use of water. Several water resource augmentation projects were encouraged (like *tanka* formation, watershed development, Kund bagwani, and so on). Kund bagwani, a proactive environmental subproject was promoted in the western district of Churu, and had positive impacts.
3. Few environmental subprojects were also implemented during DPIP phase–I. However, these were not an integral part of the EMF. Promotion of these interventions helped in demonstration of environment-friendly technologies. The interventions included construction of rainwater harvesting structures, development of degraded forestland and a deflouridation programme.
4. The EMF provided guidelines for planning, design, and construction of anicuts and check dams that helped

communities to efficiently implement these subprojects.

5. Regular internal monitoring also helped in identifying any emerging cumulative impact of any subproject and recommending the necessary mitigation measures.

Overall, the EMF provided technical inputs, guidelines, and support for implementation of subprojects in a sustainable manner, which assisted the beneficiaries in minimizing/preventing any environmental degradation without adversely affecting livelihood activities.

The process-related experience from the EMF of DPIP–I reveals that lack of coordination between SPMU and MNIT affected the overall implementation of the EMF. The proposed staff for effective EMF implementation was procured at a later stage of the project, which affected effective implementation. While valuable technical inputs were received from the MNIT, monitoring of environmental management was not internalized by the project functionaries.

7.3.3 Strengthening of EMF of RRLP–II

The following main features have been incorporated to strengthen the EMF of DPIP–I:

1. The state and district environment officers have been entrusted with the responsibility to ensure effective implementation of the EMF.
2. *Integration of environmental aspects into livelihood planning*: A village-level natural resource assessment tool has been developed to facilitate the integration of environmental issues into the livelihood plan development process.
3. *Simplification of the environmental appraisal process*: Environmental appraisal of livelihood plans by the PFTs has been made a single-step process. Screening of the livelihood activities likely to be taken up by SHGs was conducted as part of this study and a pre-classified list of activities is available. The PFTs need to use the appropriate environmental guidelines, and fill the environment appraisal summary sheet. The environmental guidelines (EGs) indicate suggested mitigation measures that can be taken up by individual SHG members, by the SHG as a group or by the CDO at the village level.
4. *Assessment of cumulative impacts:* A detailed plan and tool for internal monitoring have been designed to assess the implementation of mitigation measures. The

tool is built into the monitoring exercise and can capture any emerging cumulative impact at the village environment level.

5. Common safety guidelines have been prepared for the activities categorized as those having negligible impact
6. *Proactive environmental management*: The EMF also details out a strategy to promote environment-friendly activities/practices in the RRLP.
7. *Internal monitoring and external audit*: Regular monitoring would be carried out by RRLP staffs (state, district environment coordinators, PFT) and independent external audit would be carried out twice during the project duration.

7.3.4. Stakeholder consultation

The key stakeholders, including SHGs, federations, NGOs, and line departments were consulted for the preparation of the Environmental Management Framework. Overall three levels of consultation with the stakeholders were held:

Field consultation: The key stakeholder consultations involved Focus Group Discussions (FGDs) with identified stakeholders, who were mainly the SHG/CIG members of seven districts. In addition to the above mentioned tools, open informal interviews were conducted with stakeholders during the course of the study.

Consultation meetings: Consultation meetings were held with the NGOs, research institutes, and the federation to elicit their comments and suggestions on the structure of the EMF. These included interactive session with SRIJAN, PRADAN, Saheli Samiti, Jaipur Zilla Vikas Parishad, and MNIT.

Consultation workshops: Two multi-stakeholder workshops were conducted at Jaipur and Sawai Madhopur where representatives from inline departments, research and academic institutes, NGOs, federations, and SHGs were invited to provide their feedback and suggestions on the draft EMF.

7.4 Components of the EMF

As mentioned above, the EMF comprises a set of procedures to assess any activity from an environmental viewpoint, approve the same, and regularly monitor the adoption of preventive/mitigation measures. The following sections provide details on various components of the EMF.

7.4.1 Environmental management toolkit

Integration of environmental perspective into livelihood planning

Collection of information on environment at the village level

Basic information on environment, specifically related to water resources, land use, forest, soil characteristics, availability of fodder resources, availability of community pastureland, agriculture-related information such as cropping pattern, major crops, information on livestock and so on may be collected through a participatory rural exercise (PRA).
This exercise will be conducted during the initial phase of the formulation of the SHG livelihood plan. The PRA will be conducted with the SHG community by a team of facilitators, including members from the Cluster Development Organization (CDO), community resource persons (CRPs) and paraworkers during the livelihood plan development. **Annexure 5** provides a format to conduct village-level natural resource assessment.

The information collated from this PRA activity will be useful for

1. Environmental assessment of any proposed activity
2. Assessing the cumulative impact of any activity
3. Allocating the village infrastructure investment fund for required investments at the community level
4. Identification of interventions for proactive environmental subprojects and climate change adaptation initiatives
5. Help during internal monitoring and evaluation

Environmental assessment

The environmental assessment is to be conducted for all activities supported under community investment and climate change adaptation support.

Assessment for the activities under climate change adaptation initiatives will be undertaken as part of the preparatory process for activities under this component. The overall applicability of EMF for various RRLP funds is shown in Table 7.1.

Table 7.1 EMF requirements for various funds under the RRLP for community institutions

S.No.	Name of fund	Loan amount (INR)	Objective	Managed by	Utilized by	EMF applicability (Yes/No)
1	**SHG Startup Seed Fund**	Rs 15,000 per SHG	To help stabilize the SHG by enabling it to meet the urgent requirements of its members (mostly used for consumption needs)	DPMU–PFT	SHG	No
2	**SHG Livelihood Fund**	Rs 1,15,000 per SHG	To help SHG members in investing in their livelihoods	DPMU–PFT	SHG	Yes
3	**CDO Utthan Sansthan Fund**	Rs 50,000 per CDO	To help cluster organizations invest in common infrastructure that is directly related to livelihoods	DPMU–PFT	CDO	Yes
4	**Producer Organization (PO) Sectoral Fund – Establishment Phase**	Rs. 5,00,000 per PO	To help producer organizations meet establishment expenses and for investing in their respective value chains	DPMU	PO	Yes
5	**Producer Organization Sectoral Fund – Business Strategy Report**	Rs. 15,00,000 per PO	To start the proposed business	DPMU	PO	Yes
5	**PFT Area Federation – Start up**	Rs 50,000 per PFT	To help in establishing the federation and to build corpus	DPMU	PFT Federation	No

(Source: RRLP PIP, June 2010)

The environmental assessment should be conducted as part of the following:

- SHG livelihood plan development process for SHGs, cluster development activity plan development process for CDOs, and
- Business strategy development process for POs.

Assessment for all the proposed activities would comprise the two following steps:

Environmental screening

All the activities proposed by SHGs, CDOs or producer organizations (SHG livelihood plan, cluster development plan and business plan) go through the screening process. This helps to determine: Compliance with legal and regulatory framework, i.e. whether the activity is permissible and abides by all the legal requirements of the government of Rajasthan, Government of India (GoI) and safeguard policies of the World Bank.

Necessity for detailed assessment, i.e. whether the activity needs to be forwarded to the DPMU for detailed environmental appraisal in view of greater environmental impacts

For checking compliance with the legal and regulatory framework, a 'negative list' of activities has been identified. This is presented in **Annexure 3** and contains a list of activities that will not be supported under the RRLP. The SPMU will circulate this list to all DPMUs and PFTs for information.

For determining necessity of a detailed appraisal, a categorized list of activities has been developed (**Annexure 4**), based on the DPIP phase–I experience and the field study.

As shown in Annexure 4, most of the SHG-level livelihood activities would belong to either negligible or low impact category, while a few would be in the medium category. For activities in the negligible category, no further appraisal process is required. Most of the cluster development activities are also likely to be in the low impact category.

In case the activity to be taken up by the PO is not listed in Annexure 4, screening to determine if detailed appraisal is required would be conducted by the District Environment Coordinator in consultation with the producer organizations' Board of Directors and relevant staff.

Environmental appraisal

For SHGs' livelihood activities in the low and medium categories, the environmental appraisal would be conducted by the Project Facilitation Team (PFT) in consultation with the Cluster Development Organization (CDO).

The SHG members will participate in the appraisal process of their livelihood plans. Each SHG's livelihood plan may include proposals for a single activity to be taken up by all members or multiple activities to be taken up by members as individuals or as small groups. In either case, the appraisal process will be conducted for the SHG livelihood plan in consultation with SHG members (Fig 7.1).

Environment appraisal will be conducted to:

1. Identify the specific prevention/mitigation measures that will be implemented by each SHG member / SHG level/CDO level/ producer organizations to prevent/mitigate the

adverse environmental impacts of the proposed livelihood activity.

2. Assess the requirements of various resources (financial, technical, institutional, and so on) to implement the mitigation measures.
3. Identify the relevant institutes/government departments, which can support the resource requirements for implementation of the mitigation measures.
4. (If required) To revise the budget considering all the above three points.

Environmental guidelines (EGs) have been prepared for the 23 select activities, which are likely to be proposed. These EGs are provided in **Annexure 6**. The EGs includes the following items;

1. Possible environmental impact/damage that may be caused due to the livelihood activity.
2. The mitigation measures which are a set of simple 'Dos' and 'Donts' to be practised by the SHG (at member level, SHG level, and CDO level)/ producer organizations.
3. Since there are many relevant government departments/institutes that promote better environmental practices and support them by providing technical/financial inputs, the prepared EGs also provide guidelines for the convergence of these schemes to implement the mitigation measures. The following table outlines the major schemes for likely convergence.

Table 7.2 Potential schemes for convergence

Sl No.	Scheme	Objective	Relevant activities
1	**NREGS** (The Mahatma Gandhi National Rural Employment Guarantee Scheme)	Aims at enhancing the livelihood security of people in rural areas by guaranteeing 100 days of wage employment in a financial year to a rural household, whose adult members volunteer to do unskilled manual work	Farm ponds, farm fencing, land reclamation, nursery plantation, thrashing flour, goat and sheep rearing, community cattle shed, agriculture godown, composting, tanka formation
2	**SGSY** (Swarnjayanti Gram Swarozgar Yojana)	To bring the assisted poor families (Swarozgaries) above the poverty line by ensuring appreciable sustained level of income over a period of time. This objective is being achieved by *inter alia* organizing the rural poor into Self-Help Groups (SHGs) through the process of social mobilization, their training and capacity building, and provision of income generating assets.	Minor irrigation, non-farm activities, skill development training
3	**PMGSY** (Pradhan Mantri Gramin Sadak Yojana)	To provide connectivity, by way of an all-weather road (with necessary culverts and cross-drainage structures, which is operable throughout the year), to the eligible unconnected habitations in the rural areas.	Road construction

Annexure 7a provides the common guidelines for safety and health, especially for SHGs involved in non-farm activities like handicrafts. General Environmental Guidelines (GEG) are also provided in **Annexure 7b** for those activities, for which detailed EGs have not been prepared. While EGs are prepared for selected activities, during implementation, the State Environment Specialist, based on information from the MIS, will identify and prepare similar guidelines for any emerging popular livelihood activity, in consultation with the relevant line departments, academic institutions, and others.

In appraisal of the SHG Livelihood Plans, the PFT will hold a detailed discussion with the SHG members and CDO members on the possible impacts of the proposed activity/activities, mitigation measures, feasibility of implementing these measures, and the support available from relevant departments/institutes to implement the same. This discussion session with the SHG is viewed as a capacity-building exercise as it will build awareness among the SHG members on the environmental management aspects of their livelihood activities. Subsequently, the PFT would fill the Environmental Appraisal Summary Sheet (EASS) **(Annexure 8a)**.

The EASS for an SHG Livelihood Plan includes the following:

- No. of SHG members interested in the activity
- Scale of the activity
- Relevant details from a natural resource assessment of village
- Mitigation measures the SHG members are interested in adopting
- Need for any training, technical assistance, and so on
- Legal and regulatory requirement (if any)

This summary sheet would enable the PFT/CDO to

- Understand the demand for a particular livelihood activity
- Identify any emerging cumulative impact and pressure on natural resources
- Provide help during the internal monitoring and evaluation process
- Identify and Plan the proactive environment pilots

Once the PFT fills the summary sheet, the nodal person of the SHG and CDO would be required to sign the form.

The environmental appraisal for cluster development plan would be facilitated by PFT in consultation with CDO, CRPs and paraworkers. Once the environment appraisal summary sheet **(Annexure 8b)** is filled by PFT, the DPMU would approve the same.

Most of the producer organization activities would be classified as either medium category (detailed environmental appraisal required) or (a few) in high category, and hence, the primary screening holds mandatory (Fig. 7.2). For the activities categorized as medium level of appraisal, the environmental appraisal would be carried out by DPMU. Subsequently, the DPMU would fill the environmental appraisal summary sheet (EASS) (**Annexure 8c**). For activities that are categorized under high level of appraisal, a detailed environmental appraisal by an external technical agency is required. The producer organization would bear the cost of such external environment appraisal. The EASS for such activities is provided in **Annexure 8d.** The overall process of environmental assessment for various proposed activities is depicted in Table 7.3.

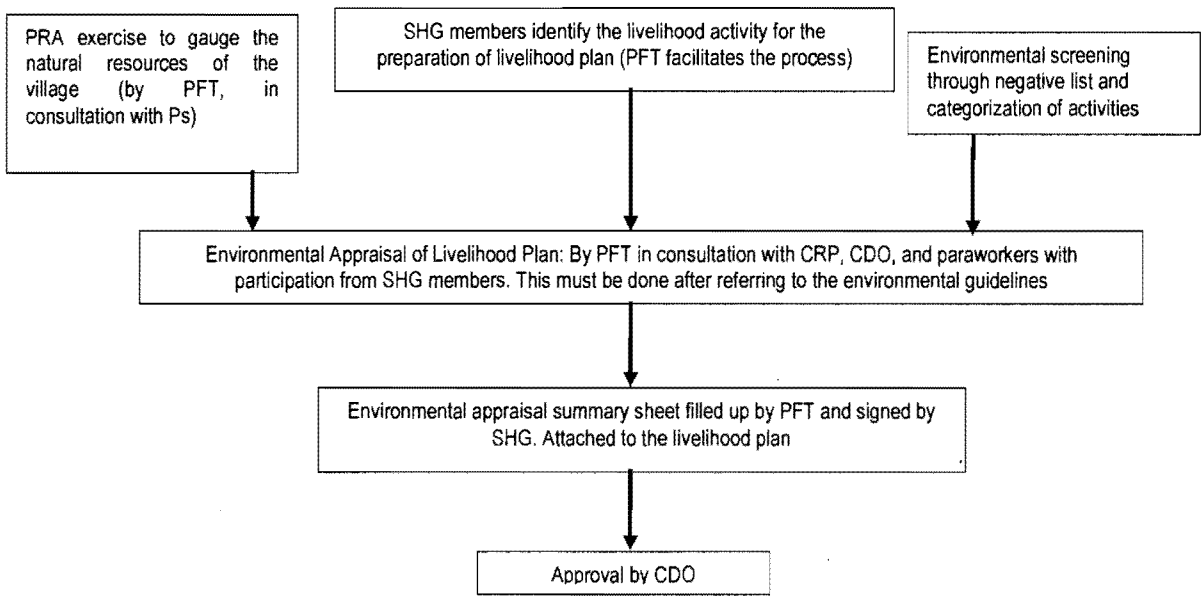

Figure 7.1 Schematic presentation of environmental assessment process for the SHGs' proposed livelihood activities

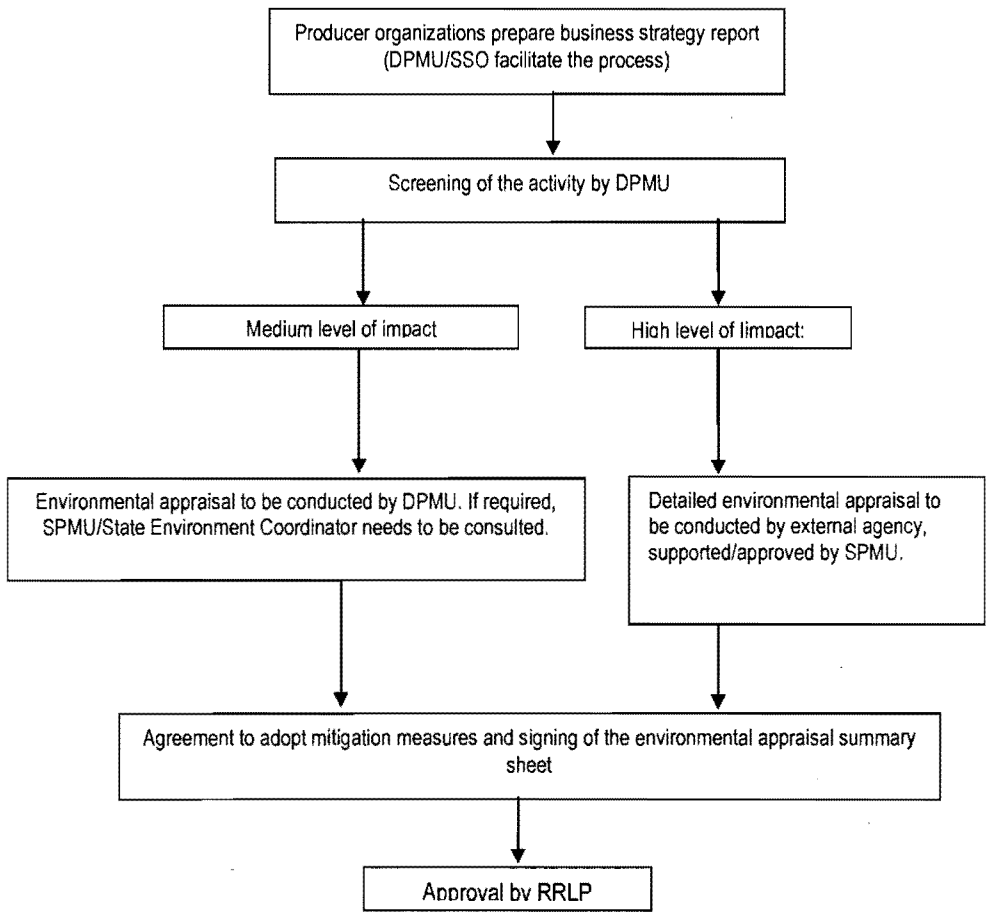

Figure 7.2 Schematic presentation of environmental assessment process for the producer organization's business plan

Table 7.3 Process for environmental assessment

Activity	Relevant document for environmental assessment	Environmental assessment to be conducted by	Signatory to sign the environmental appraisal summary sheet	Approval by	Follow-up monitoring
SHG Livelihood Fund	1. Screening list of activities 2. List of activities not to be supported 3. Village-level natural resource assessment sheet 4. Environmental guidelines 5. Environmental appraisal summary sheet	PFT	Nodal person of SHG	CDO	PFT and CDO, DPMU
CDO Utthan Sansthan Fund	1. Screening list of activities 2. List of activities not to be supported 3. Village-level natural resource assessment sheet 4. Environmental guidelines 5. Environmental appraisal summary sheet	PFT	CDO	DPMU	PFT and DPMU
Producer Organization Sectoral Fund	1. Screening list of activities 2. List of activities not to be supported 3. Environmental guidelines 4. Environmental appraisal summary sheet	DPMU	Representative of PO	SPMU	DPMU, SPMU

7.4.2 Promotion of Pilot Proactive Environment subprojects

Chapter 6 provides details of a sample of proactive environmental subprojects that may be promoted as part of the RRLP. A PFT may also identify any subproject (other than those listed in Chapter 6) as proactive environment subproject. However, the identified project should have the following criteria:

1. The project should be directly related to livelihood activities of SHGs or CDO
2. The project should be feasible in the local environmental conditions
3. The project should have measurable positive impacts on the local environment
4. The project should have scope for sustainability

During this process, PFT would consult SSOs, and if the identified project satisfies the above criteria, a detailed plan for pilot implementation can be prepared.

These proactive subprojects may be implemented on a pilot mode (years 2-4) prior to full-scale implementation (year 5) with the following main objectives:

- To demonstrate/showcase the feasibility and advantages of sound environmental practices
- To identify the type and level of intervention required to promote sound environmental practices in RRLP

It is proposed that at least 20% PFT (approximately two PFT per district) in each RRLP district will implement the pilot subprojects. A total of six villages (2 PFT x 3 villages) in each district will observe the pilot scale implementation. The overall strategy is detailed below:

- RRLP will identify 3–4 regional Sector Support Organizations who have proven expertise in implementation of environmental management in rural livelihoods (agriculture and water resources, livestock and fodder resources, forest-based livelihoods, and so on). Each SSO will service 4–5 districts and facilitate the implementation of proactive environmental pilots by PFTs (two PFTs per district). Thus, each SSO will work with 8–10 PFTs.

- Each PFT will identify suitable pilot subprojects and the villages where these would be implemented. This process would be facilitated by the identified SSOs.

- After identification, the PFT and SSO will prepare a detailed plan for the implementation of the pilot, in consultation with SHGs/CDOs.

- The pilot implementation of the proactive projects would achieve the following during the implementation period:
    - Preparation and training of CRPs
    - Training of SHGs members and CDOs
    - Identification of the convergence schemes
    - Exchange of experience and knowledge sharing across PFTs/districts.

Identification of levels of intervention required for further scaling up in year 4 such as need for training, technical assistance, IEC materials, and so on.

There is no separate fund available to SHGs for implementation of activities under the pilot subprojects. The SHG members will utilize the support available (for loans) from the SHG Livelihood Fund and the CDO Utthan Sansthan Fund for this purpose. However, the cost towards engaging the services of the SSOs and the cost of honorarium for the CRPs has been included in the EMF budget. **Annexure 14** provides the detailed term of references (ToRs) for the appointment of SSOs.

7.4.3 Institutional arrangement

Successful implementation of the EMF would require involvement of environmental experts at every level, i.e. state, district, block, and village levels. Table 7.4 describes the required institutional arrangement, along with the respective roles and responsibilities.

Table 7.4 Institutional structure to ensure EMF implementation

Designation	Overall responsibility	Role in successful implementation of EMF
State Level		
State Project Director	Overall responsibility for ensuring implementation of EMF in the project.	Ensure that sufficient procurement has occurred for effective implementation of EMF. Coordinate with relevant government departments/institutes to ensure their support to the EMF's implementation
State Environment Coordinator	Key responsibility towards implementation of EMF	Key functionary at the state level with overall responsibility for efficient EMF implementation. Ensuring environmental assessment and internal monitoring are conducted in accordance with EMF Ensure that all legal requirements are met Ensure periodical revision and updating of EGs as per requirement. Review the overall process of EMF

Designation	Overall responsibility	Role in successful implementation of EMF
		implementation Ensure that external audits are conducted as per the EMF Ensure implementation of pilot proactive environmental subprojects Ensure that all capacity building requirements of the EMF are met.
Training Coordinator	Integration of EMF training/capacity building in all the training programmes	Ensure that all capacity-building requirements of the EMF are integrated into the overall capacity-building strategy
Monitoring Evaluation and Learning (M E & L) Coordinator	Integration of M&E of the EMF implementation into overall M&E of the RRLP	Will ensure that M&E for the environmental components are conducted regularly
Project Management Coordinator	Integration of EMF into the overall Project Management framework	Ensure that EMF is integral part of the overall management framework of the RRLP.
Sector-specific experts such as in agriculture, dairy, and so on	Development of strategies for successful implementation of EMF	Provide support to district and PFT-level project functionaries in implementation of mitigation measures in specific sectors like agriculture, livestock, horticulture, and so on.
Communication Coordinator	Ensuring IEC activities in EMF implementation	Ensure that the IEC activities in EMF implementation are conducted and form an integral part of the overall IEC activities
District Level		
District Project Manager	Reviewing and ensuring EMF implementation at district level	Ensure implementation of EMF at district level Ensure the coordination among PFTs/CDO and SPMU Facilitate coordination with relevant government departments/institutes
District Environment Coordinator	Overall implementation of EMF at district level	Ensure that the environmental screening/assessment of the business plan proposed by producer organizations is conducted. Ensure all the legal requirements are met. Coordinate with PFT on the training requirement and technical support Conduct half-yearly internal monitoring for all activities in all blocks Identify the need and feasibility of proactive environmental subprojects Ensure implementation of pilot proactive environmental subprojects
Block Level		
PFT Coordinator	Ensuring EMF implementation at the block level	Environmental appraisal of the proposed activities Collect data at village level for assessment of cumulative environmental impacts. Coordinate support from relevant departments/institutes for training/technical

Designation	Overall responsibility	Role in successful implementation of EMF
		support to SHG members Coordinate with SSOs and CDOs/SHGs on implementation of environmentally proactive subprojects
Village Level		
Cluster Development Organization		Participate in environmental appraisal of SHGs' livelihood plans and cluster development plan Participate in implementation of pilot proactive environmental subprojects
CRPs and paraworkers	Support to CDO on EMF implementation	Provide the necessary input to CDO and SHGs during preparation of livelihood plans, appraisal and implementation of mitigation measures, and in implementation of pilot environmental proactive subprojects.

7.4.4 Internal monitoring and evaluation

Periodic internal monitoring of the EMF's implementation helps in identifying any gap and helps rectify the same as soon as it is diagnosed. It will also aid in identifying any emerging environmental issue, which needs to be addressed.

Internal monitoring by the District Environment Coordinator should be conducted on a half-yearly basis. Thus, a total of 10 internal monitoring rounds are recommended for the five-year duration of the RRLP. Prior to each monitoring round, the village level assessment report on the cumulative impact would be provided by the CDO to the PFT for review. An indicative format for the assessment of cumulative impact is provided in **Annexure 9a–9d** for four main activities: dairy, goat/sheep farming, tubewell, and NTFP. Further, **Annexures 9e** and **9f** provide the formats for cumulative impact assessment at block level (to be filled by PFT and would be submitted to the District Environment Coordinator) and at district level (to be filled by the District Environment Coordinator). Similar formats can be developed as per need by the State Environment Coordinator for assessing the cumulative impacts of other livelihood activities.

The overall strategy to conduct such a monitoring programme will have the following components:

1. *Comprehensive desk review* of all the information available such as activities taken up under SHG Livelihood Plans, CDO cluster development funds, PO business plans, the village level assessment report on the cumulative impact, and so on. This will help in identifying :
   - Key environmental issues related to cumulative impacts
   - Adoption of suggested mitigation measures
   - Support received through convergence with other government schemes

2. *Field visits*: The District Environment Coordinator will visit the field to gather on-site information on implementation of EMF in SHGs/CDOs, producer organizations' activities/proactive environment subprojects, and projects under cluster development fund. This will lead to checking if:
   - Regulatory requirements are met by SHGs/CDOs/ producer organizations.
   - SHGs members/CDOs/ producer organizations are adopting and implementing the mitigation measures suggested (EGs).
   - Suggested mitigation measures are efficient in addressing environmental issues
   - Any unforeseen environmental issue is emerging
   - Cumulative impact of any set of activities is to be addressed
   - There is a need for training/capacity building/IEC activity
   - Implementation of proactive environment subprojects

The sample has to be such that a cluster of SHGs and villages is selected for monitoring by the District Environment Manager in consultation with the State Environment Coordinator. In order to compile the representative information for all the main sectors (like agriculture, dairy, and so on) a sample of 15% of the SHGs needs to be covered in the first year of RRLP. The overall sample size recommended for the internal monitoring and evaluation process is provided in Table 7.5. The size has been arrived at based on figures provided in the PIP on the

phasing of the RRLP. Further, out of the total number of SHGs visited, at least 30% should be from 'medium' category, and 70% from 'low' category. Further, these visited SHGs/CDOs/producer organizations should be representative of all main sectors (agriculture, dairy, horticulture, and so on). This can be achieved by having 30% agriculture (including irrigation), 30% animal husbandry (including dairy), 20% forest-based activities and 20% remaining subprojects in the selected sample.

Table 7.5 Sample size recommended for internal monitoring

Item	Year 1		Year 2		Year 3		Year 4		Year 5	
	6th month	12th month	6th month	12th month	6th month	12th month	6th month	12th month	6th month	12th month
SHGs	15% (~ 380)	15% (~ 380)	2.5% (~ 550)	2.5% (~ 550)	2.5% (~ 790)	2.5% (~ 790)	2.5% (~ 825)	2.5% (~ 825)	2.5% (~ 825)	2.5% (~ 825)
CDO	15% (51)	15% (51)	10% (146)	10% (146)	10% (310)	10% (310)	10% (220)	10% (220)	10% (220)	10% (220)
PO					100% (17 PO)	100 % (17 PO)	100 % (34 PO)	100 % (34 PO)	100 % (34 PO)	100 % (34 PO)
Proactive environmental subprojects				100 % (102 pilots)	100 % (102 pilots)	100 % (102 pilots)	100 % (102 pilots)	100 % (102 pilots)	100 % (102 pilots)	100 % (102 pilots)

2. Once the desk review and field visits are over, the District Environmental Coordinator will submit a detailed report to the SPMU. Each monitoring report will contain details of the sampling, (list of SHGs, CDOs, and producer organizations, and the activities visited), observations of the desk reviews and field visits, analysis, recommendations for action, and a follow-up plan. **Annexure 10** provides the format for such a monitoring report, which would be duly filled by the District Environment Coordinator and will be submitted to the State Environment Coordinator.

3. Next, the State Environment Coordinator will prepare a comprehensive state-level report based on all the district reports. Further, if required, the State Environment Coordinator will conduct field visits to a limited sample of the activities, which include proactive environment subprojects, facilities under cluster development investment, and producer organizations. The sample of villages, blocks, and district would be identified by the State Environment Coordinator based on the district evaluation reports. In addition, feedback will be provided by the State Environment Coordinator to the DPMU. The comments of the State Environment

Coordinator may be incorporated in the overall feedback to be provided to the concerned PFT, CDO, producer organizations, and SHGs by the District Environment Coordinator.

Hence, a total of 170 district monitoring reports and 10 state monitoring reports will be prepared during the five-year duration of the RRLP.

Outcome of the monitoring and evaluation

The regular exercise of internal monitoring and evaluation will help in

1. Identifying good practices
2. Identifying any emerging cumulative impact
3. Identifying the best performing SHGs/CDOs/PO
4. Assessing the progress of proactive environment pilots
5. Strengthening the EMF

7.4.5 External environmental audit

Independent external audits should be conducted twice during the project duration—one at the end of the second year and another at the end of the fourth year. An external environment agency should be hired by the SPMU in accordance with the World Bank's procedures for procurement. The overall objectives of such audits would be:

1. To assess the overall effectiveness of the design and implementation of the EMF
2. To assess the level of implementation and overall effectiveness of the mitigation measures
3. To assess the adverse environmental impacts of the project-supported activities (individual, as well as cumulative)
4. To recommend suggestions/changes to further strengthen the EMF

The scope of the audit will include:

1. Screening process: its suitability and categorization of subprojects
2. Efficacy of the designed tools for environmental appraisal

3. Expertise/capability and understanding of the relevant project staff of the environmental issues
4. Anticipated environmental impacts and suggested mitigation measures
5. Execution of the suggested mitigation measures
6. Unexpected adverse environmental impacts which might have emerged
7. Review of cumulative impact of a particular sector
8. Initiatives on combating climate change
9. Review of environmentally proactive pilots
10. Efficacy of the internal monitoring and evaluation plan
11. Efficacy of convergence with existing schemes to support environmental mitigation measures
    1. Review of the institutional arrangement
    2. Review of the effectiveness of the Information Education and Communication (IEC) materials and training programmes
    3. Providing the necessary recommendation for strengthening the EMF

The detailed methodology to achieve the above objectives is given below:

Frequency: Twice during the project, once at the end of 2nd year and another at the end of the 4th year of RRLP.

Methodology:

a) Desk review of documents on environmental assessment: SPMU, DPMU, and PFT would provide all the necessary information, internal monitoring reports, and feedback to the agency conducting audit. This will include review of the environmental appraisal process, EGs, environment appraisal summary sheets, district and state internal monitoring reports, strategy for IEC and so on. This will help auditors understand the status of overall EMF implementation.

b) Field visits:

These will include visits to the sample SHGs/producer organizations to evaluate the effectiveness and adoption of the EMF. The sample should be selected in such a way that it ensures representation of sectorwise subprojects at district/block/SHG/ producer organizations level. The sample to be covered for the external audit would include:
Number of districts: 40% of the RRLP district
Number of blocks: One block per district
Number of SHGs: 2.5% of SHGs across three villages in each block
Number of proactive environment subprojects: 100%

Number of infrastructure created under cluster development investment: 10 %
Number of producer organizations: 100 % in each district
Further, the sample should be finalized in consultation with the RRLP and the inclusion of all major sectors like agriculture, dairy, forest-based livelihoods, and so on should be ensured.

c) Stakeholder consultation:

This will include open interviews with the SHGs members, CDOs, producer organizations, relevant staff (PFT, DPMU). The relevant government departments, institutes, academic institutes, research organizations, and SSOs should also be consulted.

Time line for audit: The external environmental audit should be completed within three months.

7.4.6 Performance indicators

This section details the performance indicators developed to assess the environmental performance of the RRLP. These indicators may be integrated into the project MIS to ensure that periodic information is gathered by the PFTs and sent to the DPSU, and finally to the SPMU. The indicators developed are as follows:

Environmental outcomes
These indicators should be used during the half-yearly internal monitoring, and during external audits.

- Number of SHGs undertaking proactive environmental sub-projects
- Percentage of SHG livelihood activities, CDO activities, and PO business plans undertaking environmental mitigation measures in the monitored sample
- Number of villages/blocks/districts implementing mitigation measures to address cumulative impacts in the monitored sample

Thematic performace indicators:

Agriculture:
- Number of SHGs implementing sustainable agriculture practices/technologies (IPM, INM, NRM) as a percentage

of the sample of monitored SHGs who have taken up agriculture activities

- Extent of area under sustainable agriculture practices/technologies (integrated or non-chemical pest management; integrated nutrient management; etc.) supported by the project as a percentage of all agricultural area supported by the project
- Increase in expenditure on agro-chemicals by households supported by the project (as compared to the pre-project situation and as compared to a control group)

Water resources:

- Number of SHGs undertaking water conservation measures as a percentage of the sample of monitored SHGs who have taken up irrigation-related activities
- Extent of area under water conservation (recharge, harvesting, drip/sprinkler irrigation, etc.) as a percentage of all area that has been brought under tube well irrigation through the project support
- Percentage increase in number of tubewells (in sample villages) as a result of the tubewells funded through the project support

Livestock:

- Number of SHGs and CDOs undertaking fodder development as a percentage of the monitored sample who have taken up livestock activities
- Extent of area under fodder development as part of project supported livestock activities
- Percentage increase in number of livestock (in sample villages) as a result of the livestock funded through the project support

Occupational health and safety:

Number of enterprises with adoption of relevant occupational safety measures (for example, use of mask in stone carving enterprise)

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Institutional arrangements and capacity building

- Percentage of staff trained in EMF (to total staff)
  - Percentage of CRPs, paraworkers and CDOs trained on EMF
  - Percentage of districts and PFTs with Environment Coordinator.

Processes

- Number of SHGs, cluster development plans, and producer organizations' livelihood plans that have gone through the specified environmental assessment process
- Number of villages/blocks/districts for which assessment of cumulative impacts has been conducted

- Number of SHGs/producer organizations reviewed as part of the internal monitoring and evaluation

7.4.7 Capacity building

Regular capacity-building training programmes need to be conducted to ensure that all the relevant project staff is well equipped with the required technical knowledge, skills, overall awareness, and sensitization on environmental assessment of the livelihood activities, cluster development activities, and PO's business plans for effective implementation of the EMF. Training to SHGs will be provided by the relevant technical experts/institutions like Krishi Vigyan Kendra. Training to PFT, DPMU staff and other relevant staff on the EMF will be provided as part of the overall RRLP induction/orientation training. The responsibility of ensuring the delivery of this training lies with the State Environment Coordinator. Orientation to the EMF to the CDO, CRPs and producer organizations will be provided by the district environment coordinator with support from external experts and the State Environment Coordinator. The entire training will be conducted by the District Environment Coordinator with support from resource person(s) with proven record and expertise.

The following table provides details about the training programmes that should be conducted;

Table 7.6 Training Schedule of EMF

Training code	Goal of the training	Training schedule/contents	Participants	When to be conducted
T1	Orientation on EMF	Each training programme will include a session on the process of EMF including environmental appraisal, its need, how to mitigate the adverse impacts (EGs), convergence with existing schemes, process of consultation and proactive environmental activities Duration: one day Outline of curriculum EMF aspects: • Livelihood and environment links, Common environmental issues in rural areas • Importance of EMF and procedures for the same, integration of environmental aspects into lievelihood planning process • EMF process – Screening, environmental appraisal • Proactive environmental interventions in livelihood activities • Monitoring indicators Thematic aspects: • Livestock and environment: Fodder and water management; Effective use of manure • Agriculture and environment: Safe use of agrochemicals, non-chemcial crop management; • Irrigation efficiency and water conservation; Soil conservation. • Forest produce: Sustainable extraction of non-timber forest produce.	PFTs, SPMU, SSO, DPMU	To be conducted as part of the overall RRLP induction /orientation training scheme

Training code	Goal of the training	Training schedule/contents	Participants	When to be conducted
T2	Orientation on EMF	Each training programme will include a session on the process of environmental appraisal, its need, how to mitigate the adverse impacts (EGs), convergence with existing schemes, process of consultation Duration: one day Outline of curriculum EMF aspects: • Livelihood and environment links, Common environmental issues in rural areas • Importance of EMF and procedures for the same, integration of environmental aspects into lievelihood planning process • EMF process – Screening, environmental appraisal • Proactive environmental interventions in livelihood activities • Monitoring indicators Thematic aspects: • Livestock and environment: Fodder and water management; Effective use of manure • Agriculture and environment: Safe use of agrochemicals, non-chemcial crop management; • Irrigation efficiency and water conservation; Soil conservation. • Forest produce: Sustainable extraction of non-timber forest produce.	CDO, CRP and paraworkers (Only for those individuals who are involved in facilitation of SHGs' livelihood plan)	To be conducted as a part of all trainings on SHGs' livelihood plan development

Training code	Goal of the training	Training schedule/contents	Participants	When to be conducted
T3	To increase the capabilities of the project staff/ beneficiaries on the environmentally pro-active subprojects	This will include theme-specific skill enhancement training programme. The content of these training programmes would include hands-on trainings and exposure visits as well as IEC materials and technical information on the implementation of these proactive projects. Duration: three days	PFTs/ CRPs/ CDO/SHGs/ producer organizations. To be delivered by SSOs	This may be conducted at district/block /village level. One main training programme in second year Two refresher training programme in third and fourth year.

A well-developed IEC strategy is recommended to support capacity-building on EMF under RRLP. The IEC materials may include short manuals/simple guidelines with core themes related to the EMF. For the major livelihood activities (like dairy and agriculture), and proactive environmental subprojects, development of audio-visual IEC material will be highly effective. Posters and wall paintings may be developed for grassroot level sensitization and awareness generation on environmental impact of relevant subprojects and mitigation measures. These materials can be displayed at DPMU offices, PFT offices, and also during the training programmes.

7.4.8 Budget for the EMF implementation

The budget which should be allocated to ensure effective implementation of the EMF is depicted below:

Table 7.7 Budget for the EMF Implementation

S no	Component	Details of the component	Units	Amount /Unit (INR)	Total Amount (INR)
	A. Capacity building (expenditures towards all the training programmes)				
1	T1 training programmes at district level	Costed under overall RRLP Capacity-Building Budget			
2	T2 training programmes at block level	Costed under overall RRLP Capacity-Building Budget			
3	T3 training programmes at district level	70 batches x 6 days	420	10,000	42,00,000
	Subtotal A				**42,00,000**
	B. Institutional arrangement (Salaries to the project staff from SPMU to PFT level)				
1	SPMU – Project Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
2	State Environment Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
3	State HR Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
4	State Monitoring and Evaluation (M & E)Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
5	State Project Management Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
6	State-level sector-specific experts such as in agriculture, dairy and so on	Costed under overall RRLP Institutional Arrangement Budget			
7	State Communication Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
8	District Project Manager	Costed under overall RRLP Institutional Arrangement Budget			
9	District Environment Coordinator	Costed under overall RRLP Institutional Arrangement Budget			
10	PFT	Costed under overall RRLP Institutional Arrangement Budget			

S no	Component	Details of the component	Units	Amount /Unit (INR)	Total Amount (INR)
	Subtotal B				**Nil**
		C. Internal Monitoring and Evaluation			
1	10 internal monitoring to be conducted at each district during five years of RRLP	10 monitoring x 17 districts	170	20,000	34,00,000
	Sub Total C				**34,00,000**
		D. External Environmental Audits			
		2 audits in the five years of RRLP duration	2	20,00,000	40,00,000
	Subtotal D				**40,00,000**
		E. IEC Activities			
1	Printing and distribution of IEC materials			20,00,000	20,00,000
	Subtotal E				**20,00,000**
		F. Pilot Proactive Environment Subprojects			
1	Regional Sector-Specific Organizations (SSO)	4 SSOs for 3 years	12	20,00,000	2,40,00,000
2	CRPs	102 CRPs for 3 years	306	24000	73,44,000
3	Training of SHGs and experience sharing	Total 612 units including experience sharing and training	612	10,000	61,20,000
	Subtotal F				**37464000**
	GRAND TOTAL				**51064000**

7.4.9 Timeline for the EMF implementation

Sl No.	Activity	Year I											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Procurement for the institutional arrangement												
2	Orientation of the project staff of EMF												
3	Environmental appraisal and filling of environment appraisal summary sheet												
4	Internal monitoring and evaluation												
5	IEC Activity												

Sl No.	Activity	Year II											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Environmental appraisal and filling of environment appraisal summary sheet												
2	Internal monitoring and evaluation												
3	T3 training												
4	Pilot proactive projects												
5	IEC activities												
6	External environmental audit												

Sl No.	Activity	Year III											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Environmental appraisal and filling of environment appraisal summary sheet												
2	T3 training												
3	Internal monitoring and evaluation												
4	IEC activities												
5	Pilot proactive projects												

S No.	Activity	Year IV											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Environmental appraisal and filling of environment appraisal summary sheet												
2	T3 training												
3	Internal monitoring and evaluation												
4	IEC activities												
5	Pilot proactive projects												
6	External environment audit												

S No.	Activity	Year V											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Environmental appraisal and filling of environment appraisal summary sheet, environmental screening and assessment												
2	Internal monitoring and evaluation												
3	IEC activities												

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Annexure 1

Stakeholder's consultation

District: Dausa, Block: Dausa

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Maheshwara Kala	Jagadish CIG	Mainly involved in Goat farming (7-10 goat per member), dairy (1-2 buffalo per member) and agriculture. NAREGA has helped in income. The problem of fodder availability and water scarcity should be addressed in RRLP. Few members also involved in agriculture. Main Kharif crop is groundnut and Barley is major Rabi crop.	Dairy and goat farming waste like dung has increased the soil fertility. The landless peoples, who are involved in goat farming or dairy, sell the dung to the farmers. Fodder is purchased at Rs. 100-150 for per canopy of a tree. The dung is sold by the members who do not have agriculture land at Rs 3000 per trolley which is generated in about a year.	Interested in dug well / bore well which help supply water for them in irrigation and animal husbandry
Badoli	Ujala CIG	Mainly involved in dairy activities (1-2 buffalo per member). Uses fodder chopping machines. Kitchen garden already exists but all the vegetables are used for domestic purpose only. Only sur plus milk (morning) is sold.	The dung is used as manure in farms. As per their opinion farm production and milk production has gone down.	Interested in more cattle/buffalo. Would like to increase horticulture activities if piped water supply is provided.
Nangal Govind	Asha SHG	Mainly involved in Saree work. It takes 2-3 days to prepare one Saree. Net income is Rs 2000 per month.	nil	Would like to take up toy making if training and financial support are provided. Also need better market linkage for the existing Saree work. Tap water supply is one common demand.
Bhakari	Durga SHG	Mainly involved in panjiri which is supplied to the Anganbadi at Rs 34 per kg. Also involved in cloth bag making. 100-150 bags are made per month which is sold at Rs 15-20 per piece.	nil	Would like to take up dairy activities. Along with cattles, also interested in fodder chopping machine. Need water tank to start horticulture activities.

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Sikandara	Bajrang CIG Shiv CIG Ganpati CIG	All the three CIGs are involved in stone cutting/carving which is a successful activity with established market linkage.	The major issue is air/dust pollution. As per them after 5-7 years of working at stone cutting, most of the people suffer from TB, and related lung disease. They need a proper training on prevention/suppression of stone dust.	Would also like to initiate joint fruit cultivation in their village.

District: Dholpur, Block: Baseri

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Gotekapura	Anamika SHG	Mainly involved in dairy activities (1-3 buffalo per member). About 6 litre of milk is sold per day.	Suggested that dairy activity has increased soil fertility. Practice the open dumping of dead animals near to the village.	Would like to take up sewing if training is provided along with machine. Also interested in opening general stores in village. Need more cattle and fodder chopping machines. Hand pumps for drinking water.
Gotekapura	Jay Shyamanand Baba SHG	Involved in dairy activities (2-4 buffalo per member). Nearly 70% milk is surplus which is sold.	Cow dung is used as mainly manure which has increased the soil fertility. Dung is also used for cooking purpose. Practices open dumping of dead animals.	Members are interested in papad making. Would also like to take up zari work if training is provided. Demand for piped water supply for the village was highlighted.
Mathbaadri	Devpuriya SHG	Dairy activities (2-4 buffalo per member). Sell app. 10 litre milk per day. Dry fodder is purchased at a rate of Rs 140-150 /40 kg in pre monsoon season.	Depleting groundwater, reached to 75 feet.	Interested in horticulture activities and required training. Sewing is also one the interested livelihood activity. Need more cattle/buffalo. Demanded water supply for dairy activities.
Mathbaadri	Kaila Devi SHG	Involved in dairy activities (2-4 buffalo per member).	Dung largely used as manure to increase soil fertility.	Demanded water supply for dairy activities. Need more cattle.
Pipraun	Anjali SHG	Mainly involved in Dairy		Would like to take up

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
		activity (2-4 buffalo per member). Nearly 80% milk is surplus which is sold.		flour mill, beauty parlour and toffee wrapping with financial and technical support. Understands the dust pollution related to flour mill operation.
Pipraun	Jai Kela Mata SHG	Dairy activity is pre dominant (3-5 buffalo per member). Would like to continue with same.		Expressed need for fodder machines, more cattle and provision for water supply.

District: Churu, Block: Churu

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
IDS Office, Churu	27. Jeewanmata 28. Sanjog 29. Kunnu 30. Saraswati 31. Vikas 32. Vishal 33. Satguru 34. Shanti 35. Bhagwati	Involved in goat farming (10 goat per member), dairy activity (1-2 vuffalo per member), kund bagwani (by only few members), saree work, aari tari, galicha making. Area observe only crop in a year. 50-80 % milk is surplus. Goat farming is more success as the demand for water and fodder is less when compared to cattle/buffalo rearing.	Dung is used primarily as manure and also for cooking purpose. Dry/Green Fodder availability in summer is major problem. Groundwater level at 150-200 feet.	Expressed interest for market linkage especially for galicha work and ari tari work. Expressed need of fodder storage room, and more cattle. Would like to take up tent house, sewing activities. Demand for rain water harvesting structures like tanks and kund.
Ramsara	Vinayak SHG	Goat farming (~ 10-12 goat per member), Bandhej, Aari tari and sewing are current activities. Earns Rs 1500 in a month by doing aari tari work on 5-6 Sarees.	Environmental and health problem related to aari taari like solid waste and extensive pressure on eyes during bandhej work.	Need more goat, tube well for water supply. Market link for aari tari work
Ridkhala	Lakshmi SHG	Newly started SHG. Mainly involved in intra member loan for domestic/social purpose.		Interested in goat farming and dairy activity. Also expressed interest for poultry. Understand well about the diseases related to poultry , the required

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
				vaccination. Emphasised on the need of water tanks
Ridkhala	Pitarji SHG	Involved in dairy activity (~ buffalo per member). Need financial and technical support.	Dung is used mainly as manure and also for cooking purpose.	Would like to start tent house, sewing, spice mill and papad making. Water scarcity is dominant one and need water tanks/Kund.
Jharia	Kunnu	Involved in kund bagwani. Practices use of plastic and cow dung to prevent water loss as depicted in picture. Grow mainly water melon, cucumber, brinjal, lemon, kharbooj and also marigold flowers. Collect the water in kund. Use tubewell as water source. Also collect rain water. Sale is Rs 1500 /day. Net income ~ Rs 500-600 per day.	Soil fertility has increased due to use of dung as manure	none

District: Sawai Madhopur, Block: Sawai Madhopur

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Gambhira	Ujjwal SHG	Newly started SHG. Mainly involved in intra member loan.	The change in cropping pattern was observed during discussion. The yield of Bajra has decreased while yield of Jowar has increased. Groundwater depth has reached to 400 feet from 60 feet in last 10-15 year.	Would like to take up the embroidery, sewing work and general store. Understand the reuse of cloth pieces. Requested training for embroidery work. If RRLP provides water tanks and cattle then may start dairy activity as well.

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Sawai Ganj	5. Saraswati 6. Tulsi 7. Lakshmi 8. Jeewanrekha 9. Chetna 10. Ekta	Involved in general store and music instruments.	Shift in agriculture practice has been observed. Instead of growing Jowar, Bajra, has opted for mustard. Water level has gone down to 500-600 feet.	Are interested in fancy item shop, embroidery work and milk collection unit. Requires fridge/chiller for milk collection activity Also expressed need for piped water supply.
Chauth ka Barwara	- Laxmi - Shriyash - Vaibhavlakshmi	Mainly involved in carpet work, general stores and bed sheet work. The waste cloth pieces are used for bag making. Galicha making activity is not so successful due to the involvement of third party. General store gives only 10% profit. Takes 4 days to prepare a bed sheet which si sold in Rs 35-40.	There has been in a shift in agriculture practices like Ground nut growing is completely stopped in last 10-20 years because of climate change.	Are interested to start toy shop, more general stores, fancy item shop and dairy activities. Expressed need of ground water recharge and pond construction.
Karmoda	Asha	Involved in Kantha work on bed sheet, general store, and agriculture. Bed sheet making takes 304 days per sheet. Carpet making did not success due to the involvement of middle party. Pickle and sharbat making is failure due to poor market.	Ground water has reached to 450 feet from 110 feet in last 10-12 years. There is a shift in agriculture practice also; Groundnut crop is replaced by Guava garden.	Requested market linkage for Kantha work. Would like to take up dairy activity. Expressed need of ground water recharge and pond construction. Also would like to take up Candle making, Incense Making and sewing. Expressed the need for regular drinking water supply.
Mau	Luv Kush	Involved in dairy activity. Understand the pollution aspect related to generator. Poor milk production. Only morning milk (2-2.5 litre) is sold at Rs 20-25 per litre. Fodder is generally grown on own	Use dung as manure. Decreasing community pastureland. Gram and Jowar production is stopped and now opts for mustard. Depleting ground	Are interested in Sugar cane farming for which requires generator, sugar cane juice machine, crasher etc. Demand for water tank and bore well.

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
		land and available throughout year.	water is a major concern. Groundwater has reached to 200 feet from 30 feet.	

District: Tonk, Block: Uniara

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Manharpura	Jai Hanuman	Largely involved in dairy activity and intra member loan. Fodder is grown in own land and rarely purchased. Morning surplus milk is sold at Rs 25 /litre	Use dung as manure Sugar cane yield has decreased while yield of mustard has increased.	Would like start vegetable cultivation. Understand the seed certification and climate resilient crops. Also shown interest in general store, garment shop and sewing. Nursery plantation if training, sprinkler, hybrid seed, polythene bags are provided. Water tank for the water supply.
Shahadat Nagar	Jai Hanuman CIG	Involved in dhaba and tent house activity. Uses biomass based stoves to cook food. Ten house generates an income of Rs 20000 – 30000 per year.	Leftover food is used as fodder to cattle. Smoke coming from biomass stoves is a problem. Improper wastewater discharge. Groundwater depth has increased from 200 feet to 1000 feet in last 10 years	Need for pond construction was highlighted during consultation.
Sada	Goverdhan CIG	Engine renting and pipe set selling. Rs 100000 per year are gross income. Yields have increased by 2-2.5 times.	Air pollution from diesel combustion is a problem Ground water has lowered till 500 feet.	Interested in soap making. Understand well the process of soap making. Also highlighted the need of pond construction
Sada	Shree Ram CIG	Involved in dairy activity. Milk sold one time a day (generally morning) at Rs 25 per litre.	Use dung as manure Fodder is purchased during summer. Water scarcity is severe problem.	Would like to start Incense/candle making. Understand the environmental issues related to the above activity. Require training on same.

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Shahadat Nagar	Ganesh CIG	Currently practicing camel cart. It generates Rs 100 per day.	Camel dung used as manure. Open dumping of dead animal. There is a change in agriculture practice; the mustard has replaced gram.	Shown interest goat farming. Require financial assistance for pipe, generator, and other machineries for integrated agriculture

District: Banswara, Block: Ghatol

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Bhuvasa	1. Sharda 2. Parwati	Involved in bamboo basket making. It takes 4 hours to prepare one basket which is sold in Rs 80. The net profit is around Rs 20.	.No impact on forests. Grows bamboos specifically for this purpose The left over bamboo pieces are either reused of burnt for cooking fuel. There has been a shift in agricultural practice like the paddy cultivation is completely stopped in the area.	Would like to initiate dairy, sewing activity. Expresses need of hand pumps for drinking water supply.
Chanduji Ka Garha	Ambedkar SHG	Bamboo stool (mooda) making. Generally it takes a day to make 3 mooda which are sold at Rs 150 per piece. The net profit is Rs. 60-70.	Bamboos are specifically grown for this purpose. The groundwater depth has gone to 70 feet from 30 feet in last 10 years. Members opined that yield for various crops has decreased.	Would like to start the rope making and own shop. Require money for the land to open shop and technical assistance like rope making machine. Highlighted the need of toilet construction and piped water supply.
Chanduji Ka Garha	Meera SHG	Bow and arrow making (are sold to tribes and they use for hunting purpose). The bow and arrow are sold at a price of Rs 50 with net profit of Rs 15-20. Also undertake door to door selling of fruits like mango and banana.	The left over fruits/vegetables are provided to cattle	Would like to take up milk chiller (generator also) and sewing. Shown concern on poor electricity supply and need for common water storage tank.

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Chanduji Ka Garha	Suman SHG	Vegetable selling is the current livelihood activity.	The left over fruits/vegetables are provided to cattle	Would like to durry/carpet making. Along with the training, the need for machineries was also highlighted. Hand pump for the drinking water is a concern.
Harodam	Santoshi Maa SHG	Involved in goat farming. Sells adult goat at Rs 1100 and lamb at Rs 500-600 for meat purpose.	Open dumping of dead animal. Foul is the problem. Goat mortality rate is high. Groundwater depth has gone to 200 feet from 20 feet in last 10-15 year.	Need of veterinary facilities as goat mortality rate is high Would like to start vegetable cultivation and need water supply for the same.
Modasale	Meghwal	Sewing. Own shop. It generates Rs 1000-1500 per month per member.	Leftover pieces of cloth used for pillow cover and curtain making.	Are keen to take up the general store, dhaba and vegetable cultivation. Piped water supply, toilet and pond construction are highlighted need.
Bagron Ka Kheda	Saawariya	Current activity is rope making. Net income is Rs 2000 per month per member. It is a successful activity.	Ground water has gone to 400 feet from 40 feet.	. Would like to start paper plate making, sewing and soap making. Few members understand the process of soap making. The water supply to village. The ground water table has reached to 400 feet from 40 feet.
Ghatol	Saraswati SHG	Spice, pickle and papad making are the current activity. This activity generates Rs 700-800 per month per member. Hand packing is being practiced.	Polythene bags are used for packing Air pollution due to spice work.	Interested in nursery and tree plantation. Shown interest for the maternity kit. Understand the related hygiene issues. Also highlighted the need of better market linkage especially with schools, anganbadis etc.
Ghatol	Samdarshi SHG	Hide selling. Rs 1000 per month per member are earned. Also involved in fruit selling which generates	Foul smell is the concern. Also highlighted the excessive seepage from Mahi dam to	Would like to open a proper wholesale fruit shop. Understand the adverse impact of

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
		an income of Rs 4500 per month per member.	agricultural fields which sometime spoil the crop. Groundwater has reached to 150 feet from 40 feet.	applying chemicals on fruits' surface.

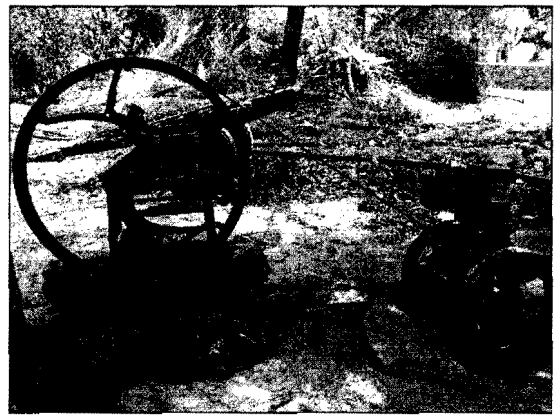
District: Udaipur, Block: Kherwara

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Bhudhar	5. Rekha 6. Jai Santoshi Maa 7. Bhagyashree	All the members are involved in sewing activity which generates Rs 800 per month per month.	Cut pieces of cloths are used to fill pillow etc. Waste threats are burnt. Fodder yield has increased. Ground water level has decreased to 350 feet.	Interested in paper plate making and incense/candle/spice making. Require technical support/machineries etc. Emphasized the need of water storage tank.
Ratampura	• Gayatri Maa SHG • Sri Krishna SHG	Buffalo rearing. One buffalo per member. 2 litres of milk in morning is sold at Rs 25 per litre.	Open dumping of the dead animal near to river is practiced. Use dung as manure Availability of green fodder is a problem in summer is purchased at Rs6-7/kg and dry grass @Rs10/kg	Are interested in taking up spice grinding, daal packing, papad making and sewing. Toilet and pond construction and literacy mission for women highlighted during the discussion
Ratampura	• Pataal Bahiravi SHG • Jai Gange SHG	Involved in leather products making like purses and key rings. No market and only 2 products sold in last two years.	Remaining scraps of hides are thrown outside. Ground water salinity is a problem.	Interested in starting pickle/papad/incense/candle making. Spice mill is also considered as good livelihood option. Require training and technical support like machineries. Need of water storage facility and toilets for women.

Name of Village	Name of SHG/CIG	Current Livelihood Activity	Environmental Issues in current activities	Possible future livelihood option
Kesariyaji	Trishila	Embroidery work, Kasida work, bag making, and sewing are current practice. The activities generate Rs 3500 per month per member.	Waste material is used to manufacture by-products.	pickle/papad/incense/candle making, artificial jewellery making is one of the livelihood option. Need technical support. Water storage tank. Also the open drains causing mosquito problem was also highlighted.
Bhorai	Bhorai SHG	Soap making and flour mill are dominant activity. Soap making generates Rs 50-60 per month per member while flour mill generates Rs 800 per month per member.	Health impacts like respiratory problems are observed among workers. Skin infection due to soap making. Transportation of raw materials is costly. Salinity in the soil has increased.	Would like to start match box making. Understand the safety issues. Expressed the need of anicut in village.
Shyampura	Ekta	Goat Rearing (5-7 goat per member) and generates Rs 1500-2000 per year by selling. General store provides a net profit of Rs 60 per day. Flour mill is a successful livelihood activity which generates Rs 1000 per month per member. Electric Motors are also one of major livelihood activity.	Change in crop pattern – Earlier: Big corn, Rice, Urad. Now: Moong, vegetables and corn. Groundwater – Earlier: 25 feet. Now: 45 feet.	Would like to take up soap making, vegetable cultivation and general store. Need of lift irrigation is highlighted.

Picture Gallery of Consultation with SHGs

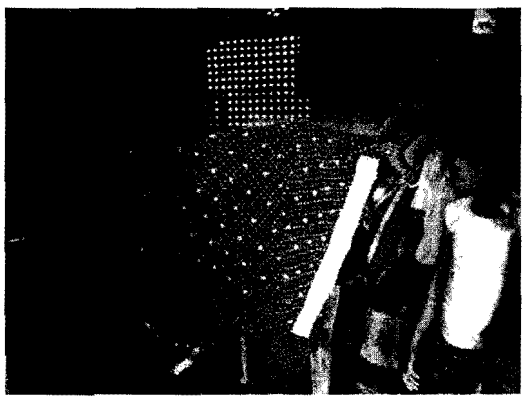
TERI team in discussion with Jagadish CIG members at Maheshwara, Dausa



Fodder chopping Machine driven by Diesel generator, Ujala CIG, Badoli, Dausa

Chopped Fodder, Ujala CIG, Badoli, Dausa

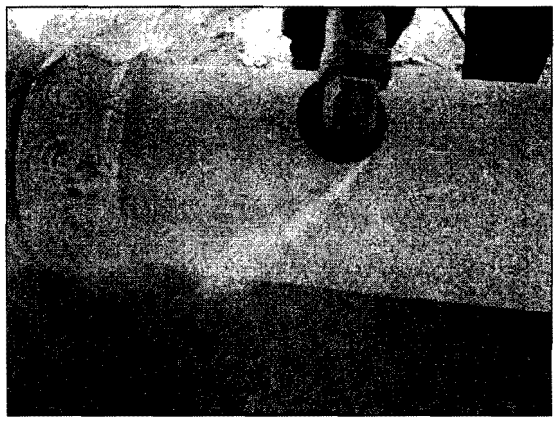
TERI team in discussion with Ujala CIG members, Badoli, Dausa



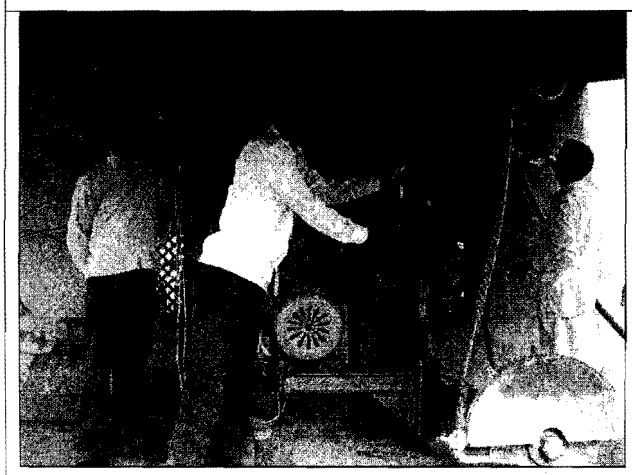
The Saree work by Asha SHG members, Nangal Govind, Dausa

TERI Team in discussion with Asha SHG members, Nangal Govind, Dausa

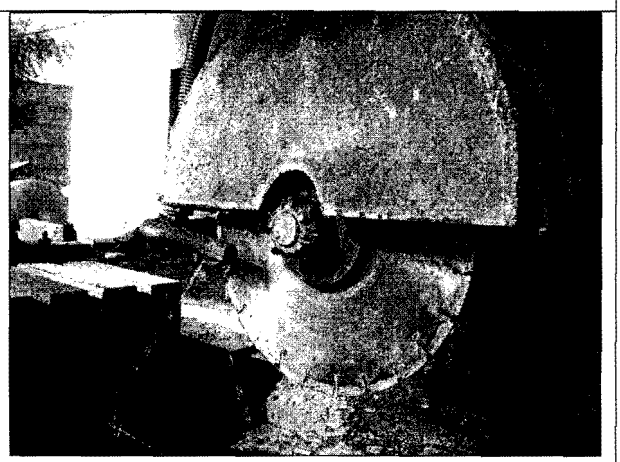
Stone Cutting by Ganpati CIG Members, Sikandara, Dausa



The Dust emission from Stone Cutting at Sikandara, Dausa



The In Use Big Machineries, Sikanadra, Dausa



Safety Issue with in use machineries, Siakndara, Dausa

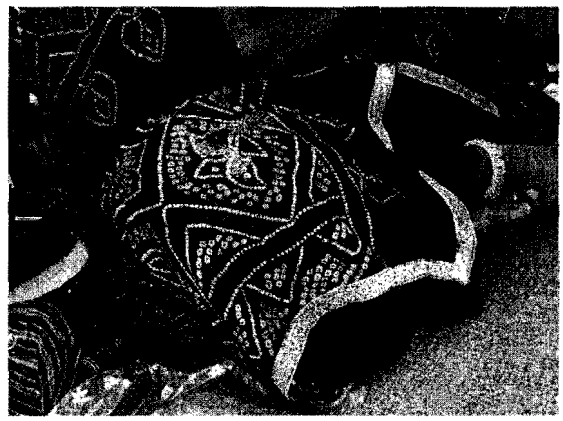
TERI team in discussion with Anamika SHG members, Gotekapura, Dholpur

TERI team in discussion with Jai Shyamanand Baba SHG members, Gotekapura, Dholpur

TERI team in discussion with Devpuriya SHG members, Mathbaadri, Dholpur

TERI team in discussion with Anjali SHG members, Pipraun, Dholpur

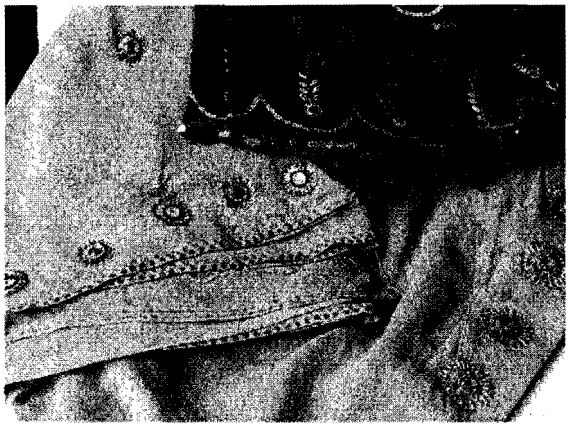
TERI team in discussion with SHG members at IDS Office, Churu



Saree work by a SHG member in Churu

TERI team in discussion with SHG members at IDS Office, Churu

Sewing work, Vinayak SHG, Ramsara, Churu



Aari Tari work on Saree, Vinayak SHG, Ramsara, Churu

Goat rearing conditions, Vinayak SHG, Ramsara, Churu

Bundi Bandhej work, Vinayak SHG, Ramsara, Churu

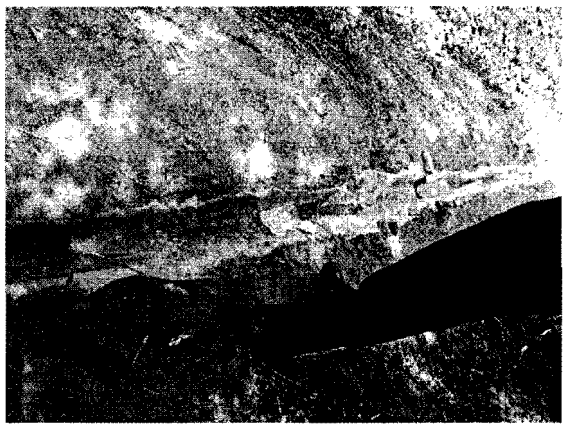
TERI team in discussion with Lakshmi SHG members, Ridkhala, Churu

TERI team in discussion with Pitarji SHG members, Ridkhala, Churu

Vegetable cultivation bu Kund bagwaani, Kunnu SHG, Jharira, Churu

Growing fruits, Kunnu SHG, Jharira, Churu

Use of cow dung to prevent water loss, Kunnu SHG, Jharira, Churu



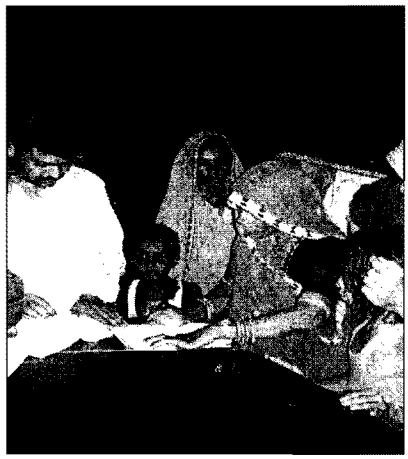
Use of plastic to prevent water loss, Kunnu SHG, Jharira, Churu

Water stored in Kund, Kunnu SHG, Jharira, Churu

Vegetables ready to sale, Kunnu SHG, Jharira, Churu

TERI team in discussion with SHG members, Sawai Ganj, Sawai Madhopur

Kantha work on bedsheet, Asha SHG, Karmoda, Sawai Madhopur

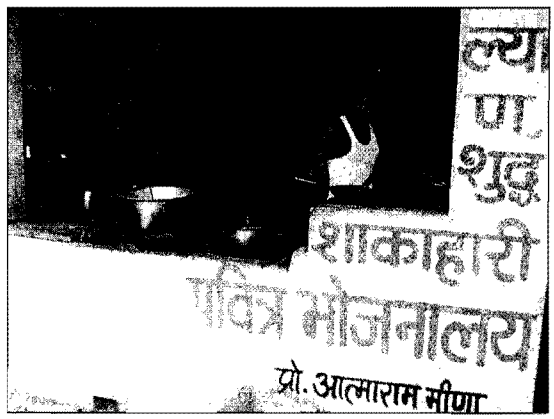


TERI team in discussion with Luv Kush SHG members, Mau, Sawai Madhopur

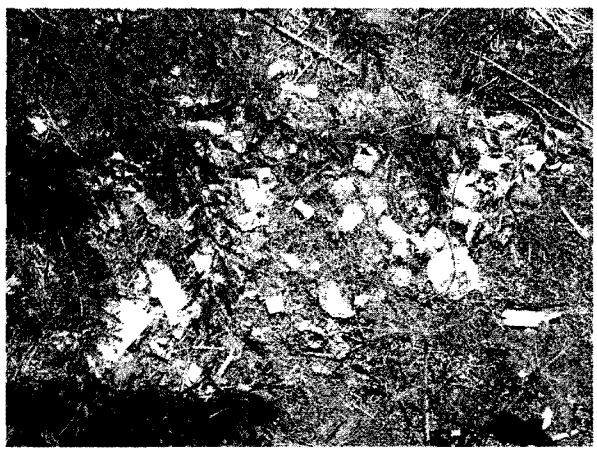
TERI team in discussion with Luv Kush SHG members, Mau, Sawai Madhopur

TERI team in discussion with Jai Hanuman SHG members, Manoharpura, Tonk

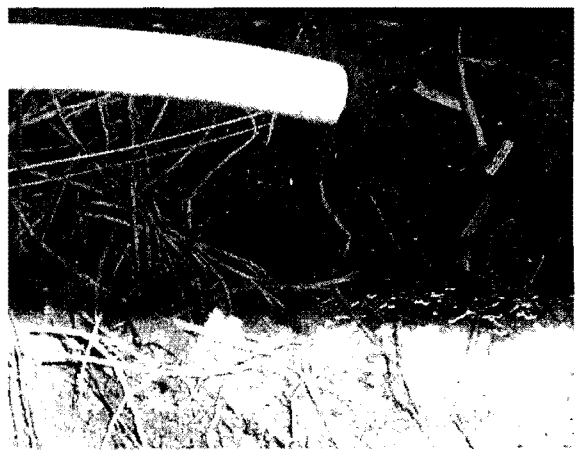
TERI team in discussion with Jai Hanuman CIG members, Shahadat Nagar, Tonk



Cooking conditions at a Dhaba, Jai Hanuman CIG, Shahadat Nagar, Tonk



Solid waste around the Dhaba, Jai Hanuman CIG, Shahadat Nagar, Tonk

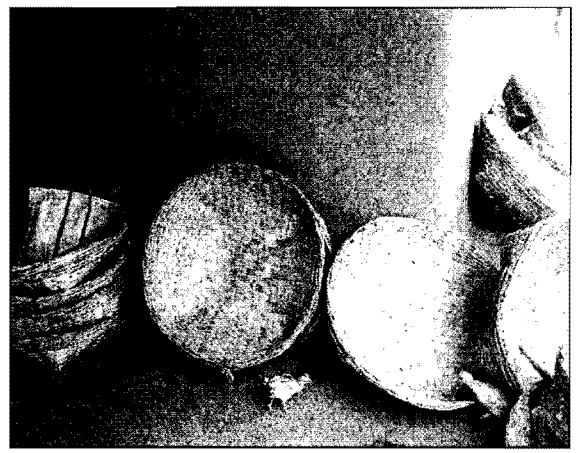


Wastewater discharged behind Dhaba, Jai Hanuman CIG, Shahadat Nagar, Tonk

TERI team in discussion with Goverdhan CIG members, Sada, Tonk

TERI team in discussion with Ganesh CIG members, Shahadat Nagar, Tonk

TERI team in discussion with SHG members, Bhuvasa, Banswara



Prepared Tokri by Sharada SHG, Bhuvasa, Banswara

TERI team in discussion with Ambedkar SHG members, Chanduji ka Garha, Banswara

Muda making by Ambedkar SHG members, Chanduji ka Garha, Banswara

TERI team in discussion with Meera SHG members, Chanduji Ka Garha, Banswara

Making Bow and arrow by Meera SHG, Chanduji ka Garha, Banswara

TERI team in discussion with Suman SHG members, Chanduji ka Garha, Banswara

TERI team in discussion with Samtoshi Maa SHG members, Harodam, Banswara

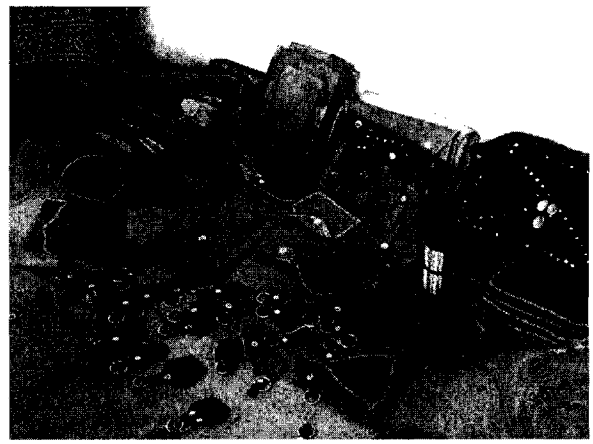
TERI team in discussion with Samtoshi Maa SHG members, Harodam, Banswara

TERI team in discussion with SHG members, Budhar, Udaipur

TERI team in discussion with SHG members, Budhar, Udaipur

TERI team in discussion with SHG members, Ratampura, Udaipur

Cattle shed, Ratampura, Udaipur



Leather products, Jai Gange SHG, Ratampura, Udaipur

TERI team in discussion with SHG members, Ratampura, Udaipur

Spice Mill, Bhorai SHG, Bhorai, Udaipur

Soap Making, Bhorai SHG, Bhorai, Udaipur

The consultation and visit to Federations

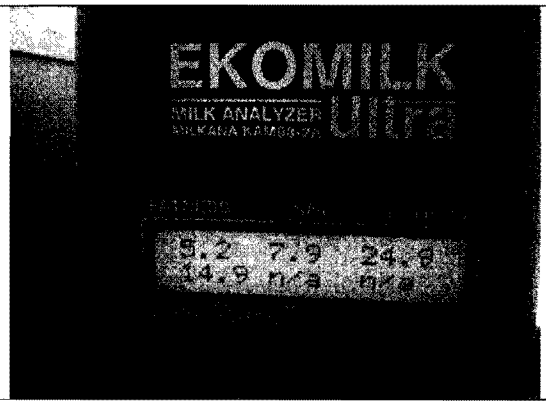
5. SRIJAN

District: Tonk	**Block:** Tonk
Village: Duni	**NGO:** Self-Reliant Initiatives through Joint Action (SRIJAN) Cluster Federation **(2003)**
Organization name: Maitree Contact Person: Mr Jitendra	**Objectives:** To enhance livelihoods through women's dairy collectives and improve market linkages.

Members	Padam Jayanti, Jitendra, Manoj
List of Cluster tasks	7. Milk collection 8. Milk lactose/fat content testing, 9. Cooling and storage 10. Distribution

Comments on SRIJAN activities

j) Covering 60 villages of Deoli block in Tonk district.
k) Good data management: The record of village names, SHGs, and SHG members, volume of milk brought in, quality of milk etc were all listed on a 'track sheet'.
l) The quality of milk was determined by 2 parameters, percentage fat and lactose content.
m) Lactometers were provided to the villagers to check the water content of the milk
n) Milk was bought from the SHGs and the members were paid based on the percentage fat in the milk.
o) No profits or losses are retained. Everything is distributed among the villagers.
p) Private trusts and donations have invested in bulk coolers for milk as well as training to improve animal husbandry practices.
q) Vet care services are also offered to all SHGs.



6. PRADAN

District: Dholpur	**Block:** Dholpur
NGO: Professional Assistance for Development Action (PRADAN) Cluster Federation (**1983**)	
Organization name: Pradan (Professional Assistance for Development Action) Contact Person: Mr Sanjay	**Mission:** Impacting Livelihoods to Enable Rural Communities.

Members	-
List of Cluster tasks	11. Promotion of SHGs 12. Forest based livelihood activities 13. Natural Resource Management 14. Livestock Development 15. Micro-enterprise promotion

Comments on PRADAN activities

Background:

1. Established in 1983 in Delhi.
2. Team offices in Assam, Bihar, Chattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and West Bengal.
3. The Dholpur office was setup in 2000 during the DPIP Phase I initiative. PRADAN covers 3 out of 4 development blocks in Dholpur itself. Federations exist in Dholpur, Bari and Sarmathura.
4. Sources of Funding: Central and State Government, BMGF, Ratan Tata trust, Darabarji Tata trust, ECO Netherlands and OxFam.

Promotion of SHGs:

1. As of the 2009 annual plan, PRADAN covers 627 SHGs and aims to add 200 more by the end of this year.
2. Promotion of SHGs (women only) in order to increase savings base, credit bonuses, and women strength.
3. Success is considered achieved when a family makes an incremental increase in income of about Rs.10,000 to Rs.12,000 per year. However, this depends from family to family.
4. Well maintained account logger and database for all SHGs activities.
5. Various kinds of training provided.

Training:

1. There are various phases, depending upon the time period, in which training is provided by PRADAN.

3	Basic introduction to SHGs (the idea, credit planning and social issues)
4	Buffalo training (seasonal, all details regarding buffalo rearing, precautions and procedures involved), Goat rearing Para-vet training (training of a village local, who then charges a small fee for his veterinary services)
5	CRP training (Community Resource Person – acts as a motivator or a social catalyst to inspire and guide the village folk to create Self Help Groups and to think 'outside the box'.
6	Agriculture training for seasonal crops (Service Providers are trained for this. Service providers are community leaders who can then deliver the knowledge to various SHGs and village members. 2. Training on Carcass management was provided earlier by PRADAN, but not anymore. Major guidelines such as digging a ditch 6 feet deep and adding lime for hastening the decay process were part of the training protocol.

2. *Activities and Clusters promoted:*

- Buffalo rearing and dairy:

16. Para-vet service initiated.
17. Created tie-ups with Mother Dairy by which 12000L of milk is transported to Delhi, everyday.
18. With this Mother Dairy tie-up, the SHG members received about Rs.22.3/L compared to the Rs. 15/L that the local milk man offered.

- Natural Resource Management:

19. Rainwater harvesting promoted.
20. Wheat and Bajra are grown behind the village homes, which serves as a good source for fodder. Water harvesting techniques have increased the productivity of these crops.
21. Mustard and Rice are grown as cash crops, which boosts incomes.

- Saheli Sangathan:

22. To provide social capital to rural poor women.
23. Micro-insurance received from VIMO- SEWA bank.

- Fodder development:

24. Rain water harvesting promoted to increase overall crop production.
25. Crop intensification methods (SRI and SWI – Scientific Rice Intensification and Wheat Intensification) applied.
26. Fodder trees are grown, such as Ardur Neem (leaves used as fodder, bark used in furniture, toys and shoes).

- Organic matter compost (Jeevamrit):

27. Activity running successfully in may villages in Orissa.
28. Start-up has been initiated in Jharkhand as well.

Executive Summary of Stakeholder Workshops under the study

"Stakeholder Consultation Workshop for review of Environmental Management Framework developed under the Rajasthan Rural Livelihood Project, Sawai Madhopur and Jaipur, July 21 & 22, 2010"

Organized by-

The Energy Research Institute

in association with

Rajasthan Rural Livelihood Project, RDPR, Government of Rajasthan

&

World Bank, New Delhi

Stakeholder Consultation Workshop for review of Environmental Management Framework developed under the Rajasthan Rural Livelihood Project

The Energy and Resources Institute (TERI) has conducted the environmental assessment study under the proposed Rajasthan Rural Livelihood Project (RRLP). One of the key components of the study involves the stakeholder consultations, thus two Multi- Stakeholder Consultation Workshops were organized in this regard with the following objectives;

6. dissemination of the results on the environmental assessment
7. review of Environmental Management Framework (EMF) developed as a part of this study

This workshop provided an excellent platform for stakeholders to participate and discuss various aspects of The EMF developed. The proceedings of both the workshops are detailed in this section. (see **Annexure 1a** for photographs)

STAKEHOLDER CONSULTATION WORKSHOP, SAWAI MADHOPUR,
Date: July 21, 2010
ZIilla Parishad,
Sawai Madhopurr, Rajasthan

The stake holder workshop commenced with a brief introduction of all the participants. The Rajasthan Rural Livelihood Project in Rajasthan (RRLP) was briefly presented to all the participants which was followed by a detailed presentation on the "Environmental Assessment Study and Development of Environmental Management Framework under the RRLP" by the consultant from TERI. The agenda for the workshop is enclosed as **Annexure-1b** and the list of participants attended the workshop is enclosed as **Annexure- I c.**

General Feedback from Participants

The following comments were received from the participants;

4. General feedback on the RRLP project

    - The participants requested a detailed presentation on the performance of the DPIP Phase I.
    - Details on the proposed support to livelihood activities specifically with respect to improvement of animal husbandry were

5. On Environmental status

    - The downward trend in number of cattle needs to be analysed.
    - Issues pertaining to air quality need to be included.

6. On EMF/EMP

    - It was pointed out that brick making should be in high category.
    - Environmental awareness is very poor in the local population and hence adequate importance may not be given to the EMF.
    - The EMF should provide details on the EMF of the DPIP I and the lessons learnt in implementing the same.

The workshop ended with a vote of thanks from the TERI team.

STAKEHOLDER CONSULTATION WORKSHOP, JAIPUR,
Date: July 22, 2010
OTS, HCM, RIPA, JLN Marg
Jaipur, Rajasthan

The workshop commenced with an inaugural address by Ms. Poonam, State Project Director, RRLP. Dr. Garima Kaushik, (Environment Specialist, RRLP) made a brief presentation on 'Overview of the RRLP project'. The agenda for the workshop is enclosed as **Annexure- 1d** and the list of participants attended the workshop is enclosed as **Annexure-1e.** A detailed presentation was made by Dr. Sumit Kumar Gautam, TERI on 'Findings of the Environmental Assessment Study and the Environment Management Framework Study' for the RRLP project.

Overall comments/feedback on the presentation

While the presentation was well accepted in general some specific comments were made with respect to data sources. The participants also requested that the Draft report may be made accessible to them for their perusal.

Specific feedback on the EMF/ EMP development
The feedback on the EMF/EMP can be summarized as follows:

Environmental Assessment procedures and tools:

- Incorporate details on water quality and on status of cottage industries in Village Natural Resource assessment
- Consult with Pollution Control Board officials for screening the list of activities
- Some activities that have been listed as negligible category need to be moved to low category and some listed in low would need to be moved to medium categories (such as Oil Expellers, Bullock/Camel carts, Stone Carving, Durry making, Tent house, etc.)
- Common health and safety guidelines need to be provided even for negligible category of activities
- Review the draft ground water policy formulated by the state government
- A safe list of pesticides needs to be included in the report
- In cases where there are health impacts (such as stone cutting) information on health and insurance schemes must be provided through the list of mitigation measures along with information on safety aspects
- Introduce 'water budgeting' for all activities involving significant use of water.
- While discussing carrying capacity it must be recognized that high numbers of non-productive cattle need to be replaced overtime with productive cattle.
- It is necessary to study the environmental implications of promoting a shift to HYVs of seeds.

- **Proactive Environmental Pilots**
- Renewable energy technologies need to be promoted as proactive subprojects

- Considering the issue of high water requirement, vermicomposting is a difficult proposition for Rajasthan

Lessons learnt from EMF implementation in Phase I

The discussions also focussed on how the DPIP phase I learnings were important in designing an effective EMF for the RRLP. It was emphasized that there is need for internalization of the monitoring system, dovetailing good environmental practices exercise within the activities (e.g., flyash use in road construction), etc.

Convergence with line departments

- Facilitate convergence with relevant Government schemes Involve/consult with the line departments while preparing the livelihood plans/cluster investment plans/business plans (for example, ensure provision of 'soil card' containing analysis and recommendations on soil quality for all agriculture activities)

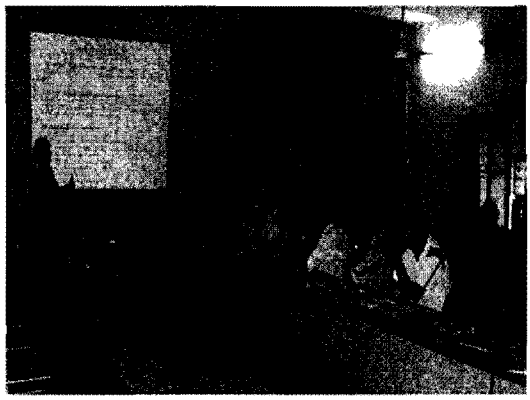
Capacity building

- Increase the number of days for PFT trainings

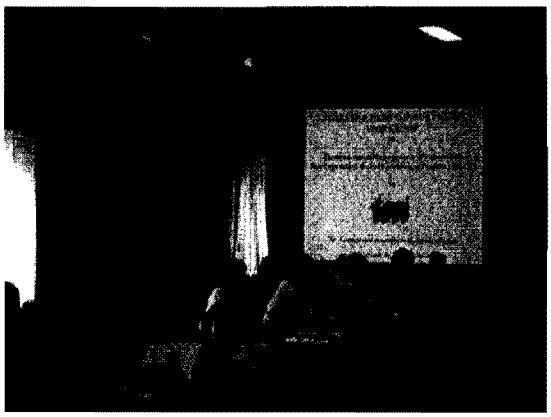
The workshop ended with a vote of thanks from Dr. Garima Kaushik

Annexure 1a Photographs

Stakeholder Consultation in Sawai Madhopur



Stakeholder Consultation in Jaipur



Annexure 1b Workshop Agenda – Sawai Madhopur

Development of Environmental Management Framework under the Rajasthan Rural Livelihood Project

Date: July 21, 2010
Zilla Panchayat, Sawai Madhopur

09:30 – 10:00	**Registration**
10:00 – 10-15	Welcome Address *by RRLP*
10:15 – 10:30	Briefing on the activity of the day *by RRLP*
10:30-10.45	Tea/Coffee Break
10:45- 12:00	Presentation on EMF *by TERI*
12:00-1:00	Feedback and Discussion
1:00- 1:30	Concluding Remarks and Vote of thanks *by TERI*
1:30	Lunch

Annexure 1c Participants List – Sawai Madhopur

STAKEHOLDER CONSULTATION WORKSHOP IN SAWAI MADHOPUR (JULY 21, 2010, WEDNESDAY) 2009WM017

S No.	Name and Designation	Organisation	Address (including phone number)	Signature
1	Upendra Mishra	- शिक्षा संस्थान - 3/21, [illegible]	- 9460152130	[signature]
2	D. D. Sharma	SARAS Coop. Dairy Sawai Madhopur	9950646193	[signature]
3	Dr P.K. Santhwal (V.O.)	Deptt of Animal husbandry S.M.	9251771080	[signature]
4.	Nand Lal Prajapat A.C.F.	DCF, RTR (core) S. Madhopur	9460246922	[signature]
	A.K. SINHA Project Manager	S.C.D.C.	9414378159	[signature]
6.	V.P. Gautam	P.O. (WE)(WCD)	9950161373	[signature]

S No.	Name and Designation		Address	Signature
7	Brij Kishor Rana Project Manager (SGSY) Z.P. SWM	Mob 91 - Zila Parishad, SWM	Mob. 9413974020	[signature]
8	Onkar Lal Meena AAO EGS	Zila Parishad SWM	9413793936	[signature]
9	Manoj Kumar DC Support officer UNDP	UNDP, Zilla Parishad, Sawaimadhopur	99 10-33-5742	[signature]
10	[illegible]	P.H.C. [illegible]	9414201438	[signature]

Annexure 1d Workshop Agenda – Jaipur

Government of Rajasthan

Rural Development & Panchayati Raj Department

Rajasthan Rural Livelihood Project (DPIP-II)

(3rd Floor, B-Block, Yojana Bhawan, C-Scheme, Jaipur, Ph: 5188109, 5188107 Fax:- 2229894)

and

The Energy and Resource Institute, New Delhi

Organizes

Consultation Workshop on Environment Management Framework for the Rajasthan Rural Livelihood Project

Date: July 22, 2010

OTS, HCM- RIPA, JLN Marg

Jaipur, Rajasthan

Workshop Schedule

S. No.	Subject	By	Time
1	Registration	TERI team	9:30-10:00 am
2	Welcome	SPD, RRLP	10:00-10:15am
3	Overview of RRLP	Specialist Environment- RRLP	10:15-10:30 am
4	Tea Break		10:30-10:45am
5	Presentation on EMF report	Consultant- TERI	10:45-12:00 noon
6	Discussions & Recommendations of workshop	All round	12:00-1:30pm
7	Lunch		1:30 onwards

Annexure 1e Participants List – Jaipur

STAKEHOLDER CONSULTATION WORKSHOP IN JAIPUR (JULY 22, 2010, WEDNESDAY) 2009WM017

Name and Designation	Organisation	Address (including phone number)	Signature
Sanjay Sharma Team Leader	PRADAN	[illegible] Shahpura, [illegible]	[signature]
Manoj Agarwal	Srijan	In front of SBI bank Deoli, (Tonk)	[signature]
Dr Anil Kumar Agarwal	SRIJAN	Ph No 01434 [illegible] 9784605018	[signature]
Jamuna Devi	Maitri Mahila Mandal Dooni	Near telephone exchange Dooni	[signature]
निरंजन सिंह	समग्र विकास संस्थान 1/170 न्यू हाउसिंग बोर्ड	9928020512 (M)	[signature]
डॉ. आर. के. जैन प्रधान वैज्ञानिक	भारतीय [illegible] [illegible]	Dr. R. K. Jain PS [illegible] RRS, ICPRI, Avikanagar [illegible] Tonk Raj	[signature]

S No.	Name and Designation	ORGANISATION	Address	Signature
7.	Dr S. K. KATARIA	Lecturer (R.I. [illegible]) Govt. M.S. College Bikaner	51/91 Mansarovar Jaipur - 20 0141 - 2783871	[signature]
8.	Sunil Sharma A.En.	A. En.	SWRPD, Jaipur	[signature]
9	Dr. Umesh Agarwal	Deputy Director Animal Husbandry, Raj. Jaipur	9414680008	[signature]
10	DR. H. R. Verma	Asstt. Director. Animal Husbandry, Raj. Jaipur		[signature]
11	P. K. [illegible]	Joint Director Agri [illegible] Jaipur	9828263307	[signature]
12.	Dr Hoshiyar Singh	Wheat Breeder	A.R.S Durgapura	[signature]

S No.	Name and Designation	Organisation	Address	Signature
13	Dr. S. L. Sharma	Assoc. Prof. & Incharge [illegible]	[illegible] Jaipur	
14.	Sanjay Mangan	RUDA Gen. Manager	Yojna Bhawan, Jaipur	
15	P. K. Mourya Dy. Director (Geology)	Water Resources Deptt.	[illegible] Jaipur	
16	Dr. M. L. Nathawat	Dy. Manager (AB)	RCDF Ltd Jaipur	
17.	AMBUJ KISHORE	ARAVALI, PATEL BHAWAN, OTS, JLN MARG JAIPUR	-DO- ambuj@aravali.org	
18	VIJAY SINGHAL	CCE, RPCB, Jaipur		

S No	Name and Designation	Organisation	Address	Signature
19.	Dr. S.S. Rathore Programme Coordinator		Krishi Vigyan Kendra V&P - Tankarda Via Chomu Distt - Jaipur	
20	Dinesh Saini DPM ~~RUDA~~		RUDA, Yojna Bhawan, Jaipur	
21	Shri S. L. Sharma Agronomist		Krishi Vigyan Kendra Chomu	
22	Sanjay Palnitkar	Environmental Consultancy	4/1/19, Malviya Nagar Jaipur	
23	Dr Ramesh Gupta Pro. Offi.	Women and Child Dev. Dep. Raj. Jaipur	2, Jal Path Jaipur	
24.	Dr. N. K. Sharma	Assistant Dir. Agri (Stat)	Pant Krishi Bhawan Jaipur	

S No.	Name and Designation	ORGANISATION	Address	Signature
25	Ikbal Mirza Advisor	Saheli Samiti Dausa	Somnath nagar Agra Road Dausa	[signature]
26	Lalji Yadav	Saheli Samiti Dausa	Somnath Nagar Agra Road Dausa	[signature]
27	Govind N Vijay	CECOEDECON, JPR	F 159,160, Institutional & Industrial Area Sitapura Jaipur	[signature]
28	Kalyani K	World Bank		Kalyani
29	Priti Kumar	WORLD BANK	HTS 70 LODI ESTATE NEW DELHI-3	[signature]
30	Garima Kaushik	R R L P	Yojana Bhawan	[signature]

S No.	Name and Designation	ORGANISATION	Address	Signature
31	[signature] (Kaluram Saini)		Sikandara (Stone cutting industry)	Kalu
32	B P Singh (Dy. Manager)	Foundation for Ecological Security	[illegible] Bhilwara	[signature]
33.	Prof A B Gupta	MNIT Jaipur		[signature]
34	Prof Rohit Goyal	"	rgoyal.mnit@yahoo.com	[signature]
35	R.C. Agrawal Project Officer (SGSY)	Rural Development and Panchayati Raj Department GOR. JAIPUR	75, Mohan Nagar Gopalpura bypass JAIPUR	[signature]
36	[illegible]	[illegible] Jaipur		[signature]

S No.	Name and Designation	ORGANISATION	Address	Signature
37.	R.K. SHARMA Project officer	Rural Development Department	Rural Dev. & Panchayati Raj Deptt, SSO Building North West Building Secretariat JAIPUR	[illegible]
38.	Dr Sunil Kumar Gautam	TERI (The Energy and Resources Institute)	Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi	
39	[illegible]		[illegible]	
40	Swati Iqbal			[illegible]
41.	Anand Nayak			[illegible]

Annexure 2

Assessment criteria for the categorisation of activities

Impact Category	Criteria	Remarks/Example	Environmental Appraisal to be done by
NEGLIGIBLE	All the activities which have almost no impacts on the environment and those that do not use natural resources	Sewing, music band, tent house, retail sale, etc.	Not required
LOW	**These projects may have limited and/or short term adverse impact on the environment and on health. However, these impacts can be mitigated by implementing recommended measures.**	Cattle/Buffalo rearing, Goat rearing, Sheep rearing, agriculture, Stone cutting, etc.	By PFT for SHG livelihood activities and Cluster development plan and by DPMU for PO business plan
MEDIUM	**These projects may have longer term adverse impact on environment, especially at the cumulative level. However, these impacts can be mitigated by implementing recommended measures.**	Irrigation tube wells, brick making, etc.	By PFT for SHG livelihood activities and Cluster development plan and by DPMU for PO business plan
HIGH	**These projects have long term deteriorating impact on environment and high level of technical intervention is required to identify specific mitigation measures to address the environmental impacts.**	Milk processing, Dyeing of carpets, etc., at producer organization level	By an external agency

Annexure 3

Activities not to be promoted under RRLP

The livelihood projects with severe environmental impacts and those not complying with the policies/regulations of state government, government of India and World Bank's safe guard policies should not be promoted under RRLP. A list of these activities is given below:

Subprojects	Remarks
Extraction of forest products and activities within forest areas without requisite permission from the Forest Department; Activities that directly or indirectly cause harm to wild animals (for example, hunting, habitat destruction, etc.).	May lead to loss of forest cover/wild life. Relevant permission is to be taken prior to undertaking activities in forest areas and activities involving extraction of forest resources. Related regulations: Forest (Conservation) Act, 1980, Indian Forest Act, 1927; Wild Life (Protection) Act, 1972
Use of banned/non permitted pesticides, use of hazardous pesticides (pesticides in classes Ia, Ib and II of the WHO classification) without appropriate technical support and safety measures	Insecticides Act, 1968; Safeguard Policies of the World Bank (OP 4.09, pesticide management)
Drilling tube well in overexploited blocks; drilling tube well in critical blocks without a plan to implement measures for water conservation	Compliance with Centre Ground Water Authority Overexploitation of groundwater, unsustainability of the tube well
Any subproject involving construction within 200 meter to historical monuments and within 100 meter to railways, highways, etc.	Related regulations: EIA Notification, 2006
Brick manufacturing in agriculture land	Air pollution causing health impacts Water pollution from manufacturing process Loss of fertile soil Related regulations: EIA Notification, 2006
Purchase of livestock in districts with fodder scarcity (Dausa, Churu, Banswara, Dungarpur) unless fodder management (fodder conservation or cultivation or pasture land development) is undertaken as integral part of the activity.	Poor fodder management will lead to reduced biomass availability, degradation of land and impact sustainability of the livelihood activity.

This list of activities needs to be communicated by the SPMU to the SHGs through DPMU, PFT and CDO.

Annexure 4

Activities likely to be supported under RRLP

Negligible	Low	Medium	High
• Tailoring and Embroidery • Camel and Bullock Carts • Retail sale (Fruit Cart, Vegetable Selling, Grocery Shop, etc) • Services (Music Band, Tent House, Beauty Parlour, Bicycle Lease Centre) • Papad Making • Toffee Wrapping • Durry Making • Candle Making	1. Agriculture 2. Horticulture 3. Kund Bagwani 4. Farm pond 5. Open wells 6. Dairy 7. Goat farming 8. Sheep farming 9. Pig farming 10. Donkey/Horse rearing 11. Poultry 12. Vermicomposting 13. NTFP collection 14. Wood Work 15. Stone Carving 16. Nagina udyog 17. Pearl drilling 18. Carpet Making 19. Weaving and Printing 20. Dhaba 21. Bakery and Sweet Making 22. Spice and Flour Mill 23. Soap and Detergent Making 24. Iron Welding Work 25. Threshers 26. Land Levelling 27. Construction of cluster level infrastructure (store room/godown, animal shed, work shed, etc.) 28. Manufacturing of bullock or camels carts 29. Expellers (Oil Extraction)	1. Irrigation Well 2. Brick making 3. Selling of pesticides	1. Large scale milk processing by producer companies for value added products 2. Large scale dyeing of carpets by producer company

Annexure 5

Village Level Natural Resource Assessment

(To be conducted by PFT for each project village in consultation with Gram Panchayat, SHGs, CDO, and CRPs)

Village: **Block:** **District:**

Resource	Details
FOREST RESOURCE	
Forest Area	
Status (degraded?)	
Flora fauna status	
Any protected area	
Current use of forest for any livelihood activity	
GRAZING LAND	
Area (indicate any encroached area separately)	
Fallow Land	
Pastureland	
Culturable wasteland)	
Season when fodder is available	
LIVESTOCK	
Number of cattle/buffalo	
Number of goat/sheep	
Other	
FODDER AVAILABILITY	
Area under fodder cultivation (mainly dry fodder – mention including crop residues)	
Period of dry fodder scarcity	
Source of dry fodder during scarcity	
Area under green fodder cultivation (like Barseem, Rajka etc)	
Period of green fodder scarcity	
Source of green fodder during scarcity	
GROUND WATER	
Total number of in use tube wells	
Total number of dried up tube wells	
Depth of Groundwater (indicate feet or metres)	
Quality of ground water (like salinity, nitrate etc)	
SURFACE WATER	
Number of open wells	
Number of ponds	
Details of any canals, streams	

Resource	Details
Quality of surface water	
Period of water availability	
AGRICULTURE	
Cropping pattern (monocropping/ mixed cropping/ crop rotation)	
Main crops grown (Rabi, Kharif, and horticultural crops)	
Soil fertility status	
Details on soil cards	
Pesticides/fertilizer usage	
Source of irrigation	
Extent of irrigation (% of sown area which is irrigated)	
SMALL SCALE MINING	
Details on the minerals, area under mining, number of peoples involved, any safety and health issues	

Name of PFT:

Signature:

Name of VDC representative:

Signature:

Date:

Annexure 6

Environmental Guidelines (EGs)

EG No 1	**IRRIGATION TUBEWELL**			
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Guidelines for convergence with existing schemes**
Over extraction will deplete ground water Unprotected / abandoned bore holes are a safety hazard for small children	Use efficient ways of irrigation like drip and sprinkle irrigation Use pipes for conveying water to avoid seepage and evaporation losses If field channels are used to convey water, line channels with plastic sheets to avoid seepage loss Use percolation pit Plug / cover boreholes that are open / abandoned	Investing in rain water harvesting through farm ponds	Organize training on rainwater harvesting, efficient irrigation methods and water conservation practices. Periodical review to assess any emerging cumulative impact	Approach Groundwater, Irrigation, Water shed and soil conservation and Agriculture Extension departments for information on subsidy schemes, training programmes, technical support, etc., on: • Efficient irrigation means. • Irrigation schedule • Farm ponds

EG No 2	PRODUCER ORGANIZATION – AGRICULTURE		
Possible Issues	**Mitigation measures**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Sale and use of banned/non permitted pesticides Unsafe handling of pesticides/insecticides Improper use of chemical fertilizers Sale of uncertified seed	Display the license (for sale of pesticides and fertilizers) in a prominent part of the premises that is open to public. Do not sell and use the banned/non permitted pesticides including pesticides in classes Ia, Ib, and II (WHO Classification of Pesticides by Hazard) Do not change or remove any inscription or mark made by the manufacturer on the container, label or wrapper of any pesticide. Maintain proper records of procurement and sale of pesticides (brand name and name of active ingredients) Provide technical support to farmers on integrated pest management, pesticide safety, etc. Stock and promote sale of safety gadgets to be used while handling pesticides (for example, hand gloves, plastic masks, etc.) Stock and sell inputs/equipment for non-chemical pest management (neem oil, pheromone traps, etc.) Do not store pesticides near to edibles products Do not sell fertilizers without ISI Mark Certification Maintain proper records of procurement and sale of fertilizers Provide soil testing and fertilizer recommendation services to member farmers	Ensuring that all the legal requirements are met like license, registration etc from competent authority If pesticides are to be sold or stocked at more than one place, take separate licenses for every such place. Take license to sell fertilizers from the competent authority	Coordinate with department of Agriculture Extension/Krishi Vigyan Kendra for the information and assistance on IPM and INM Organic farming Certified seeds Banned pesticides Soil quality and fertilizer need of the region

EG No 3	**PRODUCER ORGANIZATION – DAIRY**		
Possible Issues	**Mitigation measures**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Legal requirements Livestock management Fodder management Hygiene of product Waste management	Ensure availability of good quality animals (healthy, hardy, high yielding animals) with the help of qualified veterinary doctor Avoid grazing on forest lands as far as possible. Cultivation of suitable, fast growing fodder species. Practice rotational grazing and rotational harvesting of green fodder from field bunds / marginal lands and wastelands. Sensitization of the Gram Panchayat and CDO on adoption of norms for rotational grazing and harvesting fodder from field bunds / wastelands. Encourage stall feeding and fodder enrichment practices Compost animal wastes using a simple pit method or vermi-composting or efficient composting methods Use clean utensils and handle milk in hygienic way Wash milk utensils and cooling unit thoroughly as prescribed and dispose waste water into a soak pit	Take adequate permission from Pollution Control Board Take the required permit from the Forest Department for grazing	Coordinate with department of Animal Husbandry/Veterinary for the information and assistance on 7. Livestock breed selection 8. Fodder management 9. Composting

EG No 4	**DAIRY (Cattle/Buffalo)**				
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Fodder availability Degradation of pasture lands and forests Water availability Hygiene of cattle shed Hygiene of milk	Cultivate fodder Chop fodder and use feed trough Practice stall feeding Always store fodder in clean and dry place Use community pasture land for the grazing purpose Avoid grazing in forest areas Use supplementary animal feed (crop residues, mustard pellets (*Khali*), etc) and fodder treatment (with urea, molasses, mineral mixture etc) Keep the shed clean and dry The shed should be at least 15 meter away from drinking water source (hand pump) Use natural mosquito repellents like fumigation of mustard seeds etc Collect dung as soon as possible and compost in a pit Disposal animal carcasses by burial/disposal at least 500 meter away from habitations/water bodies	Fodder storage (fodder bank) for use in periods of scarcity Practice fodder treatment (treating dry fodder with urea, molasses, mineral mixture)	Organize training/technical support on fodder management Pastureland development Investing in rain water harvesting to meet water requirement of the livestock	In case of forest land, take permission from forest department for grazing	Co-ordinate with Animal Husbandry and Veterinary department for information on subsidy schemes, training programmes, technical support, etc., on: 1. The selection of suitable breed of cattle 2. Fodder cultivation and management Approach department of water resources and ground water for technical support on rain water harvesting to meet livestock water requirement

EG No 5	**Goat Farming and Sheep Rearing**				
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Fodder availability Degradation of pasture lands and forests Unhygienic conditions in the shed – Health of the animals and people	Use community pasture land for the grazing purpose Avoid grazing in forest areas Allow grazing on harvested fields (crop stubbles and residues) Always store fodder in clean and dry place Use supplementary animal feed (crop residues, *Prosopis juliflora* pods (Junglee Babul) etc) Keep the shed clean and dry Collect dung as soon as possible and compost in a pit Disposal animal carcasses by burial/disposal at least 500 meter away from habitations/water bodies	Practice rotational grazing Fodder storage (fodder bank) for use in periods of scarcity	Periodic review to assess any emerging cumulative impact Plant trees of, Babul, Subabul, Karanj, Ziziphus, Ber, Ker, species Pastureland development Discourage any encroachment on the grazing land	In case of forest land, take permission from forest department for grazing	Approach Agriculture Extension department, Krishi Vigyan Kendra and Animal Husbandry departments for the support on 8. fodder cultivation, and its storage 9. supplementary feed

EG No 6	AGRICULUTRE and HORTICULTURE (vegetables/fruits cultivation)				
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Non negotiable actions**	**Guidelines for convergence**
Ground water based irrigation (tube wells) lead to depleting ground water status Improper use of chemical fertilizers may lead to environmental pollution Poor soil fertility may lead to low yield Improper application of hazardous chemical pesticides /weedicides – may cause negative impacts on human and environmental health	Use efficient ways of irrigation like drip and sprinkler irrigation Use pipes for irrigation instead of flooding or open channels Increase use of organic manures Use chemical fertilizers only on basis of soil testing and technical recommendations Use mask, gloves and goggles to protect the body while spraying pesticides Always wash limbs and face after spraying Use efficient spraying equipments to prevent leakage Avoid use of chemical weedicide by de weeding using physical methods Do not apply any chemicals on the surface of fruits/vegetables	Investing in rain water harvesting through farm ponds and kunds Investing in buying efficient spray equipment for hiring out to SHG members Soil testing	Organize training on water management, fertilizer scheduling and on safe use of pesticides	Do not use banned pesticides	Co-ordinate with local Agriculture extension department/Krishi Vigyan Kendra, Irrigation, Groundwater and Horticulture department for information on subsidy schemes, training programmes, technical support, etc., on: 6. Efficient irrigation practices 7. Integrated Nutrient Management and Soil testing 8. Integrated Pesticide Management 9. Crop/weather insurance

EG No 7	NTFP (Done Pattal, fruits, medicinal plants, Mooda etc)			
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Guidelines for convergence with existing schemes Non negotiable actions**

Leaf, gum, root, bark collection - impacts on overall plant health Flowers, fruits, seed collection – impacts regeneration	<u>Collection of NTFP:</u> Leaves: Collect leaves from different trees and not more than 1/3 of leaves should be plucked from a single tree New leaves should not plucked Reasonable amount of leaf should be left for plant's survival and health Gums: Only mature trees should be selected for gum tapping Working plan of the forest areas prescribes minimum girth for different species in the particular forest area – and this should be Strictly observed. Depending on the species tapping regime of three to four years should be followed. The blaze should not be deep enough to cause injury to the stem of the tree. Fruit: Only ripe fruit should be collected Felling of trees or lopping should be prohibited. Certain area should be marked for closure for fruit collection on rotational basis. Do not pluck all the fruits from a single tree Certain amount of fruit should be left for wild animal species. If fallen fruit is being collected 25% shall be left for regeneration. Do not collect all seeds Flowers: The flower should be collected at the end of the flowering season. 25 % of the fallen flowers shall be left on the forest floor. <u>Processing of NTFP:</u> Do not procure NTFP illegally Reuse/compost the solid waste	Cultivation of medicinal plants

Ensuring the technical support and any training if required on sustainable NTFP harvesting is provided

Encourage sustainable harvesting and lay down community norms for same Take required permission from competent authority like Gram Panchayat/ Village Forest Protection or JFM Committee (in case of Village Forest), or Forest department (in case of all other forests)

Approach Forest and Horticulture departments, Krishi Vigyan Kendra, for the information, technical support, training on:

6.11 Sustainable harvesting of NTFP
6.12 Cultivation of medicinal plants

EG No 8	**Wood/Timber collection**			
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Legal requirements				
Waste – solid biodegradable				
Collect only fallen (dead) and dry wood				
Do not lop green branches				
Endangered species should not be harvested Use reject wood pieces as fuel				

Compost the solid waste which can not be reusedPlantation of suitable timber species	Ensuring that technical support and any training if required on sustainable extraction, endangered species, etc., is provided Coordination with relevant departments Plantation of suitable timber species	Take required permission from Forest department	Co-ordinate with Forest department for information on • regulations on collecting wood • endangered species of trees

EG No 9	POND/TANK CONSTRUCTION				
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Erosion of top soil – may affect the overall growth and production of grown crops Removal of plants	Avoid removing trees by selecting the site for construction on barren and uncultivable land to the extent possible Do compensatory	Investing in construction of bunds around the tank/ponds Regular maintenance structure silting including bund	Ensuring the technical support and any training if required Coordination with relevant departments	Take required permission from Gram Panchayat/ Forest department in case any felling of tree/s is required	Approach Ground Water and PHED department for the information and support on 5. technical plan 6. financial assistance

and deforestation Contamination of stored water	afforestation/ plantation in case felling of any tree/s is unavoidable Plant small shrubs, grass around the pond to control silt entering pond Use anti mosquito fish species Do now allow any other water like cattle shed runoff, sullage, etc., to enter into the pond/tanks Do not allow cattle to drink water directly from pond/tank Prevent disposal of any kind of solid waste into pond/tanks	strengthening and desiltation			

EG No 10	**STORE ROOM CONSTRUCTION**	
Possible Issues	**Mitigation measures**	**Non negotiable actions**
Top soil erosion Tree felling	Avoid felling of trees by selecting the suitable site on barren/unculturable land. Do compensatory afforestation/ plantation in case felling of any tree/s is unavoidable	Take required permission from Gram Panchayat/ Forest department in case any felling of tree/s is required

	Ensure that removed top fertile soil is preserved and used at other arable land Take help of qualified Civil Engineer on the design of store room. Ensure that the room has proper drainage facility Keep the room dry and clean Apply only permitted insecticides	

EG No 11	**ANIMAL SHED/ WORK SHED CONSTRUCTION**	
Possible Issues	**Mitigation measures**	**Non negotiable actions**
Top soil erosion Tree felling Environmental conditions – Light, ventilation, cleanliness, hygiene	Avoid felling of trees by selecting the suitable site like barren land Do compensatory afforestation/ plantation in case felling of any tree/s is unavoidable Ensure that removed top fertile soil is preserved and used at other arable land	Take required permission from Gram Panchayat/ Forest department in case any felling of tree/s is required

	Provide 3*6 feet area per goat/sheep and 5*8 feet per cattle/buffalo in animal shed The shed should have adequate light and ventilation Do not construct any animal shed near to drinking water facilities and provide minimum distance of 15 meters from the drinking water facility The floor of shed should have a slope to permit draining of animal wastes Provide facility for composting of animal wastes near the shed to enable easy management	

EG No 12	**POULTRY**			
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Guidelines for convergence with existing schemes**
Unhygienic conditions – health of birds and people	Use healthy breeds Provision of recommended space and ventilation. Required space per full grown bird for layers is 2300-2800 cm^2 and for broilers is 2800-3700 cm^2	Ensuring the procurement of healthy birds	Ensuring the technical support and any training if required	Co-ordinate with Animal Husbandry and Veterinary department for the selection of suitable breed and technical support in management

	Maintain cleanliness by regular cleaning Follow vaccination schedule Keep the diseased birds away from healthy birds Dispose the dead birds carcasses away from residential location Control parasites and pathogens Bury the dead birds appropriately Wear gloves and apron during burial of dead infected birds. Avoid entry of visitors to farm, especially inside the sheds			

EG No 13	**LAND LEVELLING**			
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Non negotiable actions**	**Guidelines for convergence with existing schemes**
Overall disturbed topology, soil erosion	Avoid felling of trees by selecting the suitable site like barren land; Ensure that tree roots are not exposed due to the levelling	Encourage plantation of suitable species through awareness	Take required permission from Gram Panchayat/ Forest department in case any felling of tree/s is required	Co-ordinate with departments of Watershed and Soil Conservation, Krishi Vigyan Kendra for technical know - how

	Do compensatory afforestation/ plantation in case felling of any tree/s is unavoidable Ensure that removed top fertile soil is preserved and used at other arable land Do not dump the excess soil improperly Take measures to control soil erosion and check runoff (bunds, trenches, etc.)			

EG No 14	**STONE CARVING and NAGINA UDYOG**		
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Guidelines for convergence with existing schemes**
Air Pollution – dust emission during stone and gem cutting may impact health adversely Noise – Operation of machinery/equipment Solid waste	Cover the nose and mouth using cotton cloth/masks Protect eyes using goggles Sprinkle water (if possible) to suppress the dust	Ensure safe use and maintenance of the machines Keep first-aid kit available at the work site Encourage planting the leafy trees like Neem, Ashok around the	Approach state pollution control department for technical support and know how on the dust suppression

Work shed: adequate light and ventilation	Use ear plugs Use oils to enhance lubrication in machines to reduce noise Make sure that sufficient light is available during Nagina work Dispose the stone pieces and stone slurry in useful way (road construction, pit filling, etc.)	work place to control dust	

EG No 15	**SPICE AND FLOUR MILL**		
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Guidelines for convergence with existing schemes**
Air Pollution (Dust emission) – Adverse impact on health Noise Work shed: adequate light and ventilation	Use proper safety gear like mask/cotton cloth to cover nose and mouth, goggles to protect eyes, etc. Avoid smoking at work place Use ear plugs	Ensure the regular maintenance of the machines as per manufacturer's instruction Keep first-aid kit available at the work site	

	Use oil for the lubrication of machines Read and apply manufacturers instructions Do not keep machines running when not in use	Encouraging the procurement of energy efficient machineries	

EG No 16	**IRON WELDING WORK**	
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**
Pollution –Air pollution, production of ultra-violet radiation and drops of molten metal Noise pollution Fuel Gas: Handling of cylinder and safety	Use proper gadgets like welding helmet and goggles Use ear plug Follow the manufacturer's instruction carefully Do not smoke near the gas cylinder	Ensuring that the fuel cylinders are kept safe Keep first-aid kit available at the work site

	Check the fuel cylinder regularly for leakage	

EG No 17	**Thresher Machines**	
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**
Pollution –Dust pollution Noise Grain damage	Use proper gadgets like mask/cotton cloth to cover nose and mouth, and goggles Avoid smoking at work place Use ear plug Apply lubricants on the	Ensure the regular maintenance of the machines as per manufacturer's instruction Keep first-aid kit available at the work site

	machineries for smooth functioning Read and follow manufacturer's instruction carefully	

EG No 18	**GALICHA (CARPET) MAKING**
Possible Issues	**Mitigation measures at individual level**
Air Pollution Disposal of Solid waste Working condition – Light, ventilation	Cover mouth and nose with cotton cloth or mask Ensure proper disposal of broken needles/sharp articles/broken glasses here and there

	Install looms in a place where sufficient ventilation and light is available Install fire extinguisher

EG No 19	**FOOD PREPARATION (Dhaba etc)**	
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**
Disposal of solid waste and waste water Indoor air pollution due to biomass based stoves Risk to health from	Dispose wastewater in a soak pit Segregate solid waste into biodegradable and non biodegradable Biodegradable waste/kitchen waste should be composted	Investing in cleaner fuel like LPG Investing in improved stove Encourage composting Investing in drinking water filters

unhygienic conditions, unsafe drinking water, etc.	Non-biodegradable wastes should be disposed at a designated garbage collection point. Use only clean and safe water Ensure that disposable plastic cups/ tumblers are not used Use improved biomass stoves Clean the area and all utensils Keep the area clean and apply pest control	

EG No 20	**VERMICOMPOSTING**			
Possible Issues	**Mitigation measures at individual level**	**Mitigation measures at SHG level**	**Mitigation measures at CDO Level**	**Guidelines for convergence with existing schemes**
Overall performance of activity	Use local species of earthworm like *Eisenia fetida, Eisenia andrie Eudrilus Eugenia, Lampito mauritii* and *Perionyx excavatus* Cover the bottom of pit with dry leaves, husk or straw		Ensuring the technical support and any training if required	Approach Agriculture Extension department and Krishi Vigyan Kendra for the technical support

	Keep the vermi composting pit covered with mesh or net in order to protect earthworms from birds Protect the pit from rain and direct sunlight Avoid adding polythene or non biodegradable wastes in pit Monitor activity regularly for the temperature, moisture and earthworm activity			

Annexure 7A

Common Guidelines for Health and Safety

Safety equipment:
Cover mouth and nose with cotton cloth or mask for protection against dust and other particulate matter
Use goggles to protect eyes
Install fire extinguisher
Maintain a first aid kit at work place

Waste management:
Sprinkle water (if possible) to suppress the dust

Ensure proper disposal of waste materials that can pose a health and safety hazard (sharp objects, used chemical containers, etc.)
Segregate wastes for composting and recycling/reuse
Machinery:
Apply lubricants on the machineries for smooth functioning

Read and follow manufacturer's instruction carefully

Never exceed the maximum permissible speed and load of machine
Ensure that children and lay persons do not have access to sites with high speed machinery

Work site:
Work sites must be in places wherehave sufficient ventilation and light available
Work sites must have access to safe drinking water and sanitation facilities

Annexure 7B

General Environmental Guideline (GEG)

(To be used for the activities for which specific EG is not available)

Attribute	Impacts	Mitigation Measures
Air	Is there any dust generation? Is there any air pollution? Is there any problem related to ventilation?	Use mask/cotton cloth while working The activity place should be well ventilated If possible, sprinkle the water to suppress dust Maintain the machinery as per manufacturer's instructions Avoid long working hours Do not smoke at working place Do plantation around the activity site
Water	Is there any use of water? What is the source of water? Is there any effluent/waste water generation? How is the waste water being discharged? Is there any threat of ground water contamination?	Minimize the wastage of water by recycling/reusing Practice ground water recharge/rain water harvesting Do not discharge any wastewater within 15 meter of drinking water source (hand pump, well) Protect water from any kind of contamination
Soil	Will the activity damage top soil? Will the activity cause soil erosion?	Avoid up rooting trees Conserve top fertile soil Grow shrubs/trees/grass to prevent soil erosion
Solid Waste	Is the solid waste biodegradable (like organics, fodder residue, agriculture residues) Will the disposal of solid waste create obstruction to any natural drainage?	Do not mix organic waste with non biodegradable waste Compost all organic waste Do not dispose the waste in any water body or in a manner obstructing natural drainage
Hygiene	Is there any collection of wastewater? Does the activity contribute to contamination and spread of disease?	Dispose waste water through soak pits, avoid stagnation of waste water Maintain safe distance between worksite and habitation Always wash hands and face with soap after performing activity
Based on the identified impacts, coordinate with District Environmental Specialist and the relevant line department for technical support in identification of required mitigation measures.		

Annexure 8A

Environmental Appraisal Summary Sheet – SHG Livelihood Plan

Name of SHG: **Village:** **Block:** **District:**

S No	Livelihood Activity	No of Members	Scale of activity (ex no. of goat/sheep, tube well etc)	Relevant Information from NRA of Village	Actions on which SHG members agreed to exceute (based on EGs)	Identified needs (technical assistance, convergence, training etc)

Are any of the proposed activities included in the 'Activities not to be promoted under RRLP'? **Yes / No**
Have the Environmental Guidelines been referred to for identifying impacts and mitigation measures? **Yes / No**
Does the SHG agree to implement all the non-negotiable actions listed in the Environmental Guidelines? **Yes / No**

Name and Signature of SHG Nodal Person **Name and Signature of PFT** **Name and Signature of CDO**
Date:

Annexure 8B

Environmental Appraisal Summary Sheet – CDO

Name of CDO:
Village:
Block:
District:

Proposed Activity	
Scale of activity	
Mention mitigation measures	
Identified needs (technical assistance, convergence, training etc)	

Are any of the proposed activities included in the 'Activities not to be promoted under RRLP'? Yes / No
Have the Environmental Guidelines been referred to for identifying impacts and mitigation measures? Yes / No
Does the CDO agree to implement all the non-negotiable actions listed in the Environmental Guidelines? Yes / No

Name and Signature of CDO Nodal Person

Name and Signature of PFT

Name and Signature of DPMU

Date:

Annexure 8C

Environmental Appraisal Summary Sheet – Producer Organization

Name of Organization
Block:
District:

Proposed Activity	
Scale of activity	
Mention mitigation measures	
Identified needs (technical assistance, training, support under convergence with existing Government schemes, etc.)	

Are any of the proposed activities included in the 'Activities not to be promoted under RRLP'? **Yes / No**
Have the Environmental Guidelines been referred to for identifying impacts and mitigation measures? **Yes / No**
Does the PO agree to implement all the non-negotiable actions listed in the Environmental Guidelines? **Yes / No**

Name and Signature of PO Nodal Person

Name and Signature of DPMU

Name and Signature of RRLP
Date:

Annexure 8D

Environmental Appraisal Summary Sheet for high impact activities

Name of Organization (PO/CDO):
Village:
Block:
District:

Proposed Activity	
Scale of activity (please provide estimated production)	
Resource requirement and sources (ex. water, energy, raw materials, etc., and the source where the resources will be procured)	
Baseline environmental status (with reference to the resources required, the nature of the activity being proposed and its likely impacts)	
Identified adverse impacts on environment: Surface water (availability, quality) Ground water (availability, quality) Air pollution Based on the identified impacts, coordinate with District Environmental Specialist and the relevant line department for technical support in identification of required mitigation measures. Solid waste Land use and soil status Agriculture and livestock Forests and biodiversity Health and safety issues Hazardous chemicals	
Proposed plan to mitigate adverse impacts (provide in detail):	
Is the activity in compliance with all relevant laws/regulations/safeguard policies? Give details.	

Name and Signature of Environmental Expert who conducted this appraisal:
Name and Signature of PO/CDO Nodal Person:
Name and Signature of DPMU:
Name and Signature of RRLP:
Date:

Annexure 9A

Assessment of Cumulative Impacts – Dairy

(To be filled by PFT in consultation with CDO and submitted to District Environment Specialist/DPMU once every six months)

Village: **Block:** **District:** **Period: From.....To.....**

Number of SHGs	Number of members who received support for dairy activity	Number of cattle/buffalo sanctioned (during the period for which assessment is being conducted)	Total number of cattle/buffalo approved till date under RRLP in the village	Total number of cattle/buffalo in village (RRLP + NON RRLP)	Observed Cumulative Impacts	Mitigation measures currently being practised (give details)Mitigation measures required for mitigating cumulative impact (give details)	Required measures for mitigating cumulative impact (give details)
					Grazing:	Grazing management:	Better grazing management:
					Fodder availability:	Fodder availability:	Fodder cultivation:
					Water availability:	Water availability:	Fodder treatment:
					Others:	Composting:	Composting:
						Others:	Others:

Name of CDO
Signature of CDO
Date:

Annexure 9B

Assessment of Cumulative Impacts – Goat/Sheep rearing

(To be filled by PFT in consultation with CDO and submitted to District Environment Specialist/DPMU once every six months)

Village: **Block:** **District:** **Period: From.....To.....**

Number of SHGs involved in the sub projects	Number of members who received support for goat/sheep rearing activity	Number of goat/sheep sanctioned (during the period for which assessment is being conducted)	Total number of goat/sheep approved till date under RRLP	Total number of goat/sheep in village (RRLP + NON RRLP)	Observed Cumulative Impacts	Mitigation measures currently being practised (give details)	Required measures for mitigating cumulative impact (give details)
					Grazing: Fodder availability: Water availability: Others:	Grazing management: Fodder availability: Water availability: Composting: Others:	Development of community grazing land: Regulation on open grazing: Better grazing management (rotational grazing): Supplementary feed: Others:

Name of CDO
Signature of CDO
Date:

Annexure 9C

Assessment of Cumulative Impacts – Tube well

(To be filled by PFT in consultation with CDO and submitted to District Environment Specialist/DPMU once every six months)

Village: **Block:** **District:** **Period: From.....To.....**

Number of SHGs involved in the sub projects	Number of members who received support for tubewell	Number of Tube well sanctioned (during the period for which assessment is being conducted)	Total number of tube wells approved till date under RRLP	Total number of Tube wells in village (RRLP + NON RRLP)	Observed Cumulative Impacts	Mitigation measures currently being practised (give details)	Required measures for mitigating cumulative impact (give details)
					Decline in ground water table: Dried up bore wells: Shift to cultivation of high water demand crops: Others:		

Farm ponds:

Rain water harvesting:

Efficient irrigation methods:

Others:Water harvesting:

Efficient irrigation:

Cropping system:

Others:

Name of CDO
Signature of CDO
Date:

Annexure 9D

Assessment of Cumulative Impacts – NTFP

(To be filled by PFT in consultation with CDO and submitted to District Environment Specialist/DPMU once every six months)

Village: **Block:** **District:** **Period: From.....To.....**

Number of SHGs involved in the sub projects	Number of members who received support for NTFP activityNames of NTFP species and part (seed, fruit, leaf, root, etc.) involved (mention separately for each NTFP species)	Total quantity of NTFP harvested (mention separately for each NTFP species) till date under RRLP	Total quantity of NTFP harvested in village (RRLP + NON RRLP)	Observed Cumulative Impacts	Mitigation measures currently being practised (give details)Required measures for mitigating cumulative impact (give details)	Required measures for mitigating cumulative impact (give details)
				Over-extraction:	Ensuring that legal requirements are met:	
				Impact on regeneration:	Sustainable extraction practices:	
				Others:	Cultivation of medicinal plants:	

Name of CDO
Signature of CDO
Date:

Annexure 9E

Assessment of Cumulative Impacts – PFT Level

(To be filled by PFT and submitted it to DPMU every six months)

Number of Villages:
Total number of SHGs:
Block:
District:
Period: From.....To.....

Dairy	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	
Tube wells	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	
NTFP	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	
Others	
Activity	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	

Name of PFT Coordinator:
Signature of PFT Coordinator:
Date:

Annexure 9F

Assessment of Cumulative Impacts – District Level

(To be filled by DPMU and submitted to SPMU every six months)

Total number of Blocks:
Number of Villages:
Total number of SHGs:
District:
Period: From.....To.....

Livestock	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	
Tube wells	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	
NTFP	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	
Others	
Activity	
Total number of SHG members involved	
Observed cumulative impacts	
Mitigation measures currently being practised	
Recommendations for mitigating cumulative impact	

Name of DPMU Coordinator / District Environmental Specialist:
Signature of DPMU Coordinator / District Environmental Specialist:
Date:

Annexure 9G

Terms of Reference for Cummulative Impact Assessment for the Livestock Sector

(This is an indicative terms of reference. It will need to be developed further, in consultation with key stakeholders working on livestock-natural resource management issues in Rajasthan, during the course of project implementation.)

Introduction: The Cumulative Impact Assessment (CIA) study will be undertaken as part of the mid-term external environmental audit. Cumulative impacts are the combined, incremental effects of human activity that may pose a threat to the environment. Cumulative impacts result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that should be the focus of cumulative impact assessment[34].

Purpose: The purpose of the CIA is to capture the cumulative impact of the livestock activities supported by the project on the local natural resource base.

Scope: The scope of the CIA study will include:

r) Livestock activities – Cumulative impacts refer to the total effects on the resource of an action and all other activities affecting that resource no matter what entity is taking the actions. Hence the scope will include both project as well as relevant non-project activities that affect the local natural resources. The full range of livestock activities including purchase of new livestock, fodder management/production/banks, pasture land management, provision of extension support and training, etc. will be covered. All livestock including small and large ruminants will be within the purview of the study.

s) Nature of impact – The cumulative impact will cover both positive and negative impacts.

t) Natural resources – The local natural resource base implies biomass (fodder grass, trees), biodiversity (flora and fauna), land (soil erosion, compaction, fertility), water (availability, quality), etc.

u) Level at which the impact will be assessed – The focus will be on village (habitation) level impacts. However, as livestock – especially small ruminants – use pasture/grazing lands that may overlap with neighbouring villages, the cumulative impact on such lands may be assessed at the level of the resource.

[34] *Consideration Of Cumulative Impacts In EPA Review of NEPA Documents*. U.S. Environmental Protection Agency, Office of Federal Activities (2252A) EPA 315-R-99-002/May 1999. http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf

Sample: The sample for the CIA will cover 1 representative district in each of the 6 agro-climatic zones covered in the porject area. In each district 2 villages will be selected – one with the maximum number of large ruminants and the other with the maximum number of small ruminants purchased through project support. Thus, a total of 12 project villages will be studied. Another 12 villages in the same zone will be taken as the control.

Methodology: The methodology will involve:

8. Desk review: Review of project documents to understand the project supported livestock interventions will be undertaken. The Panchayat and other relevant records on livestock population, pasture land, crops cultivated, etc., will be reviewed to understand the current and pre-project situation with respect to livestock and the fodder resources in the village.
9. Stakeholder consultations: Consultations will be held with the self-help groups, other user groups, Panchayat representatives, the extension staff of the animal husbandry department, project team, and any significant other stakeholders. The purpose of the consultations will be to obtain qualitative and quantitiative information on the cumulative impact of the livestock interventions in the village on the local natural resource base.
10. Field studies: Field studies will be undertaken to get quantitative details on the livestock population, biomass production, fodder consumption, fodder availability, fodder conservation and management, manure production and utilization, soil fertility, water consumption by livestock, etc.

Output:
A report on CIA documenting the methodology, key findings and practical recommendations for promoting environmentally

Annexure 10

Format for Internal Monitoring Report

(To be filled by district environment coordinator and submitted to state environment coordinator)

Name of District:

Period: From ..... To.....

Desk Review	
Number of Villages	
Number of PFTs	
Number of Producer Organizations	
Number of Cluster Development Plans	
Total number of SHGs plans	
Total number of SHGs livelihood activities (sector wise)	1. Agriculture
	2.Tube well
	3.Cattle/Buffalo
	4.Goat/sheep
	5. NTFP
	6. Others
Total number of cluster development plans (with details of the activities)	1.
	2.
	3.
Producer Organizations' Business plans (with details of the activities)	1.
	2.
Number of villages for which Natural Resource Assessment has been conducted	
Activities in Medium impact category	1. Tube wells
	2. Brick manufacturing
Number of SHGs plans with duly filled Environment Appraisal Summary Sheet	
Field visits	
Names of Villages and Blocks visited	
Name of Producer Organizations	1.
	2.
Activities undertaken by POs	1
	2
Status of implementation of agreed mitigation actions by POs (refer Environment Appraisal Summary Sheet)	Number of POs implementing the agreed actions
	Issues in implementing the agreed actions
	Recommendations
Name of Cluster Development Organizations	1
	2
Activities undertaken by CDOs	1.
	2.
	3.
Status of implementation of agreed mitigation actions by CDOs (refer Environment Appraisal Summary Sheet)	Number of CDOs implementing the agreed actions
	Issues in implementing the agreed actions
	Recommendations
Name of SHGs	1.
	2.
	3.

Desk Review	
	4.
	5.
Activities undertaken by SHGs	1.
	2.
	3.
	4.
Status of implementation of agreed mitigation actions by SHGs (refer Environment Appraisal Summary Sheet)	Number of SHGs implementing the agreed actions
	Issues in implementing the agreed actions
	Recommendations
Remarks on Cumulative Impacts (Refer Cumulative Assessment Sheet)	
Remarks on any unforeseen emerged impact	
Recommendations	
Need for training/technical support	
Recommendations given to PFT	1.
	2.
	3.
	4.
Remark on progress of Proactive Environment Sub-projects (if existing)	
Any other observation	

Name of District Environment Coordinator:

Signature:

Date:

Annexure 11

Sources of secondary data collected

S No	Department and Address	Phone	Fax	Email
1	**RSPCB** Nodal Officer: Mr. Vijay Singhal (Sr. Environmental Engineer, RPCB, Jaipur) **Head Office** Rajasthan Pollution Control Board, 4, Institutional Area, Jhalana Doongri, Jaipur	0141- 2709335 5159655, 5159652 9667575992, 9414073930 (M) EPBX : 0141-5159600,5159699	5159697	
	RSPCB Chairman – Mr Vs Singh	510187, 9667575999,	5159694	chairperson@rpcb.nic.in
	RSPCB - Member Secy – Dr. Deep Narayan Pandey	5101872, 9667576000,	5159695	member-secretary@rpcb.nic.in
2	**Deptt Agriculture** Nodal Person: M Mr. Dayal Singh, Jt. Director Agriculture – QC	5102578		
	Director & Special Secretary Agriculture, Pant Krishi Bhawan, Jaipur	2227709		
	Director Horticulture, Pant Krishi Bhawan, Rajasthan, Jaipur	2227606		
3	**Animal Husbandry** Director Dr Rajesh Sharma Pashudhan Bhawan, Gandhinagar Mod, Tonk Road, Rajasthan, Jaipur-302015	2743331, 2742984, 2743192 2742243 9414070990	2743267, 2743822	
	Nodal Officer - Dr. Prakash Bhati, Deputy Director (Plan)	2743073		
4	**Directorate Of Economics & Statistics**			
	Nodal Officer : Mr. M.M.S. Udawat, Dy. Director, (0141-2228776, Ext. 252)	2221840, 2225749, 2222947, 2226170, 2221098, 2221574	2229756	

S No	Department and Address	Phone	Fax	Email
	Yojana Bhawan, Tilak Marg. C- Scheme, Jaipur			
	Director – Mr. Suraj Mal Raigar	2222740, Etn 210		dir.des@rajasthan.gov.in
5	**Watershed And Soil Conservation** Nodal Officer: Mr. Prabhakar Saraswat, J.En (Mies)	2227477 /2227154,		
	Mr. Sudarshan Sethi, Secy, Panchayatiraj Deptt	2227915, 2701972		sudersansethi@yahoo.com
	Mr Alok, Commissioner Watershed And Soil Conservation And Secy Rural Development Pant Krishi Bhavan, Janpath, Jaipur	2227189, 2701655 9412211300	2227858	dir_wdsc@dataone.in
6	**Rural Development And Panchayati Raj**			
	Mr. C S Rajan, Pr. Secy, Rural Development And Panchayati Raj, Pant Krishi Bhavan, Janpath, Jaipur	2227635, 2707342		prsecy-rdpr-rj@.nic.in
	Mr. Tanmay Kumar, Commissioner, Nrega	9414181018 2227110	2227503	
	Mr. C.L.Verma, PD Cum DS (SAP)	9413342617 2227379		
7	**Disaster Management And Relief**			
	Nodal Officer : Mr. O.P. Gupta, Dy.Secretary Disaster Management & Relief, Secretariat, Jaipur	2227985	2227230	relief-rj@nic.in
	Mr. Tanmay Kumar, Secy	9414181018 2227110	2227503	
	Mr. B.L. Gupta, Stat Office	2227084	2227230	
8	**Deptt Industry** Office Of The Commissioner Of Industries, Rajasthan Udyog Bhawan: Tilak Marg: Jaipur : 302005	2227727-29, 31, 33-34; 2227630	2227516; 5106748	
	Raj Hans Upadhyay – Commissioner	2227796		
9	**Deptt Forest**			
	B L Arya – Pr. Secy	2227004		2227004
	Mrs Seema Singh – Dep.	5116991/4320		

S No	Department and Address	Phone	Fax	Email
	Secy			
	Sen Officer – Mr. M L Jangid	5153222/4330		
	Principal Chief Conservator Of Forest, Van Bhawan, Vaniki Path, Jaipur-302005	2227391	2227832	abhijit_ghose@hotmail.com
	Nodal Officer Name: Mr. Arindam Tomar, Conservator Of Forests (IT)	2710627		
10	**Mines And Geology**			
	Mr. R.K. Hirat Nodal Officer (Computerization) Additional Director (Mines-E & D),	Phone: 0294-2522548		
	Dr Govind Sharma – Pr Secy	2227509		minessecretary@dmg-raj.org
	Mr. R P Berwa – SO Mines	5153222 (1626)		
11	**Water Resources**			
	Nodal Person - Superintending Engg, PMU, RWSRP, Sinchai Bhawan, JLN Marg, Jaipur - 302017	2702672	2702672	dditjpr.wr@rajasthan.gov.in
	Mr Ramlubhaya, Pr Secy	2227654, 94140-72314	2227694	
	Mr S. C. Meharishi, CE WR	2227042 97838-19259	2227288	

Annexure 12

Review of climate change adaptation initiatives

Climate change has drawn huge attention in recent time due to the threat it has posed on the various livelihood activities 100like agriculture, water availability etc. The effect of climate change would be high on a country like India where nearly 2/3 population resides in rural area. These rural communities mainly depend upon the agriculture and dairy activities for their livelihood. Climate change resulting in warming, sea level rise and melting of glaciers will adversely affect the global hydrological cycle. This will also seriously affect the ground water due to change in precipitation and evapo-transpiration. Considering the effect of this, India declared its first National Action Plan on Climate Change (NAPCC) in 2008. The plan identifies eight core national missions (as shown below) to submit detailed implementation plan to combat climate change.

Table : National Missions under National Action Plan on Climate Change

S No	Mission	Objective	Responsible Body
1	National Solar Mission	20000 MW of solar power by 2020	Ministry of Non Renewable Energy Sources
2	National Mission for Enhanced Energy Efficiency	10000 MW of EE savings by 2020	Ministry of power
3	National Mission on Sustainable Habitat	EE in residential and commercial buildings, public transport, solid waste management	Ministry of Urban Development
4	National Water Mission	Water conservation, river basin management to improve the water use efficiency by 20%	Ministry of water resources
5	National Mission for sustaining the Himalayan Ecosystem	Conservation and adaptation practices, global monitoring	Ministry of Science and Technology
6	National Mission for a Green India	Increase national forest cover to 33% by the end of 12^{th} plan	Ministry of Environment and Forests
7	National Mission for Sustainable Agriculture	Drought proofing, risk management, agricultural research	Ministry of Agriculture
8	National Mission on Strategic Knowledge for Climate Change	Vulnerability assessment, research and observation, data management	Ministry of Science and Technology

It can be noticed from the above table that out of the eight identified missions, four missions (Sl no 4, 6, 7 and 8) are directly relevant to the rural communities which are more vulnerable to climate change in the state of Rajasthan. Following section reviews and briefs the above missions relevant to the rural communities of the state of Rajasthan;

National Mission for a Green India

As mentioned in table, this mission aims at afforestation of 6 million hectares in the country to achieve the 33% forest cover of India. The programme would be implemented through Compensatory Afforestation Management and Planning Authority (CAMPA) including Joint Forest Management Committees. The programme focuses on two aspects: increase the forest cover and density and biodiversity conservation. Rajasthan with more than 2/3 area falling in the Thar Desert zone has its forest cover limited to eastern and southern part of state. The initiatives of the state government to implement Green Mission in the state could be summarised in the following sections

1. Afforestation activities of the state are undertaken through Joint Forest Management. At present there are 4916 committees managing 7.79 lakh hectare of forest cover.
2. State government has also transferred the social forestry and farm forestry activities to the Panchayati Raj Institutions.
3. State government is also in policy making phase on Multi Stakeholder Partnership by inviting investment on degrading lands.
4. Government is also in process to identify corridors for species migration especially for Sariska and Ranthambore Tiger reserve.
5. The funds under state plan and NREGS will be utilised on raising the seedlings on a large scale in departmental nurseries so that tall plants are available for plantation and afforestation purpose.
6. State government is carrying out the conservation of wildlife and biodiversity in 2 national parks and 25 sanctuaries of the state covering an area of 9260 sq km. The existing area under various Protected Area (PAN) is 2.8% of the state's total geographical area. State aims at having 4.8% of geographical area for biodiversity purposes which would also include the world heritage sites like Sambhar Lake, sacred grooves and other wetlands rich in biodiversity.

7. State has also initiated project for conservation of 39 red listed medicinal plants in collaboration with National Medicinal Plant Board and FRLHT.

National Water Mission

There exists a wide gap between water supply and water demand in the state of Rajasthan. This could be attributed to growing population, environmental degradation, detrimental climate change etc. In response to National water mission, state government has prepared draft state water policy to address the water related problems. This aims at reforms at institutional level/administrative levels and also at infrastructure levels. Also, Communication and Capability Development Unit (CCDU) has been set up in Water Resources Department (WRD). CCDU involves the local government bodies, Panchayat Raj Institutions (PRIs), SHGs, CBOs, NGOs etc to generate awareness and capacity development on the importance of water conservation, and methods of the same like artificial recharge, rain water harvesting etc. The following section provides details on the initiatives of the state government.

Table 7.7 :Suggested Action Plan for the implementation of National Water Mission in Rajasthan

S No	Committee	Actions	Institution for participation	Time Frame
1	Policy and institutional framework	Better understanding of water resources Increasing food and water security Drought Management Improved water quality To modify the state water policy in view of climate change, Improved quality of water Ground water management	WRD, PHED, GWD, PRIs, ULBs, Agriculture deptt	By 2017
2	Surface water management	Assessment of basin wise water Raising storage capacities of large dams, Augmentation of live storage of minor dams, Restoration of small water bodies, Preventing evapo – transpiration by the use of plastic and mulches and efficient means of irrigation	WRD, IMD, GWD, PRIs	By 2017
3	Ground water management	Groundwater Bill Implementation plan for Rain water harvesting and artificial	GWD, PHED, ULBs, PRIs	By 2017

S No	Committee	Actions	Institution for participation	Time Frame
		recharge Plan a state legislation for over exploitation of Ground water. To quantify the ground water recharge potentials Promoting micro-irrigation like drip and sprinkle irrigation		
4	Domestic and Industrial Water Management	Emphasizing on recycle and reuse Promoting desalination/deflouridation Water conservation measures viz source augmentation like Rain water harvesting, artificial recharge Effective governance and regulation Promotion of best practises	PHED, PRIs, ULBs, GWD, WRD	By 2017
5	Efficient use eof water for various purposes	Mandatory water assessment and audits Ensuring proper industrial water disposal Institutional reforms Water harvesting and artificial recharge of ground water	WRD, RWSRP, IMTI Kota, GWD, PHED	By 2017
6	Basin level planning and Management	Ensure integrated water resources management Minimizing wastage Integrated water policies to cope with variability in rainfall and river flow at the basin level Updating the state water policy due to change in climate scenario	WRD, PHED, GWD, NGOs, Remote sensing station Jodhpur	By 2017

To minimize the effect of climate change on agriculture practices, state government is promoting the use of drought resilient crops in the western part of the state. Also as discussed in above section, sprinkle and drip irrigation are encouraged to effectively use the water resources and prevent evapo-transpiration losses. Government also provides subsidies on the water charges if HDPE and PVC pipe line is used or irrigation. Detailed Project Report (DPR) is being prepared by Water Resource Department to improve the canal system through selective lining.

Annexure 13

List of safe pesticides unlikely to present acute hazard in normal use

Aclonifen	Chlorothalonil	Ethirimol	Imazaquin
Acrinathrin	Chlorotoluron	Ethofumesate	Imazethapyrlmibenconazole
Alloxydim	Chlorpropham	Etofenprox	Inabenfide
Amitrole	Chlorpyrifos methyl	Famoxadone	Iprodione
Ammonium sulfamate	Chlorsulfuron	Fenarimol	Iprovalicarb
Ancymidol	Chlorthal-dimethyl	Fenbutatin oxide	Isoxaben
Anthraquinone	Chlozolinate	Fenchlorazole	Kasugamycin
Asulam	Cinmethylin	Fenclorim	Lenacil
Atrazine	Cinosulfuron	Fenfuram	Linuron
Azimsulfuron	Clofentezine	Fenhexamid	Maleic hydrazide
Azoxystrobine	Clomeprop	Fenoxycarb	Mancozeb
Benalaxyl	Clopyralid	Fenpiclonil	Maneb
Benazolin	Cloxyfonac	Fenpropimorph	Mefenacet
Benfluralin	Cryolite [C]	Fenuron	Mepanipyrim
Benfuresate	Cycloprothrin	Fenuron-TCA	Mepronil
Benomyl	Cyclosulfamuron	Ferbam	Metazachlor
Benoxacor	Cycloxydim	Flamprop	Methabenzthiazuron
Bensulfuron-methyl	Cyhalofop	Flucarbazone-sodium	Methoprene
Bifenox	Cyromazine	Flucycloxuron	Methoxychlor
Bioresmethrin	Daimuron	Flufenoxuron	Methyldymron
Biphenyl	Dalapon	Flumetralin	Metiram
Bispyribac	Daminozide	Flumetsulam	Metobromuron
Bitertanol	Desmedipham	Fluometuron	Metosulam
Borax	Diafenthiuron	Flupropanate	Metoxuron
Bromacil	Dichlobenil	Flupyrsulfuron	Metsulfuron methyl
Bromobutide	Dichlofluanid	Flurenol	Monolinuron
Bromopropylate	Diclomezine	Fluridone	2-(1-Naphthyl) acetamide
Bupirimate	Dicloran	Flurochloridone	1-Naphthylacetic acid
Buprofezin	Diclosulam	Fluroxypyr	Napropamide
Butachlor	Diethofencarb	Fluthiacet	Naptalam
Butralin	Diflubenzuron	Flutolanil	Neburon
Butylate	Diflufenican	tau-Fluvalinate	Niclosamide
Captan	Dikegulac	Folpet	Nicosulfuron
Carbendazim	Dimefuron	Fosamine	Nitrothal-isopropyl
Carbetamide	Dimethirimol	Fosetyl	Norflurazon
Carboxin	Dimethomorph	Gibberellic acid	Ofurace
Carpropamid	Dimethyl phthalate	Glyphosate	Oryzalin
Chlomethoxyfen	Dinitramine	Hexaconazole	Oxabetrinil
Chloramben	Dipropyl isocinchomerate	Hexaflumuron	Oxadiazon
Chloransulam methyl	Dithiopyr	Hexythiazox	Oxine-copper
Chlorbromuron	Diuron	Hydroprene	Oxycarboxin
Chlorfluazuron	Dodemorph	Hymexazol	Oxyfluorfen
Chloridazon	Ethalfluralin	Imazamethabenzmethyl	Penconazole
Chlorimuron	Ethephon	Imazapyr	Pencycuron

Annexure 14

Terms of Reference (TOR) for appointment of Sector Support Organizations (SSOs) to provide support to RRLP project on pilot implementation of proactive environmental sub projects

Background:

The Rajasthan Rural Livelihood Project (RRLP) is being implemented by the Government of Rajasthan in 17 districts with an aim to increase and sustain income of the poor, especially women. This would be achieved through social inclusion and community mobilization; building sustainable member-based organizations of the poor; creation of linkages between these organizations and financial (banks and insurance companies) and other service providers; and adopt new livelihood strategies for climate change adaptation.

An environmental management framework (EMF) has been developed for the RRLP to promote environmental sustainability of the livelihood activities supported and to mitigate any adverse environmental impacts that may be caused by the livelihood activities. An important component of the EMF is the promotion of proactive environmental sub-projects. These projects may include but not limited to

5. Rain Water Harvesting (Roof top rainwater harvesting, kund bagwani, farm ponds, etc.)
6. Efficient Irrigation (drip and sprinkler irrigation)
7. Organic farming
8. Biogas plants
9. Fodder development (pasture land development, fodder treatment and enrichment, etc.)

These proactive sub-projects are to be implemented on a pilot mode (in select blocks of all project districts) with the following main objectives;

- To demonstrate/showcase the feasibility and advantages of good environmental practices
- To identify type and level of intervention required to promote the good environmental practices in RRLP

With this background, it is proposed that sector support organizations that have proven expertise and capabilities in implementing community-based interventions on natural resource management and environmental conservation (in Rajasthan) would be appointed to provide field level technical and operational support for implementation of identified sub projects in RRLP. These organizations will work in close coordination with the block level Project Facilitation Team (PFT)s, District Project Management Unit (DPMU) and State Project Management Unit (SPMU). The organizations will have overall responsibility for ensuring the proper implementation of such proactive sub projects.

Objectives of the assignment

The assignment has the following objectives:

1) To support the PFTs in identifying the district (block) specific proactive environmental sub project
2) To support the PFTs in preparing the detailed plan for the implementation of identified sub project
3) To provide training to PFT, SHGs (Self Help Groups), Cluster Development Organization (CDO) and CRPs (Community Resource Persons) for the implementation of projects.

4) To provide technical and operational hand-holding support to PFT, SHGs (Self Help Groups), Cluster Development Organization (CDO) and CRPs (Community Resource Persons) during the implementation of projects.
5) To develop a model for ensuring sustainability of the services of the CRPs.

Scope of the assignment

The scope of the work includes:

Identification of feasible proactive sub projects

The appointed SSOs will help and support the PFTs in identifying the feasible sub projects. This will include the review of local environmental situation, the technical feasibility of sub projects and the likely advantages in terms of livelihood enhancement/sustainability.

Preparation of implementation plan

The SSOs will also provide support in preparing the detailed plan for the implementation of identified sub projects. This will include the planning, technical designs and time frame.

Capacity Building

During the implementation process, SSOs will provide the training to PFT, SHGs (Self Help Groups), Cluster Development Organization (CDO) and CRPs (Community Resource Persons). This will also include the exchange visits to other blocks and preparation of IEC materials.

Monitoring of the implementation

The SSO will also be required to monitor the implementation of these sub projects. This will include regular field visits to assess the impact of sub projects and recommend required changes in strategy/activities.

Sustainability and Scaling Up

The SSO will document the processes, outputs and outcomes of each of the sub-projects facilitated and identify the strategy for sustainability and scaling up of the sub-projects – based on the lessons learnt from the pilot experience.

The appointed SSO is to work in close coordination with the SPMU.

Schedule:

The agency is expected to provide handholding support throughout the sub-project implementation period of 3 years. The agency has to develop an annual schedule for various activities.

Deliverables:

The Agency should submit the following deliverables according to pre-agreed schedule

- Feasibility report to be submitted including the scoping study and identification of the feasible sub projects
- Implementation Report of the proactive environmental sub projects
- Half yearly reports on the monitoring of proactive sub projects
- Detailed report on capacity building and trainings provided for each training conducted
- Report on modified procedures, if any