Environment Assessment and Environment Management Framework for the National Rural Livelihood Project (NRLP)

Final Report

February, 2011

सत्यमेव जयते
Government of India

Document of the Government of India

Contents

Tables

Figures

Charts

Annexes

Annex A

Annex B

Abbreviations and Acronyms

AAPs	Annual Action Plans
CIG	Common Interest Group
CMSA	Community Managed Sustainable Agriculture
CoP	Code of Practice
CRP	Community Resource Persons
EAP	Environmental Action Plan
EGs	environmental guidelines
G-CRPs	Green-CRPs
EMF	Environmental Management Framework
MoRD	Ministry of Rural Development
NMMU	National Mission Management Unit
NRLP	National Rural Livelihood Project
PFTs	Project Facilitating Teams
SHG	Self Help Group
SMMU	State Mission Management Unit
SPIP	State Perspective and Implementation Plan
SRI	System for Rice Intensification
SRLMs	State Rural Livelihood Missions
VO	Village Organization

Executive Summary

1. The Government of India is preparing the National Rural Livelihood Project (NRLP) that is proposed to be implemented in 100 districts and 400 blocks of 12 states with an aim to increase and sustain income of the poor, especially women. The project development objective of the proposed NRLP is to establish efficient and effective institutional platforms of the rural poor that enable them to increase household income through sustainable livelihood enhancements and improved access to financial and selected public services. This will be achieved through increased membership of the rural poor in inclusive, community-managed institutions, increased amount of resources and services leveraged by the poor from financial institutions, increase in productive assets and income from various livelihoods among the rural poor, and improved access to public services related to food, nutrition and health.

2. The project has the following four components:
   i. Institution building and human capacity development
   ii. State Livelihood Support
   iii. Innovation and Partnership Support
   iv. Project Management

3. NRLP will be implemented intensively in the villages of 400 selected blocks (approx. 100 districts) of 12 priority states of the country to demonstrate the effectiveness of the comprehensive livelihood approach. Some of the 12 states have been chosen because of their past experience in implementing Bank supported livelihood projects, where they have support structures and systems already in place to expand them to new districts through the NRLP (Bihar; Madhya Pradesh; Orissa; Rajasthan). Other States to be supported by the NRLP have been identified on the basis of high incidence of poverty and large number of rural poor (Uttar Pradesh), tribal population (Jharkhand, Chhattisgarh), and pockets of acute poverty at the sub-regional level combined with a pre-existing base of substantial social capital (Karnataka, Maharashtra, West Bengal, Gujarat, Assam).

4. This report is an environmental assessment study for the proposed NRLP. The study was conducted with the objective of understanding the environmental conditions and the related legal/regulatory framework in these states. It presents an Environmental Management Framework (EMF) that provides a strategy to manage adverse environmental impacts of livelihood activities and thereby secure livelihoods for the poor. Further, it also provides details of the institutional mechanism to operationalize the EMF. Finally, it presents a set of case studies where environmental problems have been viewed as potential opportunities for providing "Green Solutions[1]" and built the institutional mechanism to successfully implement the solutions at scale.

5. The process of development of the EMF included:
   - Secondary research on environmental status of the 12 states
   - Review of the relevant legal and regulatory provisions
   - Analysis of EMF performance in existing Bank supported livelihood projects

[1] Environmentally-friendly solutions

- Field study in 4 states (Karnataka, Andhra Pradesh, Bihar, Tamil Nadu) primarily to document the strategy adopted for promotion of Green Opportunities
- Consultation with key stakeholders from the project states through a national workshop

Review of Environmental Status

6. Based on a review of the secondary data and information from the project states and experience from existing livelihood projects, it is expected that while the project activities are likely to contribute to better environmental quality (e.g., through sustainable agriculture), improper management and poor capacities can lead to (i) land degradation including soil erosion (ii) poor water availability and quality, depletion of groundwater (iii) improper use of agro-chemicals (imbalanced use of fertilizers, unsafe use of hazardous pesticides) (iv) decreasing fodder availability and (v) degradation of forests (unsustainable extraction of forest produce, shifting agriculture, grazing). No potential large scale, significant and/or irreversible impacts are envisaged in NRLP.

Regulatory and Legal Framework

7. A majority of the relevant acts, rules, and regulations of the government of India, state governments and the safeguard policies of World Bank concerning livelihood activities that are likely to be supported under NRLP have been reviewed. The NRLP triggers the following safeguard policies of the World Bank:
   - Environmental Assessment (OP 4.01)
   - Forests (OP 4.36)
   - Natural habitats (OP 4.04)
   - Pest Management (OP4.09)

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

Environment Management Framework Strategy

9. The Bank has been supporting projects on poverty reduction and rural livelihoods in the states of Andhra Pradesh, Madhya Pradesh, Rajasthan, Chhattisgarh, Bihar and Tamil Nadu. These projects have yielded valuable experience and learnings on the implementation of environmental safeguards.

10. An analysis of the Bank supported livelihood projects shows two distinct models of implementation which have different challenges with respect to environmental safeguards. In the earlier CIGs[2] model livelihoods are financed by the project through a one-time grant for a common livelihood activity. Therefore, it was simpler to screen the common livelihood activity for environmental impacts and ensure that mitigation measures were implemented.

[2] CIG – Common Interest Group

11. However, now the model is based on providing loans to SHGs based on a micro-credit/investment plan which may contain multiple activities. The loan is provided by a larger SHG federation which is financed through a grant by the project. Currently, screening for environmental impacts is being done on an activity-by-activity basis by the Block PFT through a set of pre-designed instruments. This process is time consuming and often becomes merely an exercise in filling a set of formats with no clear understanding of issues and solutions by the SHG federation members. Clearly, a different approach is needed to implement an EMF to ensure that the community appreciates the issues involved and its relevance to securing their livelihoods better.

12. Therefore, the approach strategy of this EMF makes a radical departure from viewing EMF as a tool to merely safeguarding the environment to managing the environment in order to better secure the livelihoods. It also views potential environmental problems as opportunities for Green Solutions that may generate Green enterprises and jobs.

13. Further, the EMF seeks to shift the onus for environmental management from the project alone to include the community institutions. Therefore, the key is to ensure that the SHG federation has the support, capacity and systems which will ensure that environmental considerations are integrated into the process of appraisal of the SHG micro-credit/investment plans. As the nature and scale of livelihood activities undertaken by individual households is environmentally benign and small in scale, the potential impacts are also localized and manageable. Therefore, rather than place emphasis on micro-managing micro-impacts through appraisal of every individual household activity – it is more meaningful and efficient to focus on periodically monitoring cumulative impacts to provide pointers on required interventions.

14. The EMF proposes to achieve this through the means of an Environmental Management Plan (EMP) that each SHG Federation would prepare. The EMP would identify resources, livelihoods and their potential environmental impacts and indicate measures to secure these livelihoods. To help the SHG Federations prepare the EMP, a cadre of Community Resource Persons (CRPs) called the Green-CRPs (G-CRPs) would be developed by the Project. The EMP would be a dynamic plan which would be reviewed and modified periodically to incorporate new livelihoods or new Green Solutions. Not all livelihood activities would have an adverse impact on the environment. The EMP would also help identify good Green Practices which could be converted into Green Opportunities for newer livelihoods, enterprises or jobs.

15. This approach would not only shift the onus to the community to manage the environment to secure their livelihoods but would also build their skills and knowledge to do so even after the project period. Thus, this strategy would result in a massive and wide-spread transfer of knowledge and skills in the area of environment management.

16. Since this approach is new and radical, it is proposed to pilot test it in 360 SHG Federations spread across 12 states during Year-2 of the NRLP and if found successful after a mid-term evaluation scale it up to eventually cover 12,000 SHG Federations by Year-5. The selection of the village federations for the pilot will be based on well-defined criteria to ensure that the pilots are not affected by implementation set-backs. These will also be clustered in a limited number of blocks to ensure that focused and intensive support is provided through TA agencies. With the cluster approach, the pilot will reach

30% of the districts (30 out of 100), blocks (120 out of 400) and federations (1,200 out of 40,000).

17. It must be emphasized, however, that EMF compliance with the regulatory requirements will apply universally to all the 40,000 federations in the project. Training of project staff and community institutions, internal monitoring and external audit systems will apply to all 40,000 federations. Therefore, the EMF has a mechanism to manage risk in federations that are not part of the pilot.

Components of the Environment Management Framework

18. The Environment Management Framework (EMF) comprises a detailed strategy and procedures for preparation and implementation of an EMP at SHG primary federation or producer collective level, capacity building and monitoring to enable the adoption of mitigation measures, and the promotion of green opportunities as pilot projects. The main components of the EMF are described below:

Environment Action Plan as part of State Perspective Plans

19. As a part of the rollout of NRLP, all State Rural Livelihood Missions (SRLMs) would undertake a situational analysis (poverty diagnostic study) and develop a State Perspective and Implementation Plan (SPIP) and Annual Action Plans (AAPs). An Environmental Action Plan (EAP) will be developed by each State Mission Management Unit (SMMU) as part of the SPIP. The first year EAP would identify strategically important Green Opportunities, develop and field test a process for developing EMPs at the SHG Federation level and prepare a capacity building plan for the entire implementation mechanism.

Piloting of EMPs by SHG Federations and Scale-up

20. As described above, the EMP will be prepared by the VO with facilitation by the Green CRPs. It will be prepared prior to the micro-credit plan preparation process in the affiliate SHGs and will be updated annually. The executive committee of the VO will include an Environmental Management Committee.

Environmental Management Toolkit

21. The experience of implementation of livelihood projects has led to the development of a comprehensive toolkit to guide identification of measures to mitigate potential negative environmental impacts in rural livelihoods. The toolkit contains the following:

- A regulatory list of activities that are not to be supported
- List of higher order activities that require detailed environmental appraisal by technically qualified personnel due to potential for relatively higher impacts
- Environmental guidelines for managing major rural livelihoods such as agriculture, livestock, non-timber forest produce and fishery. These include a listing of the possible impacts and the relevant mitigation measures.

Green Opportunities – Going beyond environmental management

22. The EMF also presents a bouquet of Green Opportunities, which describe how organizations have addressed environmental issues by developing innovative Green Solutions that have resulted in Green enterprises and Green jobs. The Green Opportunities cover the broad thematic areas of agriculture, animal husbandry and energy. It also presents pathways to integrate these Green Opportunities into the main programs of NRLP. It suggests the creation of a Green Opportunities Repository at the national and the state level. It describes the steps in integrating knowledge of Green Opportunities with the preparation of the EMPs by the G-CRP.

Technical Assistance to States

23. The National Environment Management Coordinator at the NMMU would provide technical assistance for facilitating preparatory work on environment which would be include the following:
    - Development of operational manuals on EMF – including EMPs of primary federations, Code of Practices of producer collectives, Green CRPs, Green Opportunities
    - Development of a repository of Green Opportunities and Resource Institutions
    - Exposure visits to SRLM teams to best practices in facilitating environment-friendly livelihoods other states
    - Recruiting, if required, the services of a consultant firm to undertake Situation Analysis and assist in development of the EAP for inclusion in the SPIP
    - National workshop/s to facilitate cross-learning/exchange that will contribute to development of robust EAPs
    - Stakeholders' consultations in each state including meetings, workshops, focus group discussions
    - Induction and capacity building of key staff at the SMMUs
    - Appraisal and approval of the EAP in the SPIP

Institutional Arrangements to Support the EMF

24. Institutional arrangements for the EMF are detailed both in the project structure as well as in the community institutions. The effective implementation of the EMF will require relevant institutional arrangements at the national, state, district and sub-district levels. The roles and responsibilities of the key staff at the national, state, district and sub-district levels and key individuals/entities in the SHG federations and producer collectives are provided in the Report. However, the staffing costs are not included in the budget of this EMF. The costs of the staffing for the state, district and sub-district levels will be included in the overall project management costs of the NRLP.

Training and Capacity Building

25. The orientation of this EMF is to strengthen the capacity for environmental management in NRLP institutional structures at the national and states levels, and especially, in the G-CRPs and community institutions such as SHGs, SHG federations and producer collectives. A detailed training and capacity building plan is provided in the Report.

Monitoring and Audit

26. The focus of monitoring is three fold: (a) the implementation of the EMF, (b) the adoption of environmental management in livelihood activities, (c) the environmental status. Monitoring is planned at 3 levels: community monitoring, internal monitoring and external audit. An external audit of the environmental performance of the NRLP will include a cumulative impact assessment and be undertaken annually during the project period – in years 2, 3, 4 and 5. An external agency will be hired by the NMMU for the purpose.

Performance Indicators

27. The Report provides a list of suggested performance indicators for environment and sector-specific outcomes, institutional arrangements, capacity building and process-related.

Budget

28. The estimated budget for the EMF implementation is $ 7.0 million.

Implementation Roll-Out Strategy

29. The EMF of the NRLP builds on the experience of existing livelihoods projects in the country. However, it has certain elements that are novel – for example, the SHG federation EMPs and the CoPs of the producer collectives. It is necessary to phase out the implementation of the EMF in the NRLP to ensure that innovative elements are put on trial before they are scaled up.

30. The first year outputs would include a cadre of trained G-CRPs in 6 states, a field-tested methodology for preparation of EMPs, an EAP which is integrated into the SPIPs and also a candidate list of strategically important Green Opportunities for piloting or scaled-up implementation. EMP implementation will be scaled up to reach 12,000 federations by the end of the fifth year.

1. Introduction

1.1 Project Objective

1. The project development objective of the proposed NRLP is to establish efficient and effective institutional platforms of the rural poor that enable them to increase household income through sustainable livelihood enhancements and improved access to financial and selected public services. This will be achieved through increased membership of the rural poor in inclusive, community-managed institutions, increased amount of resources and services leveraged by the poor from financial institutions, increase in productive assets and income from various livelihoods among the rural poor, and improved access to public services related to food, nutrition and health.

1.2 Project Description

2. The proposed project will support the following four components:

i. **Component 1. Institutional and Human Capacity Development ($ 61.3 million):** The objective of this component is to transform the role of MoRD into a provider of high quality technical assistance in the field of rural livelihoods promotion. To achieve the objective of this component, the proposed project intends to support the following activities:

   a. *Human resource development* — establish a team of high quality professionals to provide technical assistance to the states in various thematic areas such as community mobilization, livelihood promotion, financial inclusion, human resource management, monitoring and evaluation, environment management, and fiduciary management, among others. This team will provide continuous and year-round support to state governments in the implementation of the NRLM and related activities in the rural development sector.
   b. *Training and capacity building* — support development of partnerships with well established training and research institutions in the field of rural development throughout India that can deliver focused training programs for successful implementation of the NRLM and related activities in the rural development sector. The activities supported will include curriculum development, design and conduct of training programs including e-learning and distance learning. Under this feasibility of establishment of a National Center for Rural Livelihoods will be explored.

ii. **Component 2. State Livelihood Support ($ 793.7 million):** The objective of this component is to support state governments in the establishment of the necessary institutional architecture for the implementation of NRLM activities from the state to the block level, including support to the formation of institutions of the poor. To achieve the objective of this component, the proposed project intends to support the following activities:

   c. *State Rural Livelihoods Missions (SRLM)* — support the formation of an autonomous and professionally managed mission at the state-level for the implementation of the NRLM comprising of a multi-disciplinary team with

expertise in themes like social mobilization, institution building, capacity building, microfinance, farm and non-farm livelihoods, and job employment, among others. In addition, the SRLM would establish implementing entities at the district and block levels comprising of multidisciplinary teams to further facilitate implementation of NRLM financed activities.

d. *Institution Building and Capacity Building* — support the identification, selection, and mobilization of poor rural households into self-managed institutions, such as Self Help Groups (SHGs) and their federations. This would also include providing capacity building and training activities for SHG members and federations in livelihood activities, bookkeeping, financial literacy, and business education, among others.
e. *Community Investment Support* — provide livelihood grants to the institutions of the poor to enable them to undertake productive livelihood enhancing initiatives.
f. *Special Programs* — support for pilot activities that have potential for scaling-up and replication such as last mile delivery of public services including health and nutrition, implementing activities in high-conflict areas in partnership with civil society organizations, value-chain development, using new technologies for financial inclusion, among others.

iv. **Component 3. Innovation and Partnership Support ($ 45 million):** The objective of this component is to create an institutional mechanism to identify, nurture and support innovative ideas from across the country to address the livelihood needs of the rural poor To achieve the objective of this component, the proposed project intends to support the following activities:

a. *Innovation Forums and Action Pilots* — support selected innovations identified through development marketplace-type forums that have the potential to be scaled-up in a viable manner in partnership with development foundations
b. *Social Entrepreneurship Development* — support the development of a network of grassroots innovators and social entrepreneurs, identified through a competitive process, at state and national level.
c. *Public-Private-Community-Partnership* — develop and support effective partnerships with the private sector, foundations public corporations, and civil society organizations on livelihoods development for the rural poor throughout India. These could include ICT, agribusiness, financial inclusion, and youth employment, among others.

v. **Component 4. Project Implementation Support ($ 100 million):** The objective of component is to establish an effective project management unit at the national level that develops key systems and processes for coordination and management of the proposed project and the NRLM. Given that the NRLP, and more importantly the NRLM, will be implemented across India, there are substantial managerial requirements which are critical to ensure the satisfactory implementation of both the NRLP and NRLM. In this regard, a dedicated National Mission Management Unit (NMMU) has been established under the MoRD. To achieve the objective of this component, the proposed project intends to support the following activities:

a. *National Mission Management Unit (NMMU)* — strengthen the various functions of the NMMU to be able to manage, deliver and support all aspects of not only the NRLP, but also the NRLM.
b. *Monitoring and Evaluation* — given the geographic scale and magnitude of the resources and activities to be supported by the NRLP/NRLM, a very comprehensive and robust monitoring and evaluation system will be established to not only track implementation progress but also to provide meaningful reports on household level impacts and implementation experiences so as to enable MoRD and state governments to take corrective actions, if necessary. This would include the development of an integrated management information system (MIS) that would collect data from the village to the national level in a systematic and timely manner for not only the NRLM, but also other public services provided to rural households throughout India.
c. *Governance and Accountability Framework* — the NRLP would support the development and roll-out of a user friendly and highly responsive governance and accountability mechanism by which to ensure that all aspects of the proposed project are being implemented in accordance with agreed principles and procedures.
d. *Knowledge Management and Communication* — incorporating lessons from experience and communicating consistent and significant messages at both a policy and operational level, is critical for the overall success of the NRLP/NRLM. In this regard, the project will invest in a variety of products and services to enhance the generation and use of knowledge and communications as a key tool for enhancing the quality of the program.

1.3 Project Location

3. NRLP will be implemented intensively in the villages of 500 selected blocks of 12 priority states of the country to demonstrate the effectiveness of the comprehensive livelihood approach. Some of the 12 states have been chosen because of their past experience in implementing Bank supported livelihood projects, where they have support structures and systems already in place to expand them to new districts through the NRLP (Bihar; Madhya Pradesh; Orissa; Rajasthan). Other States to be supported by the NRLP have been identified on the basis of high incidence of poverty and large number of rural poor (Uttar Pradesh), tribal population (Jharkhand, Chattisgarh), and pockets of acute poverty at the sub-regional level combined with a pre-base of substantial social capital (Karnataka, Maharashtra, West Bengal, Gujarat, Assam).

1.3.1 Environment Assessment Study

4. An Environmental Assessment study was undertaken and an Environment Management Framework (EMF) has been developed for the NRLP to ensure compliance with applicable laws and regulations of the Government of India, the 12 state Governments and triggered safeguard policies of the World Bank. This is the first draft of the report of the Environmental Assessment study.

1.4 Structure of the Report

5. This report is structured as follows. Chapter 1 provides an overview of the objectives and components of NRLP. Chapter 2 provides a consolidated overview of the environmental status at the national and state levels that could have a bearing on community-oriented rural projects. Chapter 3 summarizes the legal and regulatory framework that is relevant to environmental management in NRLM. Chapter 4 presents an integrated Environment Management Framework which is the backbone of the report. It provides a technical and institutional strategy and procedures for environment management planning for activities supported by NRLP at the national, state and village community levels. The EMF includes a strategy for identifying and facilitating green opportunities that can bring aggregate community co-benefits in terms of a sustainable environment and income generation through innovative methodologies and technologies that have worked in India through community-driven or entrepreneur based approaches. This strategy is presented in Chapter 5. The report has a number of Annexes that provide details of the content in each of the chapters.

2. Environmental Baseline at National and State Levels

1. The NRLP involves intensive investment in selected districts and sub-districts of 12 high-priority states and will also demonstrate a model for expansion of NRLM throughout the country. The 12 states are: Karnataka, Madhya Pradesh, Chhattisgarh, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Orissa, Maharashtra, Gujarat, West Bengal and Assam.

2. This chapter provides a brief overview of the environmental status and issues in the 12 states. This is the output of a secondary research exercise aimed at understanding the environmental context of the project area. The chapter is organized thematically and contains the following sections:
   - Administrative divisions
   - Population
   - Agro-climatic zones
   - Land use
   - Land degradation
   - Soils
   - Water
   - Agriculture
   - Livestock
   - Forests
   - Summary of key environmental issues

2.1 Administrative Divisions

3. The 12 project states are organized into 387 districts and 3724 blocks. Of these, the project will reach 400 blocks. The average number of villages[3] per block is 128 and the average number of habitations per block is 356. The project outreach will hence be in the range of 40,000 villages.

Table 2.1: Administrative Divisions in Project States

State	*Districts*	*Blocks*	*Villages*	*Habitations*
Assam	27	219 Blocks	25,124	86976
Bihar	38	534 Blocks	39,015	107642
Chhattisgarh	16	146 Blocks	19,744	72329
Gujarat	25	170 Blocks	18,066	34415
Jharkhand	24	211 Blocks	29,354	120061
Karnataka	27	176 Talukas	27,481	59203
Madhya Pradesh	48	313 Blocks	52,117	127197
Maharashtra	35	353 Tehsils	41,095	98098
Orissa	24	211 Blocks	47,529	141928
Rajasthan	33	237 Blocks	39,752	121133
Uttar Pradesh	71	813 Blocks	97,942	260110
West Bengal	19	341 Blocks	37,945	95394

3 Inhabited, revenue villages

Implications for Environmental Management
The massive outreach of the project emphasizes the need for (a) a robust, yet simple management system for environmental safeguards that can be implemented across 12 states, 400 blocks and 40,000 villages (b) a decentralized, self-managing system that does not rely on top-down monitoring alone, but emphasizes local responsibility and action.

2.2 Population

4. The 12 project states account for 74% of the country's population on 67% of its geographical area. Rajasthan is the largest state with 10% of the country's area, while Assam occupies just 2% of the area. Uttar Pradesh is the most populous state with 16% of the country's population, while Chhattisgarh accounts for just about 2%.

Table 2.2: Population Profile of States in Project Area[4] (2001)

State	*Population (million)*	*Population as % of India's population*	*Area (sq km)*	*Area as % of India's area*	*Population density*
Assam	26.66	3%	78,438	2%	339
Bihar	82.8	8%	94,163	3%	880
Chhattisgarh	20.8	2%	1,35,191	4%	154
Gujarat	50.05	5%	1,95,984	6%	258
Jharkhand	26.9	3%	79,714	2%	338
Karnataka	52.8	5%	1,91,791	6%	275
Madhya Pradesh	60.3	6%	3,08,245	9%	196
Maharashtra	96.7	9%	3,07,713	9%	314
Orissa	36.81	4%	1,55,707	5%	236
Rajasthan	56.5	5%	3,42,239	10%	165
Uttar Pradesh	166.2	16%	2,36,286	7%	690
West Bengal	80.22	8%	88,752	3%	904
India	1028.7	74%	32,87,263	67%	335

5. The most densely populated states are West Bengal, Bihar and Uttar Pradesh. Chhattisgarh, Rajasthan and Madhya Pradesh are the most sparsely populated of the project states.

4 Census of India, 2001. http://www.censusindia.gov.in

Figure 2.1: Population in Project States (2001)[5]

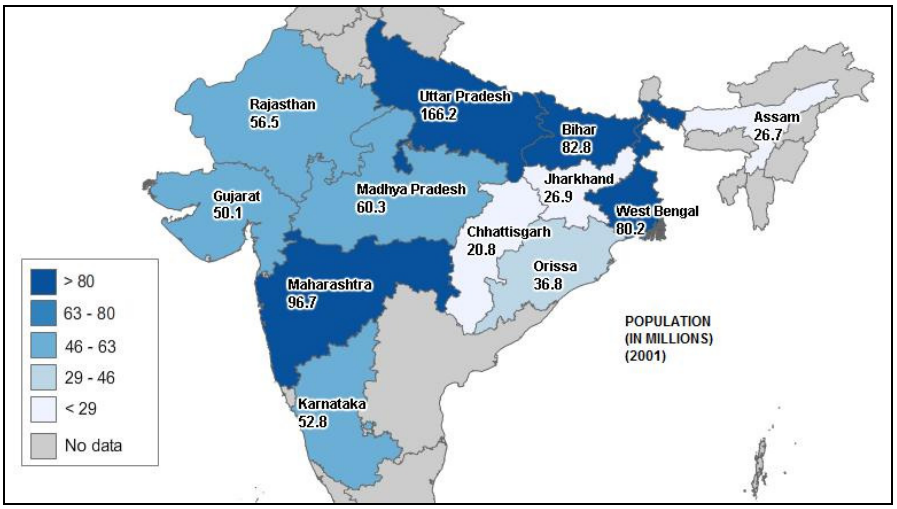
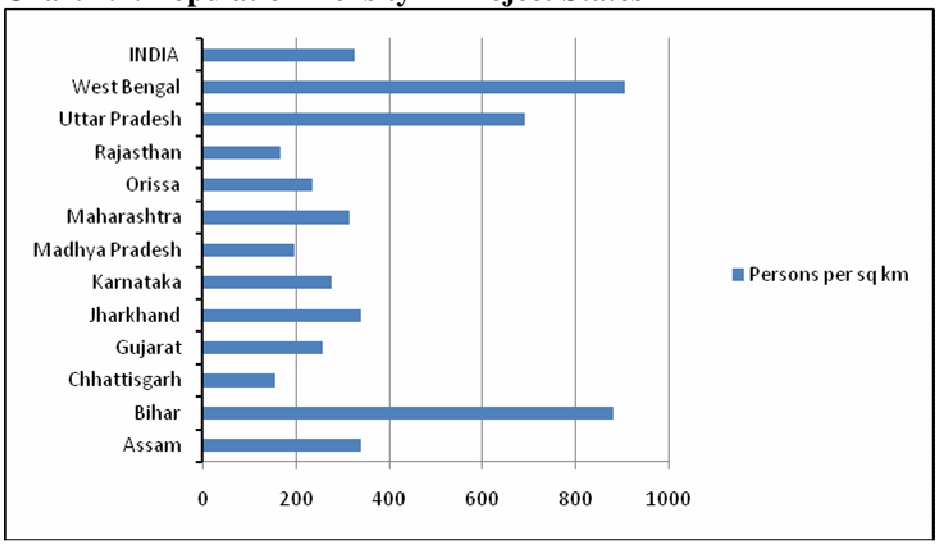


Chart 2.1: Population Density in Project States[6]



Implications for Environmental Management

High population density implies greater pressure on the limited land resource for various uses – agriculture, livestock, etc. Such states have limited availability of common property resources such as pastures and grazing lands (also see sections on Land use and Livestock). Considering that animal husbandry is an important livelihood activity of the rural poor, there is a need for facilitating local action on fodder management, especially in states with little availability of commons.

[5] Map preparation (figures 2.1, 2.2, 2.3, and 2.4): Frank van Cappelle (2010). StatPlanet: Interactive Data Visualization and Mapping Software. http://www.sacmeq.org/statplanet

6 Census of India, 2001.

2.3 Agro-climatic zones

6. The country has been broadly divided into fifteen agricultural regions based on agro-climatic features, particularly soil type, climate including temperature and rainfall, and water resources availability. The 12 project states fall in 13 of the 15 agro-climatic zones in India. Table 2.3 provides details of the agro-climatic zones that the project states fall in.

Table 2.3: Agro-climatic Zones in the Project Area

	Assam	*Bihar*	*Chhattisgarh*	*Gujarat*	*Jharkhand*	*Karnataka*	*Madhya Pradesh*	*Maharashtra*	*Orissa*	*Rajasthan*	*Uttar Pradesh*	*West Bengal*
II Eastern Himalayan Region	✓											✓
III Lower Gangetic Plain Region												✓
IV Middle Gangetic Plain Region		✓									✓	
V Upper Gangetic Plain Region											✓	
VI Trans Gangetic Plain Region										✓		
VII Eastern Plateau and Hills Region			✓		✓		✓	✓	✓			✓
VIII Central Plateau and Hills Region							✓			✓	✓	
IX Western Plateau and Hills Region							✓	✓				
X Southern Plateau and Hills Region						✓						
XI East Coast Plains and Hills Region									✓			
XII West Coast Plains and Ghat Region						✓		✓				
XIII Gujarat Plains and Hills Region				✓								
XIV Western Dry Region										✓		

7. The state profiles provided in Annex 18 give further details on the features of the agro-climatic zones in each state.

Implications for Environmental Management
The agro-climatic diversity of the project area emphasizes the need for locale-specific environmental management. The Environmental Action Plans (EAPs) developed need to be specific to the diverse agro-climatic contexts within the states (for example, the states of Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal have three agro-climatic zones each).

8. Agro-ecological regions are regions that are homogenous in terms of soil, climate and physiography and conducive moisture availability periods i.e., length of growing period (LGP). They are land units carved out of agro-climatic zones superimposed on landform which acts as modifier to climate and length of growing period. The country has been grouped into 20 agro-ecological regions (AER).The 12 project states fall in 15 AERs. Table 2.4 provides details of the agro-climatic zones that the project states fall in along with information on the main features and constraints in each AER[7].

7 K.S.Gajbhiye, C. Mandal. Agro-Ecological Zones, their Soil Resource and Cropping Systems. National Bureau of Soil Survey and Land Use Planning, Nagpur. http://agricoop.nic.in/Farm%20Mech.%20PDF/05024-01.pdf

Table 2.4: Agro-ecological Zones in the Project Area

Agro-ecological Region	*Location in Project Area*	*Agro-climate*	*Soils*	*Land use*	*Constraints*
2 Hot Arid Ecoregion with Desert and Saline Soils	Rajasthan: Bikaner, Jaisalmer, Barmer, Jodhpur, Ganganagar, Churu, Jhunjhunu, Sirohi, Jalore Gujarat: Lakhpat, Banni, Great Rann of Kutch, Banaskantha, Bhuj, Jamnagar (Northern part)	Typical hot summer and cool winter (arid). Mean annual precipitation is less than 400 mm. It is just adequate to cover 15-20 per cent of annual PET demand (1500 and 2000 mm). This results in large deficit of water (1500-1800 mm) throughout the year. LGP is of less than 90 days.	Soils are gently to very gently sloping grey brown soils and desert soils, interspersed with level to very gently sloping saline and alkali soils. The sandy soils are moderately calcareous and alkaline in reaction.	The area is under rainfed mono-cropping (traditional) agriculture. The resistant and short duration rainy season crops, such as pearl millet, 'chari' (fodder), and pulses are grown in non-saline areas. The yields are low. In areas with irrigation cotton, sugarcane, mustard, gram and wheat are grown. The natural vegetation comprises sparse, sporadic tropical thorn forest. Forest area in the region is drastically reduced.	Erratic and scanty rainfall leading to high water deficit; Soil salinity leading to frequent physiological droughts; Acute droughtiness at the time of grain formation; Nutrient imbalance, especially for N, P, Zn and Fe.
3 Hot Arid Ecoregion with Red and Black Soils	Karnataka: Bellary, Southern Raichur, Bijapur, Northern Chitradurga, Tumkur	Hot and dry summer and mild winter. Rainfall is erratic and ranges from 400 to 500 mm. It covers about 20 to 25 per cent of the annual PET demand of 1800 to 1900 mm. The region experiences severe drought conditions almost throughout the year with gross annual water deficit of 1500-1600 mm. The LGP is of less than 90 days.	Soils are gently sloping shallow and medium red loamy, and, level to very gently sloping deep clayey black soils. The dominant red (loamy) soils are slightly acidic and non-calcareous. The subdominant deep, clayey black soils are slightly alkaline and calcareous in nature.	The traditional practice is rainfed farming which includes fallowing the land in rainy season and growing of crops in the post-rainy season on residual soil moisture. The common post-rainy season crops are sorghum and safflower. The yields are very low. Groundnut, sunflower, sugarcane and cotton are intensively grown under irrigated conditions. The natural vegetation of the area comprises tropical thorn forest.	High runoff and erosion hazard during stormy cloud bursts; Prolonged dry spells during crop growing period resulting in occasional crop failure; Narrow range of workable soil moisture in black soils; Subsoil sodicity affecting soil structure, drainage and oxygen availability, especially in subdominant black soils; High subsoil density in red loamy soils limiting effective rooting depth.
4 Hot Semi-arid	Uttar Pradesh: (Western part), Ghaziabad,	Hot and dry summer and cool winter. Annual	The soils are moderately to very gently sloping,	Almost 65 per cent of the region is under irrigated	Coarser soil texture and low plant available water

Ecoregion with Alluvium Derived Soils	Bulandshahr, Aligarh, Mathura, Etah, Agra, Mainpuri, Moradabad (Southern Part), Bandaun, Shahjahanpur (Southern part), Fatehgarh, Hardoi, Unnao, Etawah, Kanpur, Rai Bareily, Fatehpur, Bela, Jaunpur, Allahabad, Western part of Varanasi, Lalitpur Rajasthan: Alwar, Bharatpur, Jaipur, Sawai-Madhopur, Dhaulpur, Ajmer, Tonk, Bhilwara, Udaipur, Dungarpur Gujarat: Sabarkantha, Mehsana, Ahmedabad, Surendranagar, part of Bhuj Madhya Pradesh: Bhind, Morena, Gwalior, Datia, Shivpuri	precipitation ranges from 500 to 1000 mm with an increasing trend from west to east. It covers 35 to 42 per cent of the mean annual PET demand (1400 and 1900 mm). Annual water deficit is 700-1000 mm. The LGP ranges between 90 and 150 days.	coarse to fine loamy and include highly sodic soils. In the northern part of the region, the terrain is frequently interrupted by stable sand dunes.	agriculture. The remaining part is under traditional rainfed agriculture. In the northern plain, the droughty climate is overcome by tubewell irrigation and the area is intensively cultivated for both kharif and rabi crops, such as rice, millets, maize, pulses, berseem, wheat, mustard and sugarcane. The moderately high yields of wheat and paddy are obtained with irrigation. In some parts of central highlands, like Bundelkhand, less than 25 per cent of the net cropped area is under irrigation, while the rest is under rainfed agriculture. The predominant kharif crops grown under rainfed agriculture are jowar, piegeonpea and soybean, while rabi crops, such as pulses (gram), lentil and wheat are grown on residual moisture with one or two protective irrigations at critical stages of crop growth. In Chambal catchment, the cropping pattern has undergone drastic change replacing millets by wheat, cotton and sugarcane after the introduction of irrigation. The natural vegetation comprises tropical dry deciduous and thorn forests.	capacity (AWC); Over exploitation of groundwater, resulting in lowering of groundwater table in some areas; At places, imperfect drainage conditions lead to spread of surface and subsurface soil salinity and/or sodicity.
5 Hot Semi-arid	Gujarat: Junagarh, Amreli, Rajkot,	The climate of the region is characterized by hot	Soils are nearly level to gently sloping deep,	Dryland farming is the common practice in the region.	The intermittent dry spell periods; Imperfect

Ecoregion with Medium and Deep Black Soils	Bhavnagar, Panch Mahal, Kheda, Vadodara, Bharauch, Surat Rajasthan: Bundi, Chittorgarh, Banswara, Kota, Jhalawar Madhya Pradesh: Ujjain, Ratlam, Jhabua, Indore, Dhar, Dewas, Khandwa, Khargone, Mandsaur	and wet summer and dry winter. The annual precipitation in the region ranges from 500 to 1000 mm. It covers 40 to 50 per cent of the annual PET demand (1600 to 2000 mm) resulting in gross annual water deficit of 800 to 1200 mm. The LGP ranges from 90 to 150 days in a year.	loamy to clayey black soils. The Kathiawar peninsula and the coastal areas have saline and alkali soils. Soils of the Malwa plateau are clayey, slightly alkaline, calcareous with characteristic swell-shrink properties.	The Kharif crops usually cultivated in the area are sorghum, pearlmillet, pigeonpea, groundnut, soybean, maize and pulses. The common Rabi crops are sorghum, safflower, sunflower and gram. Wheat is grown under irrigated conditions. The natural vegetation comprises dry deciduous forest.	drainage limits optimum root ramification and oxygen availability in low-lying areas; Salinity and alkalinity hazards under irrigated agriculture; Severe salinity and seasonal inundation by sea water in the Kathiawar coast resulting in crop failure.
6 Hot Semi-arid Ecoregion with Shallow and Medium (Dominant) Black Soils	Maharashtra: Pune, Satara, Sangli, Solapur, Osmanabad, Bid, Ahmadnagar, Dhule, Nasik, Jalgaon, Aurangabad, Ahmadnagar, Jalna, Parbhani, Nanded, Latur, Jabalpur, Buldhana, Akola, Amravati, Yavatmal, Kolhapur (Eastern part) Karnataka: Bijapur, Raichur, Dharwad, Belgaum, Uttar Kannad (Eastern part), Gadag	Hot and humid summer and mild and dry winter. Mean annual precipitation, ranging between 600 and 1000 mm, covers about 40 per cent of annual PET demand (1600 and 1800 mm). This results in gross annual deficit of 800 to 1000 mm of water. The LGP ranges from 90 to 150 days.	The soils are moderately to gently sloping shallow black soils, grading to level to very gently sloping medium and deep black soils in valleys. They include shallow, loamy skeletal and highly calcareous soil, and, clayey, calcareous and moderately alkaline soils showing marked swell-shrink properties.	The traditional practice is rainfed agriculture. Sorghum, pigeonpea and pearl millet are major kharif season crops. The drought-prone districts of the region have bimodal rainfall distribution. Therefore, crops are grown during September/October on stored residual soil moisture since there is a significantly long dry period during the first phase of the rains. The post-rainy season crops grown on residual soil moisture are mainly sorghum, safflower and sunflower. Cotton and groundnut are grown under irrigated conditions. The natural vegetation in the region comprises tropical, dry deciduous and thorn forests.	Prolonged dry spells adversely affect the crop growth and lead to crop failure in some years; High runoff during stormy cloud bursts in the rainy season result in heavy soil loss; Deficiency of N, P and Zn leads to nutrient imbalance.
8 Hot Semi-arid Ecoregion with Red Loamy Soils	Karnataka: Eastern part of Shimoga and Chikmangalur, Hassan, Mysore, Mandya, Bangalore, Chitradurga	Hot and dry summer and mild winter. Annual rainfall of 600 to 1000 mm. The western parts of the region falling in	Soils are moderate to gently sloping shallow black soils, grading to gently to very gently sloping red loamy soils.	Rainfed agriculture is the traditional practice in the region. The millets, pulses, and groundnut are cultivated in kharif season, while sorghum	High runoff that results in severe soil erosion; Coarse soil texture and low to medium PAWC (Plant Available Water

	(Southern part), Kolar, Tumkur	Karnataka receive about 70 per cent of the rainfall during June to September. The area experiences the annual water deficit of 400 to 700 mm. The LGP ranges from 90 to 150 days.	They include soils that are non-calcareous and slightly acidic in nature, and, soils that are calcareous and moderately alkaline in reaction.	and safflower are grown in rabi season. Rice is cultivated under irrigation. At places sugarcane and cotton are also grown under irrigated conditions. The natural vegetation comprises tropical, dry deciduous and thorn forests.	Capacity), resulting in severe droughtiness during the crop growing period; Nutrient imbalance, resulting from deficiency of N, P and Zn.
9 Hot Subhumid (Dry) Ecoregion with Alluvium-Derived Soils	Uttar Pradesh: Saharanpur, Bijnor, Moradabad (Northern part), Muzaffarnagar (Eastern part), Rampur, Bareily, Pilibhit, Shajahanpur (Northern part), Lakhimpur (Southern part), Sitapur, Lucknow, Barabanki, Faizabad, Sultanpur, Azamgarh, Balia, Ghazipur, Varanasi (Eastern part) Bihar: Bhojpur, Rohtas, Jahanabad, Patna, Bihar-Sariff, Aurangabad, Gaya, Nawada	Hot summer and cool winter. Annual rainfall of 1000 to 1200 mm, 70 per cent of which is received during July to September. The rainfall covers about 70 per cent of the annual PET demand of 1400 to 1800 mm and leaves an annual water deficit of 500 to 700 mm. The region has LGP of 150 to 180 days.	The soils of the region are generally deep and loamy. The dominant soilscapes constitute gently to moderately sloping alluvium soils. In general, they are neutral in reaction and have moderate clay and low organic carbon content. Itwa soils are sodic in their subsurface.	Traditionally rainfed and irrigated agriculture is common. The crops grown are rice, maize, barley, pigeonpea and jute in kharif season and wheat, mustard and lentil in rabi season. Sugarcane and cotton are grown at places under irrigated conditions. The natural vegetation comprises tropical dry deciduous forests.	Injudicious use of irrigation water may lead to waterlogging and salinity hazards.
10 Hot Sub-humid Ecoregion with Red and Black Soils	Madhya Pradesh: Guna, Sagar, Bhopal, Damoh, Vidisha, Rajgarh, Shajapur, Sehore, Raisen, Jabalpur (Western part), Narsimpur, Hoshangabad, Betul, Tikamgarh, Chhattarpur, Panna, Satna, Rewa, Sidhi,	Hot summer and mild winter. The precipitation shows an increasing trend towards east. The mean annual rainfall ranges between 1000 and 1500 mm covering about 80 per cent of the mean annual PET (1300-1600 mm). The LGP ranges from 150-180 days.	The soils are largely medium, deep black soils interspersed with patches of red soils. Gently sloping shallow black soils, gently to very gently sloping red loamy soil, and very gently sloping to nearly level medium black soils. The dominant deep black	Rainfed agriculture is the common practice. Rice, sorghum, pigeonpea and soybean are commonly grown kharif crops. Gram, wheat and vegetables are common rabi season crops. Kharif cropping is totally rainfed, whereas Rabi cropping is partly irrigated at critical stages of growth. The natural vegetation comprises	Cracking clayey soils having narrow workable moisture conditions; Dry tillage and inter tillage practices are difficult to perform; Risk of inundation of the cropped areas during rainy season and risk of acute droughtiness due to prolonged dry spells in

	Shahdol, Chhindwara, Seoni, Mandla, Balaghat, Jabalpur (Eastern part), Narsimpur, Hishangabad. Maharashtra: Wardha, Nagpur, Bhandara		soils are calcareous, slightly alkaline and have high swell-shrink potential. The red soils generally occur on ridges and on pediment surfaces. They are shallow to moderately deep, clayey, neutral to slightly acidic in nature occurring on gently to very gently sloping pediment surface in Bundelkhand region.	tropical moist deciduous forest.	Kharif season leading to crop failure at places; Soil loss due to heavy runoff during rainy season resulting in stagnation of water and poor germination; Deficiency of N, P and Zn resulting in nutrient imbalances.
11 Hot Sub-humid Ecoregion with Red and Yellow Soils	Uttar Pradesh: Mirzapur Bihar: Palamu, Hazaribag, Gumla, Lohardaga Madhya Pradesh: Ambikapur, Bilaspur, Raigarh, Raipur, Rajnangaon, Durg	Hot summers and cool winters. Annual rainfall is 1200 to 1600 mm; of which 70-80 per cent is received between July to September. It meets about 60 per cent of annual PET demand (1400 to 1500 mm). PET exceeds the precipitation from October to June. The LGP ranges between 150 and 180 days in a year.	The dominant soils in the area are moderately to gently sloping red and yellow soils and red loamy soils. They are deep, loamy, non calcareous and neutral to slightly acidic.	Rainfed agriculture is the traditional farming with cultivation of rice, millets, pigeonpea, moong and blackgram in kharif season. At places, wheat and rice are cultivated under irrigated conditions during rabi season. The natural vegetation comprises tropical moist deciduous forest.	The soils are susceptible to severe water erosion; Partial waterlogging in early stages of crop growth and seasonal droughtiness during advanced stage of crop growth; Subsoil gravelliness and coarse texture, at places, reduce AWC; Deficiency in N, P and micronutrients, such as Zn and B, causes nutrient imbalances.
12 Hot Sub-humid Ecoregion with Red and Lateritic Soils	Maharashtra: Chandrapur, Gadchiroli Madhya Pradesh: Bastar Orissa: Koraput, Kalhandi, Phulbani, Bolangir, Sambalpur, Sundergarh, Dhenkanal, Mayurbhanj, Ganjam (Western part), Puri, Cuttack, Baleshwar, Kendujhargarh Bihar: Dumka,	Hot summers and cool winters. The area receives an annual rainfall of 1000-1600 mm which covers about 80 per cent of the PET leaving deficit of 500 to 700 mm of water per year. Prolonged dry period from December to May (more than 90 days in a year). The LGP	The dominant soils of the area are represented by gently to very gently sloping red loamy soils, red and yellow soils. They are fine loamy to clayey, non-calcareous, slightly to moderately acidic. The soils are generally shallow on the ridges and plateaus and are under forest cover.	Rainfed farming is the traditional practice with cultivation of rice, pulses (moong, blackgram and pigeonpea) and groundnut. In rabi season, rice (at places) and wheat are cultivated mostly under irrigated condition. The natural vegetation comprises tropical dry and moist deciduous forests.	The soils are susceptible to severe erosion hazard; Seasonal droughtiness limits optimum crop yields; Subsoil graveliness and coarse soil texture results in low AWC; Deficiency of N, P and some micronutrients, such as Zn and B causes nutrient imbalances; The soils are subject to

	Devghar, Giridih, Dhanbad, Ranchi, Singbhum West Bengal: Birbhum (Western part)	varies from 150 to 180 days and at places it is 180 to 210 days.	The soils in valleys are deep and are generally cultivated.		moderate to high P fixation (especially the Red and Lateritic soils).
13 Hot Subhumid (Moist) Ecoregion with Alluvium – derived Soils	Uttar Pradesh: Bahraich, Gonda, Gorakhpur, Deoria, Kheri, Bahraich, Pilibhit, Gonda, Basti, Gorakhpur Bihar: Paschim Champaran, Purab Champaran, Gopalganj, Siwan, Sitamarhi, Muzaffarpur, Chhapra, Madhubani, Darbhanga, Samastipur, Saharsa, Begusarai, Munger, Khagaria, Sahibganj, Bhagalpur, Katihar, Madhepura, Purnia, Hazipur, Godda	Hot, wet summer and cool, dry winter. The area receives an annual rainfall of 1400-1800 mm which exceeds the mean annual PET demand (1300 and 1500 mm). The area experiences a small seasonal water deficit of 400 to 500 mm during February to May. The LGP ranges from 180 to 210 days in a year.	The soils in the area are represented by level to very gently sloping alluvium-derived soils. These occur in association with level to very gently sloping, imperfectly drained soils. The soils are calcareous and moderately alkaline in reaction. They show different degrees of profile development. The Tarai soils at the foothills of central Himalayas are deep, loamy and high in organic matter content.	Rainfed agriculture with cultivation of rice, maize, pigeonpea, moong are common in kharif season. In post-rainy (rabi) season, wheat, lentil, pea, sesamum, and at places, groundnut is grown on residual soil moisture with one or two protective irrigations at critical stages. The important cash crops such as sugarcane, tobacco, chillies, turmeric, coriander and potato are usually grown with supplemental irrigation. The natural vegetation comprises tropical moist deciduous and dry deciduous forests.	Flooding and imperfect drainage conditions limit soil aeration; Salinity and/or sodicity, occurring in patches, affect crop yields; Deficiency of N, P and Zn results in nutrient imbalances.
15 Hot Sub-humid (Moist) to Humid (inclusion of Per-humid) Ecoregion with Alluvium-derived Soils	West Bengal: West Dinajpur, Maldah, Murshidabad, Krishnanagar, Hoogli, North 24 Parganas, Howrah, Calcutta, Mednipur (Eastern part), Bankura, Bardhaman, Birbhum, Jalpaiguri, Koch Bihar Assam: Barpeta, Kamrup, Nalbari (Southern part), Darrang, Sonipur, Nagaur, Goalpara, Dhubri, Kokrajhar,	Hot summer and mild to moderately cool winter. The intensity of precipitation increases in northern and eastern parts (Bengal basin and Teesta-Bramhaputra Plain) as compared with the southern parts (Ganga Plain). The rainfall in Ganga Plain ranges between 1400 and 1600 mm; in Teesta-Brahmaputra Plains from 1800 to 2000 mm. The precipitation exceeds	The soils are represented by level to very gently sloping alluvial soils. The soils are slight to strongly acidic and generally have low to moderate base saturation.	Due to the high rainfall, rice based cropping system is common in the Brahmaputra, Teesta and Ganga Plains. Rice and jute are main crops in rainy season under rainfed condition. In northern foothills of eastern Himalayas (Teesta and Bramhaputra regions), plantation crops, such as tea and horticultural crops like pineapple, citrus and banana are grown. Rice, jute, pulses, oilseeds (mustard) are grown on residual soil moisture in rabi season. Considerable	Flooding and waterlogging; Excessive leaching of bases and nutrients, resulting in low base status soils, especially in the Bramhaputra (Assam) Plain; Soil acidity (results in plant nutrient fixation, especially P) leads to nutrient imbalances.

	Silchar, Karimgunj, Jorhat, Golaghat, Sibsagar, Dibrugarh, Kabir Anglong (Northern part), Lakhimpur (Northern part).	PET in most of the months in a year. The LGP is more than 210 days in a year.		areas in Ganga and Teesta Plains have been brought under irrigation to cultivate rice, wheat, and sugarcane during the rabi season. The natural vegetation comprises tropical moist and dry deciduous forests.	
16 Warm Per-humid Ecoregion with Brown and Red Hill Soils	West Bengal: Siliguri, Jalpaiguri, Darjiling Assam: Kokrajhar, Barpeta, Nalbari, Darrang	Warm summer and cool winter. The annual rainfall is 2000 mm. The area experiences short period of water stress during post-rainy period because of seasonal water deficit. The water balance shows the longest LGP (more than 270 days) in a year.	The dominant soils in the region vary from shallow to moderately shallow, loamy, brown forest to deep, organic matter rich soils with moderate to low base status. They include moderately acidic soils.	Jhum cultivation is the traditional farming. It is practiced with mixed cropping on the steep slopes under rainfed condition at an interval of 3-4 years. Another traditional practice is the cultivation of millets on upland terraces and potato, maize, millets and paddy in valleys. In the lower valleys, rice, maize, millets, potato, sweet potato, mustard, sesamum and pulses are grown under rainfed as well as irrigated conditions. At places cotton, mesta and sugarcane are also grown both under rainfed and irrigated conditions. In the hilly areas, vegetables and plantation crops like tea, medicinal plants, and horticultural crops like pineapple, citrus, apple, peer, peach, banana are grown on terraces. The natural vegetation comprises subtropical pine forest and temperate wet evergreen forests, subalpine forest, etc.	Severe climatic conditions restrict the choice of crops; Steeply sloping landforms encourage heavy runoff resulting in severe erosion hazards; Deforestation for shifting cultivation leads to severe soil degradation problem; High rainfall leading to intense leaching results in soils with poor base status; Excessive moisture leading to water stagnation in valleys during (post) monsoon period limits the choice of crop; Low temperature during post-monsoon period limits the cultivation of second arable crops. Monocropping is therefore commonly practiced in these regions.
18 Hot Sub-humid to	Orissa: Ganjam, Puri, Cuttack, Baleshwar	The north-western part of coastal strip,	The coastal alluvial soils occur on level to very	Both rainfed and irrigated agriculture are practiced in the	Imperfect to poor drainage conditions and limited

Semi-arid Ecoregion with Coastal Alluvium-derived Soils	(Coastal plain) West Bengal: Medinipur, South 24 Parganas	including Orissa and West Bengal, receives 1200 to 1600 mm of rainfall of which 80 percent is during June to September. The PET varies between 1400 to 1700 mm. The annual deficit of water is 600 to 800 mm. The LGP varies from 150 to 210 days or more in a year.	gently sloping topography and are slight to moderately sodic. They are clayey in nature and have high swell-shrink potential.	region. The main crop cultivated in the area, both in kharif and rabi season, is rice. Coconut is a dominant plantation crop of the region. In some parts, pulses, such as blackgram and lentil, and oilseed crops, such as sunflower and groundnut are cultivated after rice (on residual moisture). Besides agriculture, coastal and brackish water fisheries are important economic activities.	oxygen availability adversely affect crop yield; Soil salinity (and sodicity at places) resulting from poor drainage conditions adversely affect crop production; The area is prone to cyclones during monsoon and retreating monsoon periods.
19 Hot Humid Per-humid Ecoregion with Red, Lateritic and Alluvium derived Soils	Gujarat: Surat (Southern part), Dang, Valsad Maharashtra: Thane, Bombay, Alibagh, Ratnagiri, Sindhudurg, Dang, Kolhapur Karnataka: Uttar Kannad (Western part), Shimoga, Dakshim Kannad, Chikmangalore (Western part), Kadagul, Karwar, Mangalore	Hot and humid summer and warm winter. The mean annual rainfall exceeds 2000 mm in most of the areas. The water balance shows that rainfall exceeds PET demand (1400-1600 mm) in most of the months. The region is represented by a longer LGP ranging between 150 and 210 days.	The major soils of the region include red and laterite soils along the leeward flank of Sahyadris and the alluvium-derived soils in the coastal plains. They include soils that are very deep, clayey, strongly to moderately acidic in nature and poor in base saturation. Because of the dominance of Kaolinite clay mineral, the soils are low in retentive capacity, suggesting poor inherent fertility.	The area is intensively cultivated for rice, tapioca, coconut and spices. The natural vegetation comprises tropical moist deciduous forests.	Excessive leaching that leads to depletion of plant nutrients and bases; Waterlogging, resulting from imperfect drainage conditions affects crop growth in the coastal plains; Steep slopes, causing runoff, leads to severe soil erosion; Inundation of land area results in localised saline marshes.

2.4 Land use[8]

9. Agriculture constitutes the major land use (with the largest proportion of land being sown) in all states except Chhattisgarh, Jharkhand and Orissa. In these three states the dominant land use is forests. The states with the largest extent of land under forests are Madhya Pradesh (8699 thousand hectares), Chhattisgarh (6355), Orissa (5813) and Maharashtra (5214). As seen in Chart 2.2, the states with the largest proportion of land being cropped (net sown area) are Uttar Pradesh (69%), West Bengal (61%) and Bihar (59%). The largest extent of land under fallows is in the states of Rajasthan (4204 thousand hectares), Maharashtra (2524), Karnataka (2080) and Jharkhand (2027) – while Assam, West Bengal, Chhattisgarh and Gujarat have the least area under fallows. The largest extent of pastures and grazing lands are found in Rajasthan (1706 thousand hectares), Madhya Pradesh (1348) and Maharashtra (1252). West Bengal, Bihar, Uttar Pradesh and Jharkhand have less than 1% of the area under pastures and grazing lands.

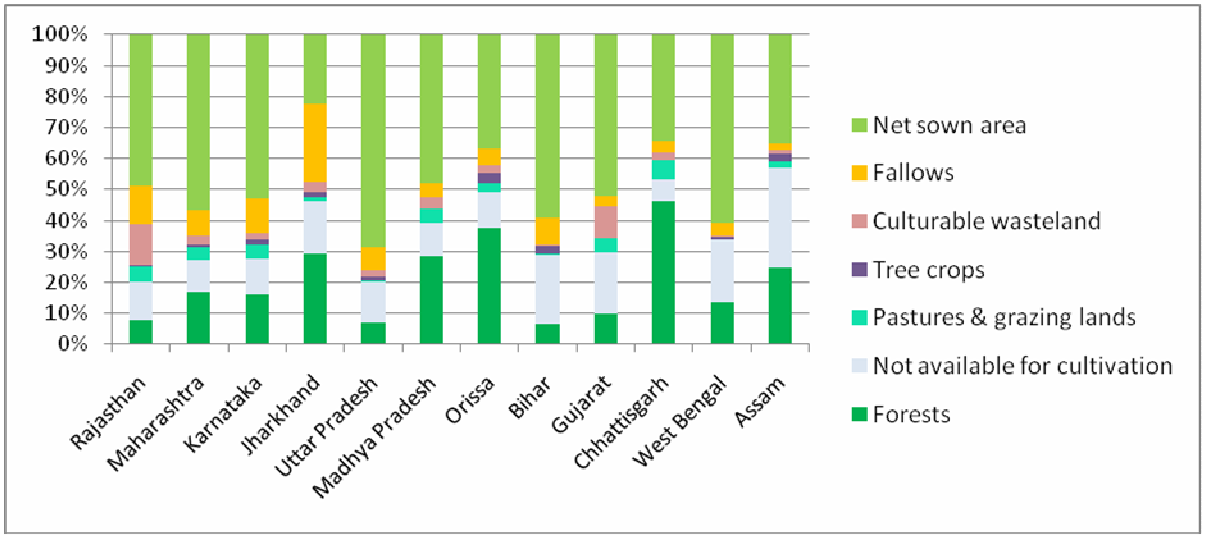
Table 2.5: Land Use in Project States (2006-2007) (area in thousand hectares)

	Forests	*Not available for cultivation*	*Pastures & grazing lands*	*Tree crops*	*Culturable wasteland*	*Fallows*	*Net sown area*
Assam	1954	2512	160	209	77	186	2753
Bihar	622	2083	17	240	46	796	5556
Chhattisgarh	6355	996	857	1	350	509	4722
Gujarat	1854	3753	850	4	1977	579	9852
Jharkhand	2333	1366	88	113	274	2027	1769
Karnataka	3072	2151	934	292	416	2080	10105
Madhya Pradesh	8699	3397	1348	19	1177	1381	14735
Maharashtra	5214	3131	1252	249	914	2524	17475
Orissa	5813	1842	443	482	392	860	5739
Rajasthan	2698	4262	1706	20	4611	4204	16764
Uttar Pradesh	1654	3215	65	376	439	1820	16633
West Bengal	1174	1754	5	58	34	363	5296

10. There are significant variations in the land use patterns within states. Annex 18 presents state profiles which include district-level details of the land use for each of the project states.

8 Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. http://dacnet.nic.in/eands/LUS_2000_2005.htm

Chart 2.2: Land Use in Project States (2006-2007)



Implications for Environmental Management
The land use pattern is closely associated with the livelihoods in an area. The overview of land use in the project states points to the need for encouraging local interventions in: sustaining forest based livelihoods in Madhya Pradesh, Chhattisgarh, Orissa and Maharashtra; fodder cultivation and management in view of the limited fodder resources from pastures and grazing lands in West Bengal, Bihar, Uttar Pradesh and Jharkhand; the need for water management as one of the critical inputs for reviving agriculture in states such as Jharkhand with large extent of fallow lands.

2.5 Land Degradation [9]

11. Land is central to all primary production systems. A variety of biotic and abiotic pressures cause degradation of land. About 12.5% (276522 sq km) of the 2218892 sq km area of the 12 project states is classified as wasteland. More than a quarter of Rajasthan is wasteland (and as Rajasthan is the largest state in India, this is a substantial extent as seen in Chart 2.1). Madhya Pradesh and Maharashtra come next with more than 35,000 sq km of wastelands.

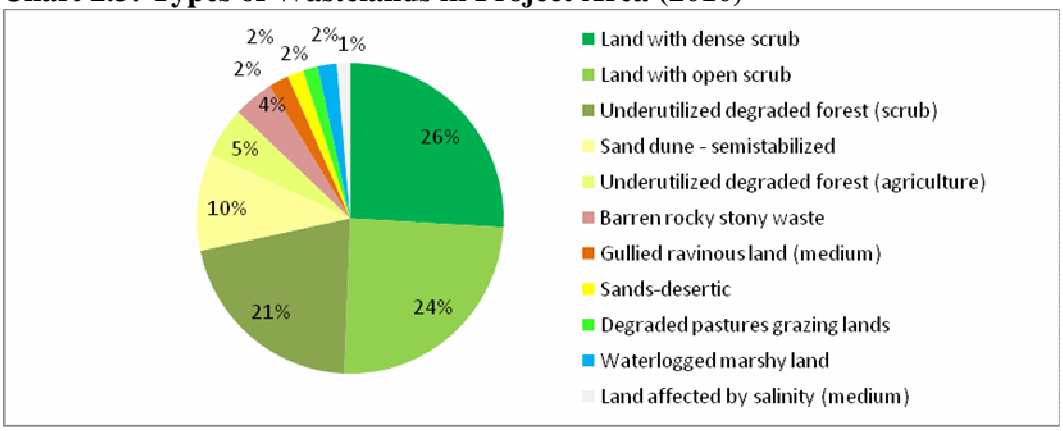
12. As seen in Chart 2.3, about half the wastelands are lands with dense and open scrub. About a quarter of the wastelands constitute degraded forests.

9 Wastelands Atlas of India 2010. Department of Land Resources. Ministry of Rural Development, Government of India. http://dolr.nic.in

Table 2.6: Wastelands in Project States (2010)

State	*Geographic area (sq km)*	*Wasteland (sq km)*	*Wasteland as % of geographic area*
Assam	78438	8778.02	11.19
Bihar	94171	6841.09	7.26
Chhattisgarh	135194	11817.82	8.74
Gujarat	196024	21350.38	10.89
Jharkhand	79706	11670.14	14.64
Karnataka	191791	14438.12	7.53
Madhya Pradesh	308252	40042.98	12.99
Maharashtra	307690	38262.81	12.44
Orissa	155707	16648.27	10.69
Rajasthan	342239	93689.47	27.38
Uttar Pradesh	240928	10988.59	4.56
West Bengal	88752	1994.41	2.25

Chart 2.3: Types of Wastelands in Project Area (2010)



13. While land with scrub and degraded forest land are the dominant wasteland types in all the project states, there are other types of wastelands, as seen in Chart 2.4, which are specific to certain states. Assam, Bihar, Uttar Pradesh and Orissa have significant extent of area under seasonal or permanent water logging. Shifting cultivation has degraded land in Orissa and to a lesser extent in Assam. Rajasthan, Uttar Pradesh and Madhya Pradesh have severely eroded land indicated by presence of ravines and gullies. Land affected by salinity is found in Uttar Pradesh, Gujarat, Rajasthan and Karnataka. Barren and rocky wastelands occur in Rajasthan, Maharashtra and Karnataka. Annex 18 has state profiles with district-level details on the types of wastelands in each of the project states.

14. Soil is the most basic input for agriculture. The loss of soil by erosion reduces the productive capacity of land. Soil erosion affects about 31% of the project area. Of this the area affected by water erosion accounts for about 28% and the rest 3% is due to wind erosion (in Rajasthan, Uttar Pradesh and Gujarat).

Chart 2.4: Extent and Types of Wastelands in Project States (2010) (area in square km)

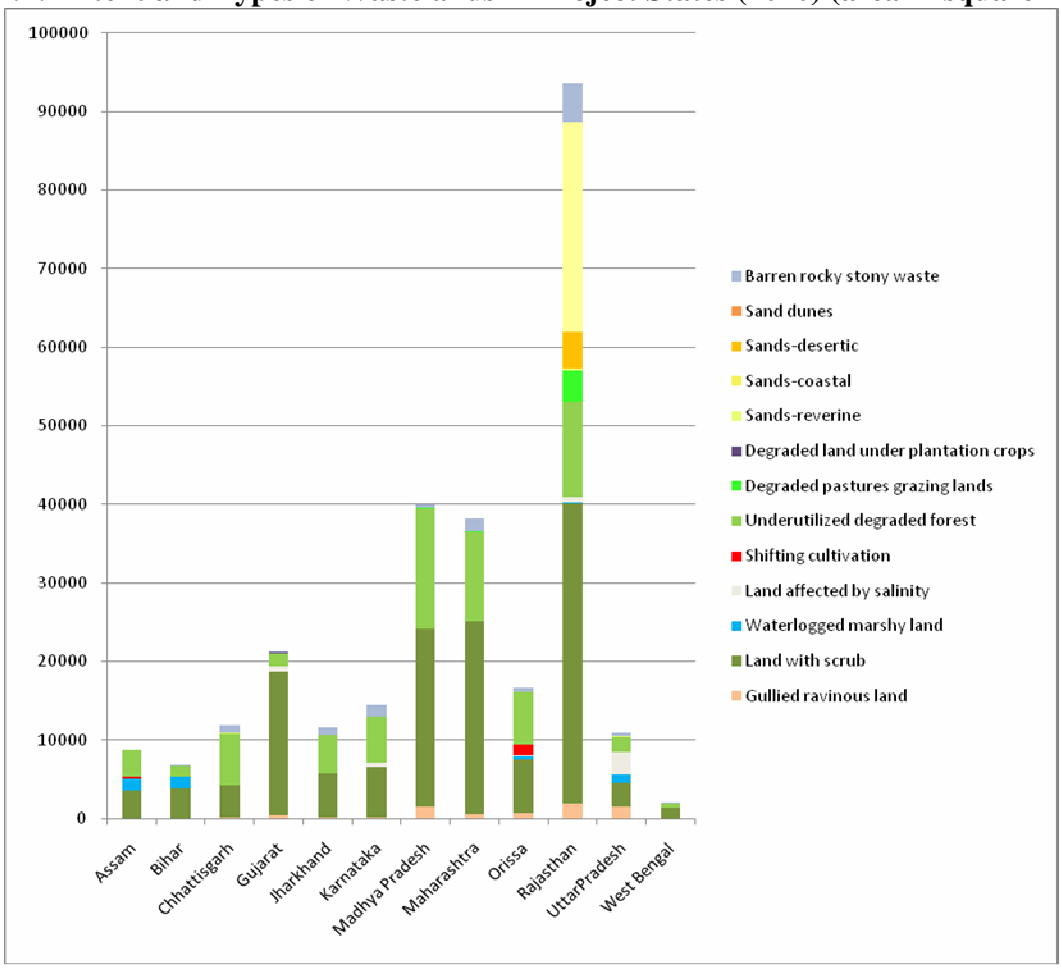
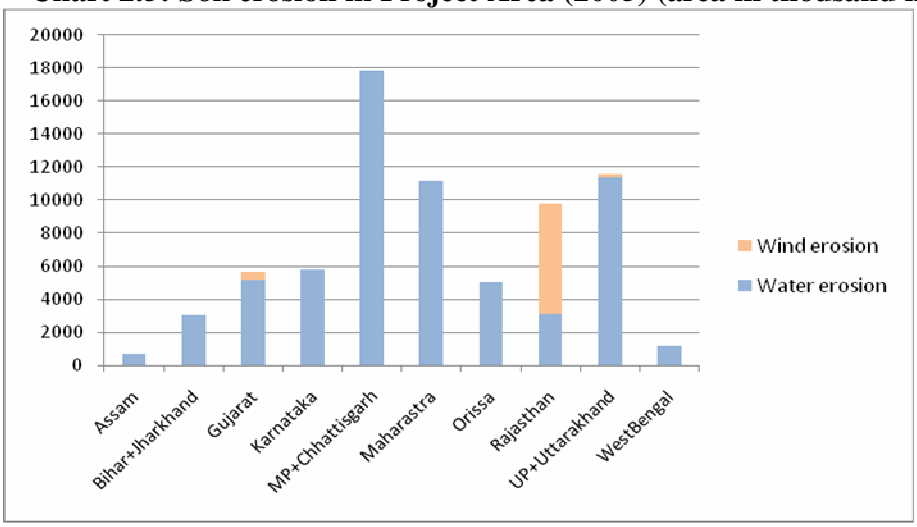


Chart 2.5: Soil erosion in Project Area (2005) (area in thousand hectares)



Implications for Environmental Management

Interventions that support livelihoods while rehabilitating degraded lands (e.g. soil and moisture conservation works, bio-energy plantations, etc.) may be promoted as part of the Green Opportunities. Demonstration of the involvement of SHG federations in rehabilitation of degraded lands[10] can open up possibilities for scaling up in convergence with existing Government programmes such as IWMP, MNREGS, etc.

15. The majority of districts in the project area are categorized as having low Nitrogen and Phosphorus status. This is especially the case in Uttar Pradesh, Maharashtra and Rajasthan.

Chart 2.6: Fertility status in Project States (2010) (percentage of districts)[11]

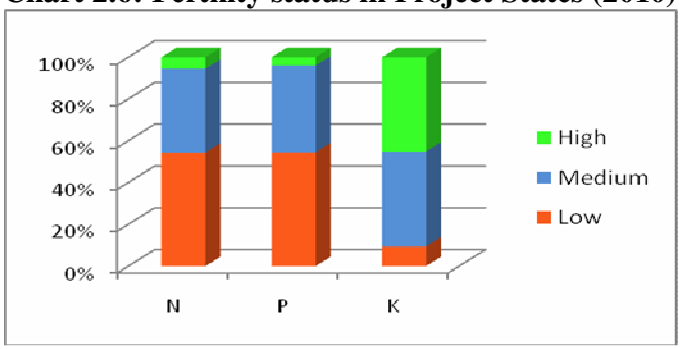
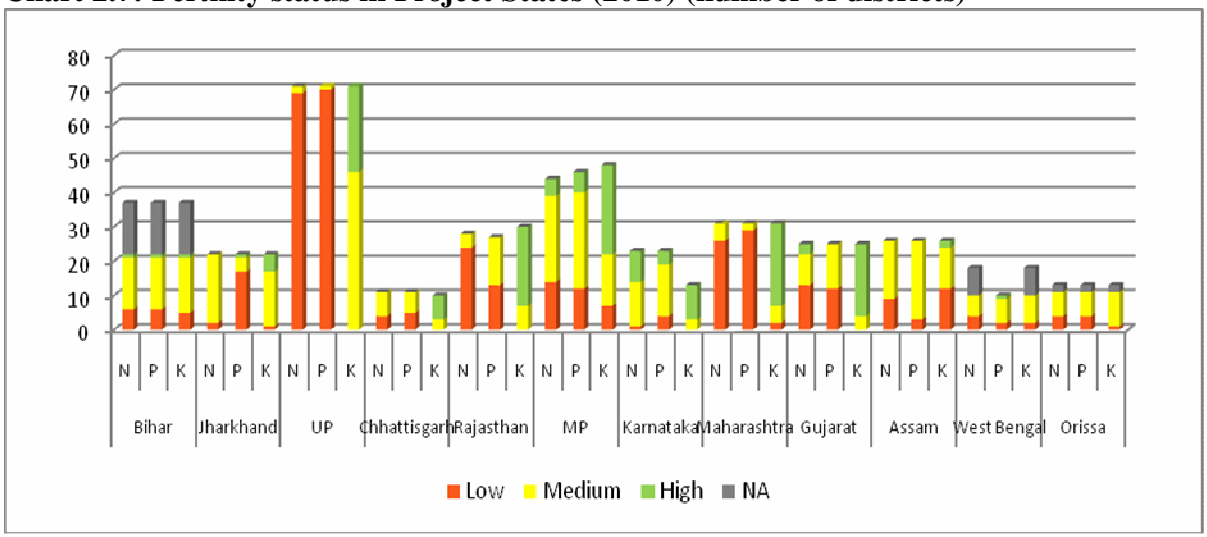


Chart 2.7: Fertility status in Project States (2010) (number of districts)[12]



10 For example, in Andhra Pradesh SHG federations (Mandal Mahila Samakhya – MMS) have been involved as Project Implementing Agencies (PIA) in watershed programs – these include Kosgi MMS and Dowlathabad MMS in Mahabubnagar district, Orvakal MMS and Midthur MMS in Kurnool district, Gandeed MMS in Ranga Reddy district.

11 Indian Institute of Soil Science. http://www.iiss.nic.in

12 Indian Institute of Soil Science. http://www.iiss.nic.in

Implications for Environmental Management

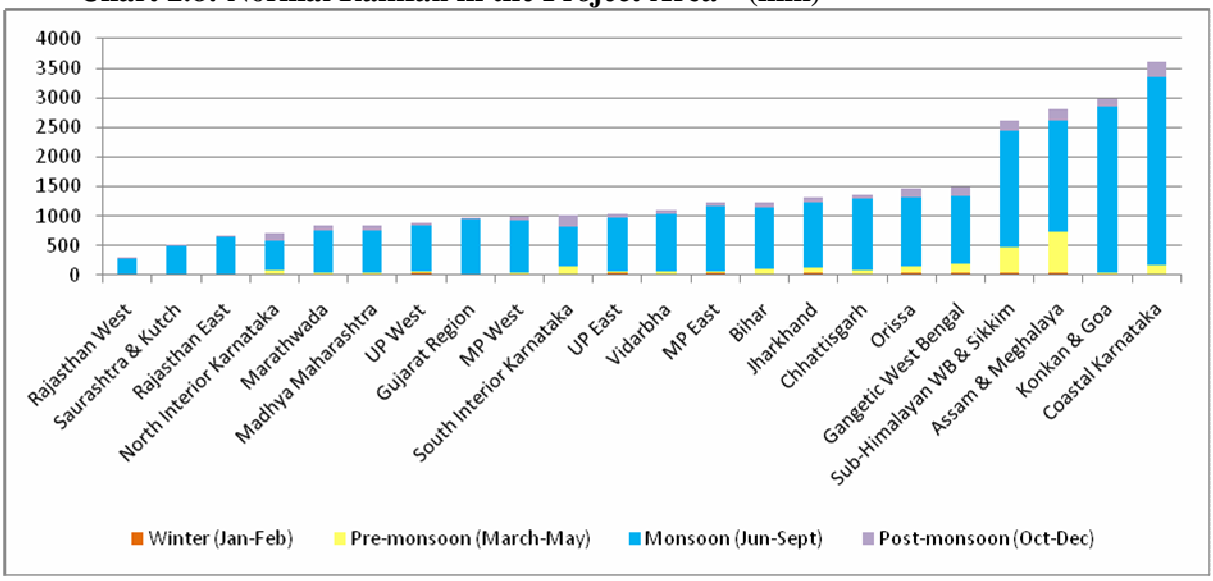
Soil testing to identify the soil nutrient status (on the basis of which fertilizer inputs can be planned) is a critical service needed by farmers – however, access to this is currently constrained by poor servicing by Government soil testing labs, low awareness on need for soil testing and poor skills in sample collection. SHG federations can play an important role in facilitating soil testing by (a) liaison with soil testing labs for organizing systematic collection of samples, timely delivery of results and their interpretation, etc. (b) management of trained paraworkers (Green CRPs) who use soil testing kits to deliver basic soil testing services to farmers[13].

2.6 Water resources

2.6.1 Rainfall and Drought

16. As seen in Chart 2.8, the annual (normal) rainfall in the project area ranges from 297 mm in West Rajasthan to 3613 mm in Coastal Karnataka. Most of this occurs during the South West monsoon (June – September).

Chart 2.8: Normal Rainfall in the Project Area[14] (mm)



17. When the rainfall deficiency is between 26 to 50%, droughts are categorized as moderate drought. When the rainfall deficiency exceeds 50%, it is a severe drought. Severe droughts are more common in Rajasthan, Gujarat and Maharashtra (except Konkan).West Rajasthan and the whole of Gujarat are chronically drought[15] prone (probability of

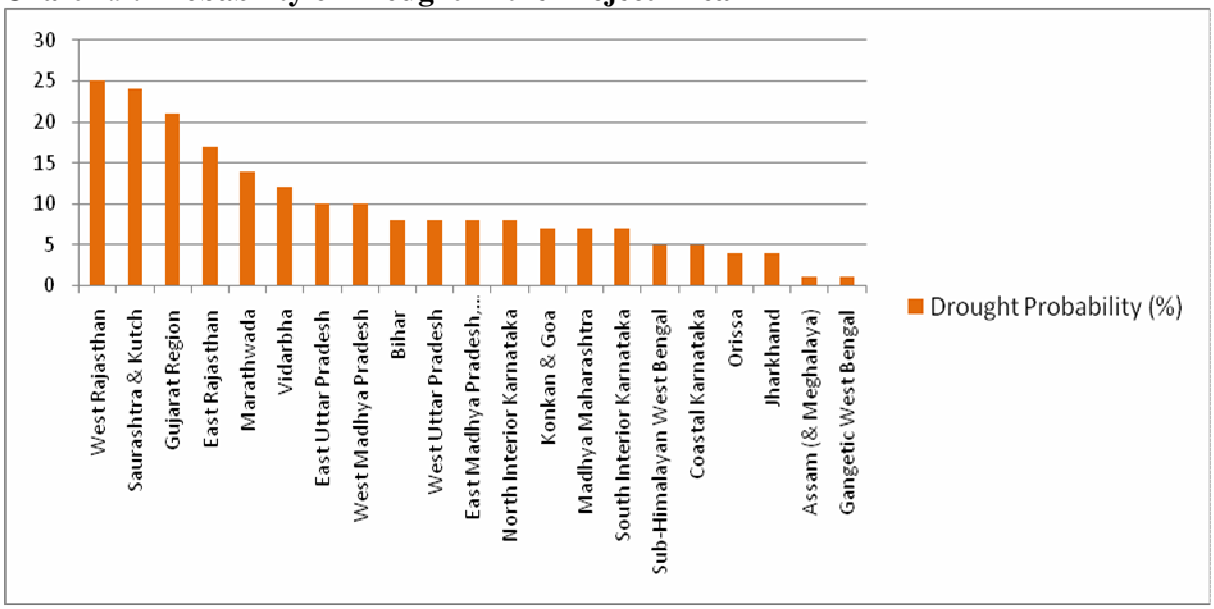
13 For example, in the IFAD supported Uttarakhand Livelihood Improvement Project for the Himalayas, soil testing service is provided to farmers by Community Resource Persons through the SHG Federation. www.ajeevika.org.in

14 Indian Meteorological Division. http://www.imd.gov.in

15 The India Meteorological Department (IMD) defines drought in any area when the rainfall deficiency in that area is ≥26% of its long term normal. It is further classified into moderate and severe drought depending upon whether the deficiency is between 26 to 50% and more than 50% respectively.

drought exceeds 20% or a drought can be expected at least once in 5 or 4 years[16]). Areas having drought probability between 10% and 20% are categorized as frequently drought prone. These areas can expect drought once in 6 to 10 years and include east Uttar Pradesh, east Rajasthan, West Madhya Pradesh, Marathwada, Vidarbha. The rest of the project area has a drought probability of less than 10% and belongs to the category of least drought affected area.

Chart 2.9: Probability of Drought in the Project Area[17]



Implications for Environmental Management

The concentration of rainfall during the South-West monsoon emphasizes the need for promoting rainwater harvesting. The chronically drought prone areas of West Rajasthan and Gujarat experience drought once every 5 or 4 years. These regions need interventions focused on drought adaptation that can be promoted as part of the Environmental Management Plans (EMPs) of the SHG federations – participatory varietal selection of crop varieties resistant to water shortages for a prolonged period, water management (e.g. building check-dams), land management (e.g. contour bunding), fodder management, etc.

2.6.2 Surface water

18. Uttar Pradesh, Madhya Pradesh and Maharashtra have over 10,000 km of rivers and canals. Karnataka comes next with about 9,000 km. The rest of the project states have under 5,000 km of rivers and canals.

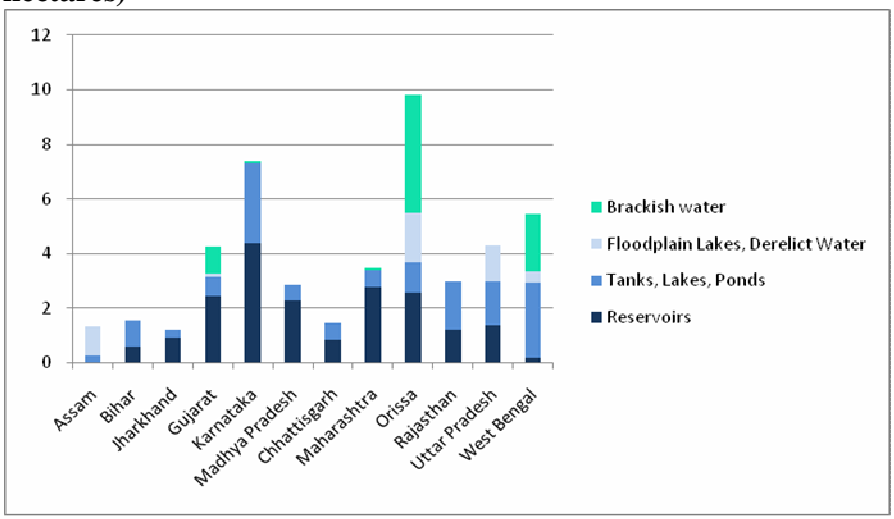
16 In the 130 years from 1875 to 2004.

17 M.P.Shewale, Shravan Kumar, 2010. Climatological Features of Drought Incidences in India. National Climate Centre. Climatology No. 21/2005. India Meteorological Department, Pune

Table 2.7

		Water bodies (area in lakh ha)				
States	*Rivers & Canals (length in km)*	*Reservoirs*	*Tanks, Lakes, Ponds*	*Floodplain Lakes, Derelict Water*	*Brackish water*	*Total Water Bodies*
Assam	4820	0.02	0.23	1.1	0	1.35
Bihar	3200	0.6	0.95	0.05	0	1.6
Jharkhand	4200	0.94	0.29	0	0	1.23
Gujarat	3865	2.43	0.71	0.12	1	4.26
Karnataka	9000	4.4	2.9	0	0.1	7.4
Madhya Pradesh	17088	2.27	0.6	0	0	2.87
Chhattisgarh	3573	0.84	0.63	0	0	1.47
Maharashtra	16000	2.79	0.59	0	0.1	3.48
Orissa	4500	2.56	1.14	1.8	4.3	9.8
Rajasthan	5290	1.2	1.8	0	0	3
Uttar Pradesh	28500	1.38	1.61	1.33	0	4.32
West Bengal	2526	0.17	2.76	0.42	2.1	5.45

Chart 2.10: Inland Water Bodies in Project States (2003-2004) (area in lakh hectares)



Implications for Environmental Management

Inland water bodies support several livelihoods – most directly – agriculture and fisheries. The large extent of area under inland water bodies in Orissa, Karnataka, West Bengal, Uttar Pradesh and Gujarat indicates the potential of fisheries as a livelihood in these states. While reservoir fisheries are more organized, those in the other water bodies (tanks, lakes and ponds; floodplain lakes; brackish water) are mostly unorganized – indicating scope for livelihood intervention in this area. Organized fishery provides opportunity for regulation and extension support that can make fishing practices sustainable.

2.6.3 Groundwater[18]

19. The stage of groundwater development in the project states ranges from 18% in Orissa to 125% in Rajasthan[19].

Table 2.8: Groundwater Development in Project States (2004)

	Net annual groundwater availability (BCM)	*Annual groundwater draft (BCM)*	*Stage of groundwater development (%)*
Assam	24.89	5.44	22
Bihar	27.42	10.77	39
Chhattisgarh	13.68	2.8	20
Gujarat	15.02	11.49	76
Jharkhand	5.25	1.09	21
Karnataka	15.3	10.71	70
Madhya Pradesh	35.33	17.12	48
Maharashtra	31.21	15.09	48
Orissa	21.01	3.85	18
Rajasthan	10.38	12.99	125
Uttar Pradesh	70.18	48.78	70
West Bengal	27.46	11.65	42

20. Overall, the status of groundwater development in the states of Rajasthan and Gujarat is not in the safe category, while Karnataka and Uttar Pradesh are close behind. The states of Orissa, Chhattisgarh, Jharkhand and Assam have the stage of development at or under 20% - indicating scope for further resource extraction. Bihar, West Bengal, Madhya Pradesh and Maharashtra are at the rage 40-50% - indicating that while there is scope for further development, wise use of the resource is necessary.

21. As seen in Chart 2.12, the states with blocks classified as having over-exploited groundwater status are Rajasthan (140 blocks), Karnataka (65), Uttar Pradesh (37), Gujarat (31), Madhya Pradesh (24) and Maharashtra (7). Rajasthan also has 50 blocks classified as critical, followed by Uttar Pradesh with 13 and Gujarat with 12 blocks. Eight of the project states have blocks with semi-critical status.

18 Central Groundwater Board, Ministry of Water Resources, Government of India. 2006. Dynamic Groundwater Resources of India (as on March 2004).

19 Stage of groundwater development is less than or equal to 70% or is more than 70% but less than or equal to 90% and shows no significant long term decline (pre and post monsoon) – Safe category

Stage of groundwater development is more than 70% but less than or equal to 90% or is more than 90% and less than or equal to 100% and shows significant long term decline (pre or post monsoon) – Semi-critical category

Stage of groundwater development is more than 90% and less than or equal to 100% and shows significant long term decline (pre and post monsoon) – Critical category

Stage of groundwater development is more than 100% and shows significant long term decline (pre and/or post monsoon) – Over-exploited category

Chart 2.11: Stage of Groundwater Development in the Project States (2004)

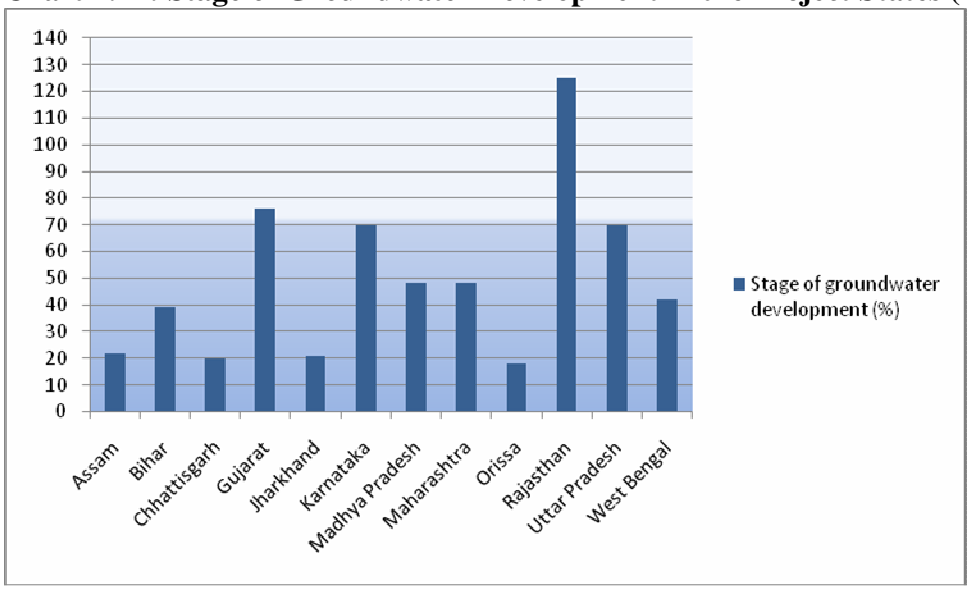
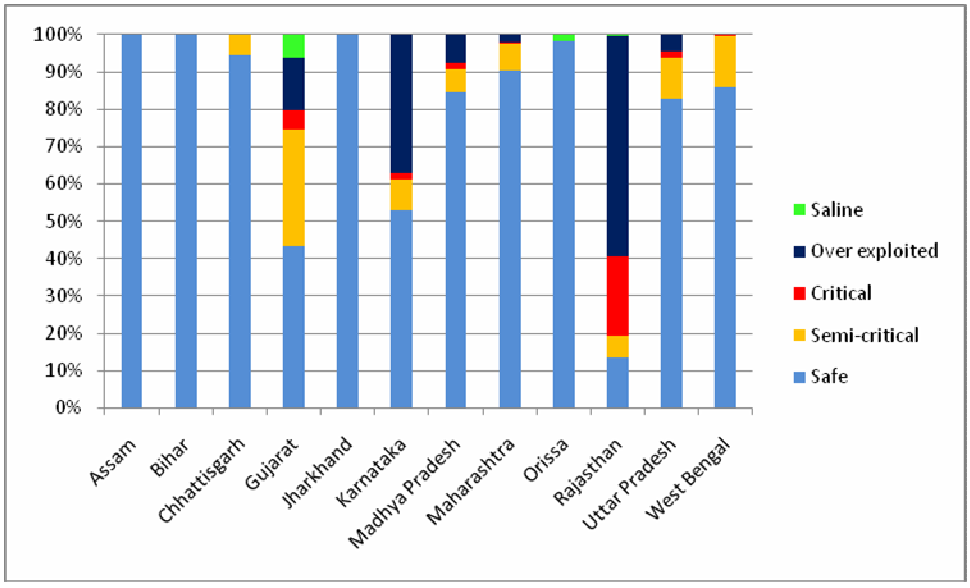


Chart 2.12: Categorization of Blocks as per Groundwater Status (2004) (percentage of blocks)



Implications for Environmental Management

The irrigation sector accounts for about 92% of the groundwater draft in the country. Irrigation tubewells are one of the main investments that poor households make with micro-credit support. It is important to regulate the use of credit for digging of irrigation tubewells – to ensure that the investment is in a sustainable resource. In blocks that have been classified as over-exploited, micro-credit support for irrigation tubewells must not be made available. In blocks that have been classified as critical and semi-critical, support may be provided on integration of required mitigation measures into the Federation's Environmental Management Plans (EMPs).

Micro-level information on the groundwater status is important for planning mitigation action at the farmer and village levels. The importance and feasibility of community based groundwater

management (involving participatory monitoring of groundwater status, crop water budgeting, etc) has been successfully demonstrated[20]. The project can use these experiences to build the capacity of Green CRPs in facilitating community based groundwater management.

2.6.4 Water quality[21]

22. About 10% of the habitations in the project states have water quality issues (133582 out of the total of 1324486 habitations). The quality of drinking water in these habitations is affected by Iron (71088 habitations), Salinity (27627), Flouride (25350), Arsenic (6545) and Nitrate (2972).

Chart 2.13: Water Quality Affected Habitations in Project Area (2010)

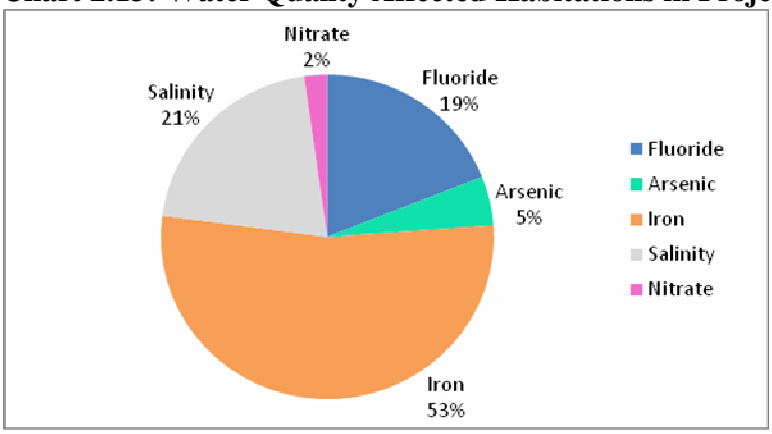
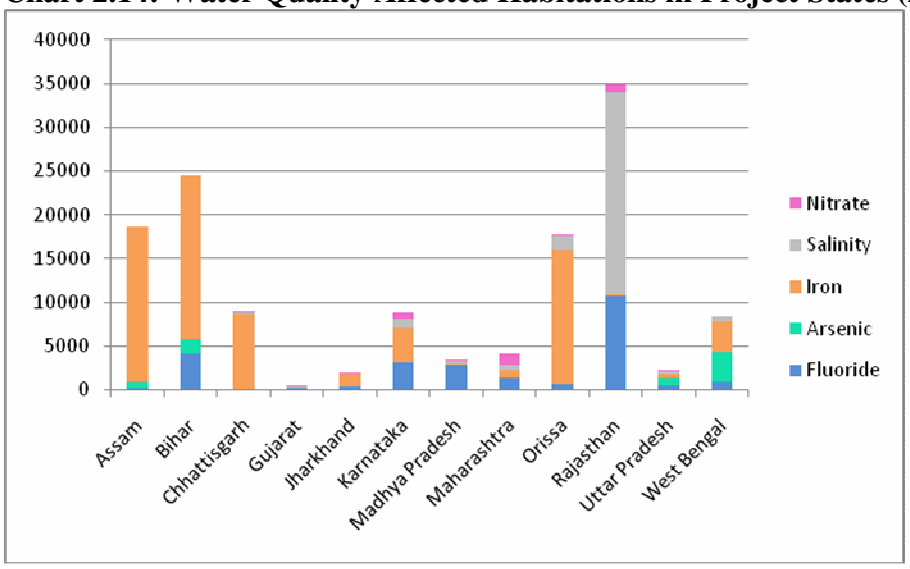


Chart 2.14: Water Quality Affected Habitations in Project States (2010)



20 The FAO supported Andhra Pradesh Farmer Managed Groundwater Systems Project and the World Bank supported Andhra Pradesh Community Based Tank Management Project and the Andhra Pradesh Drought Adaptation Initiative. Deep Wells and Prudence: Towards Pragmatic Action for Addressing Groundwater Over-exploitation in India. The World Bank. 2010.

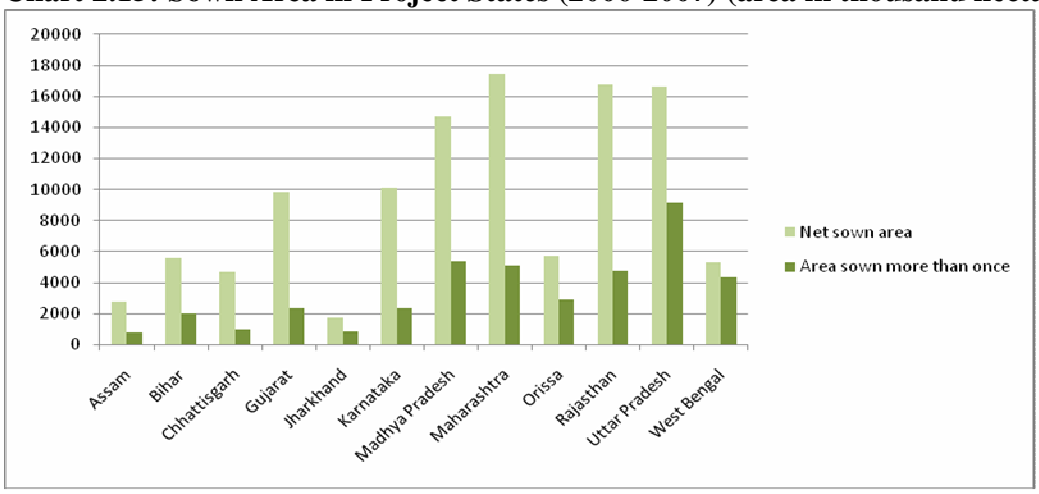
21 National Rural Drinking Water Programme, Department of Drinking Water and Sanitation, Ministry of Rural Development, Government of India. Quality Affected Habitations as on 1 April 2010. http://indiawater.nic.in

Implications for Environmental Management
Poor water quality affects livelihoods by impacting health (reduced opportunity to work, cost of treatment, etc.) – and the poor are most vulnerable. While bacteriological contamination of drinking water is a widespread problem and can be addressed through better sanitation, hygiene and disinfection, chemical contamination (Iron, Flouride, Arsenic, etc.) needs specialized treatment. One of the Green Opportunities for the project to explore and pilot could be on water quality management.

2.7 Agriculture

23. The contribution of agriculture to the State Net Domestic Product ranges from 11% (Maharashtra) to 39% (Bihar) for the project states[22] (2004-05)[23]. The states with the largest proportion of land being cropped (net sown area) are Uttar Pradesh (69%), West Bengal (61%) and Bihar (59%). In terms of the extent of gross cropped area (net sown are and area sown more than once), Uttar Pradesh, Maharashtra, Rajasthan and Madhya Pradesh lead with more than 20,000 thousand hectares followed by Karnataka and Gujarat with a little over 12,000 thousand hectares. Jharkhand and Assam have the least gross cropped area among the project states (under 5,000 thousand hectares)[24].

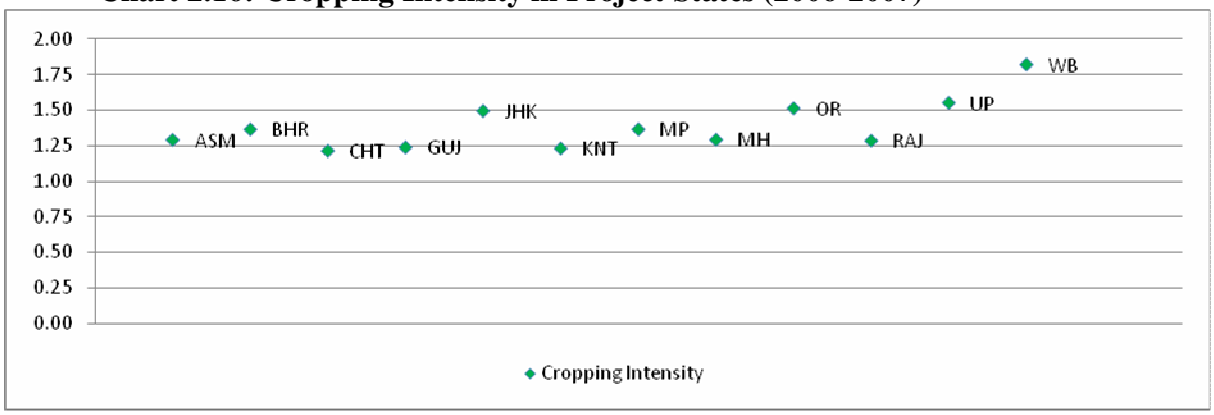
Chart 2.15: Sown Area in Project States (2006-2007) (area in thousand hectares)[25]



24. Most of the project states have cropping intensity ranging from 1.25 to 1.5. West Bengal and Uttar Pradesh have the highest cropping intensity – 1.82 and 1.55 respectively.

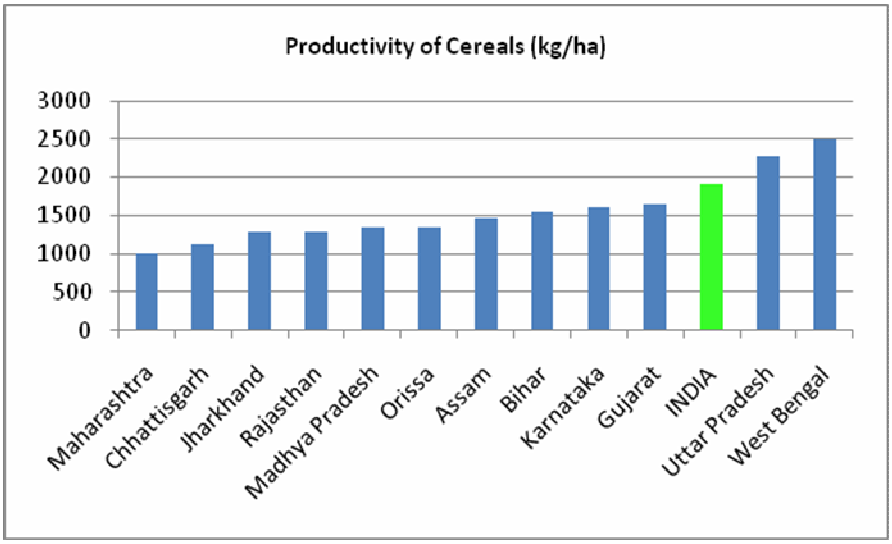
22 Water Sector at a Glance. 2007. Central Water Commission. Government of India.
23 Assam 29%, Bihar 39%, Jharkhand 23%, Gujarat 17%, Karnataka 18%, Madhya Pradesh 29%, Chhattisgarh 15%, Maharashtra 11%, Orissa 24%, Rajasthan 25%, Uttar Pradesh 33% and West Bengal 20%.
24 Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. http://dacnet.nic.in/eands/LUS_2000_2005.htm
25 Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. http://dacnet.nic.in/eands/LUS_2000_2005.htm

Chart 2.16: Cropping Intensity in Project States (2006-2007)[26]



25. As seen in Chart 2.17, the productivity of cereals in most of the project states is below the Indian average. Only two states – West Bengal and Uttar Pradesh have higher productivity levels. The productivity of pulses is higher than the average for the country for half the project states. Gujarat, Rajasthan and Maharashtra have the highest productivity rates for oil seeds[27].

Chart 2.17: Productivity of Cereals in Project States (kg/ha) (Average of 2001-02 to 2005-06)



26 ASM – Assam, BHR – Bihar, CHT – Chhattisgarh, GUJ – Gujarat, JHK – Jharkhand, KNT – Karnataka, MP – Madhya Pradesh, MH – Maharashtra, OR – Orissa, RAJ – Rajasthan, UP – Uttar Pradesh, WB – West Bengal

27 Average of 2001-02 to 2005-06. Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. http://dacnet.nic.in/eands

Chart 2.18: Productivity of Pulses in Project States (kg/ha) (Average of 2001-02 to 2005-06)

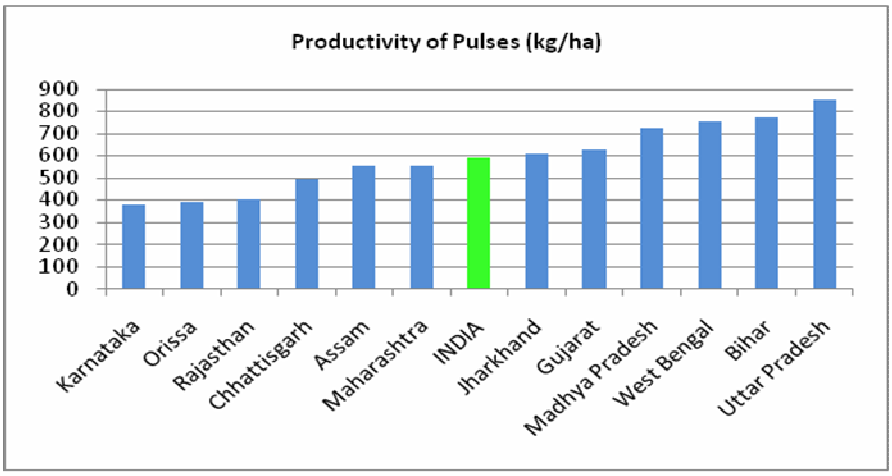
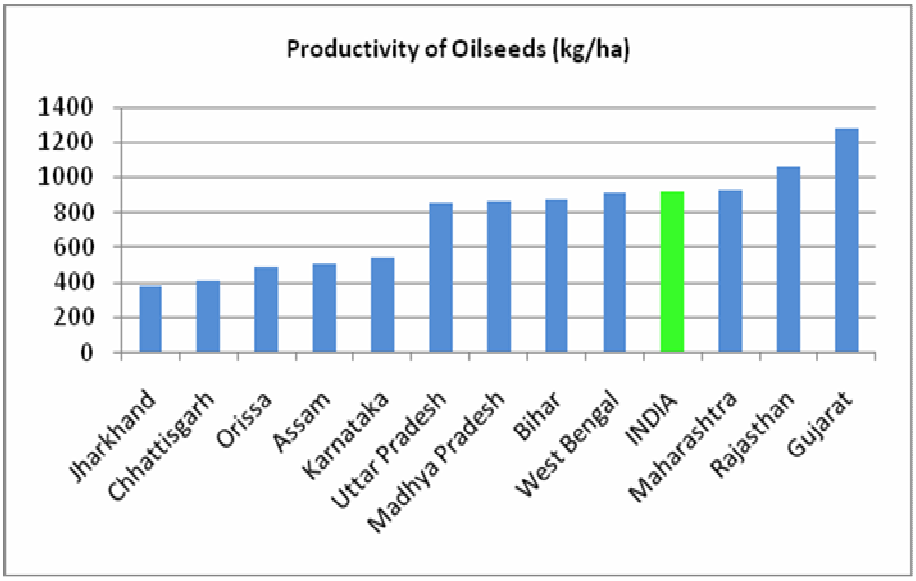


Chart 2.19: Productivity of Oilseeds in Project States (kg/ha) (Average 2001-02 to 2005-06)



26. The percentage of net sown area that is irrigated ranges from 5% in Assam and 7% in Jharkhand to 80% in Uttar Pradesh, 62% in Bihar and 55% in West Bengal. There is a heavy reliance on tubewells for irrigation in the states of Uttar Pradesh, Bihar and West Bengal – with tubewells contributing to 50-70% of the net irrigated area. Tanks play a significant role in irrigation in Jharkhand, West Bengal and Karnataka.

Implications for Environmental Management

The predominance of tubewells as a source of irrigation in the project area stresses the need for promoting efficient irrigation practices (drip and sprinkler irrigation, bucket drip kits, etc.) through the Self Help Groups. The project needs to pilot a Green Opportunity intervention on efficient irrigation management involving Self Help Groups both as beneficiaries as well as promoters of drip irrigation.

Figure 2.2: Irrigated Area in Project States

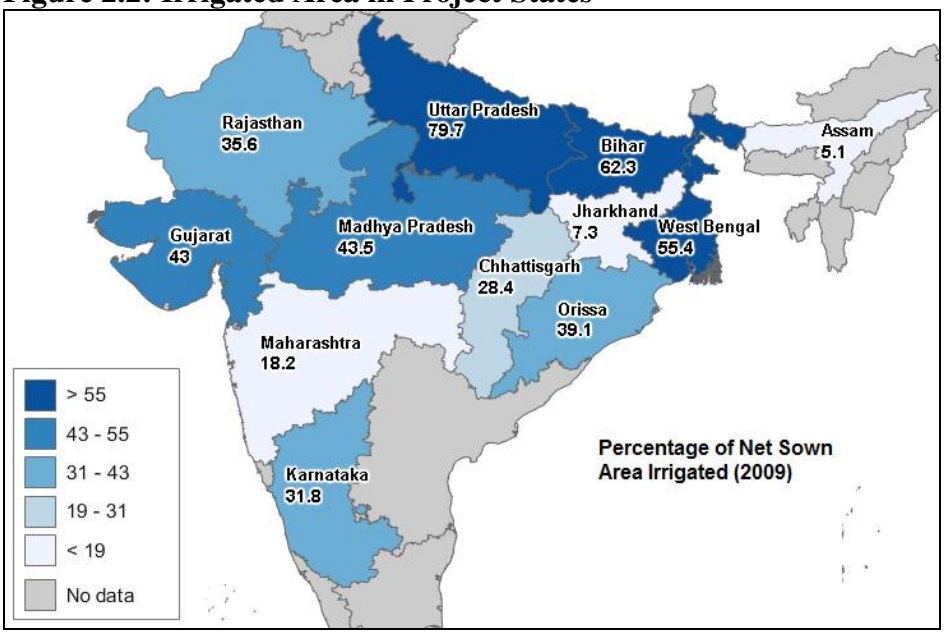
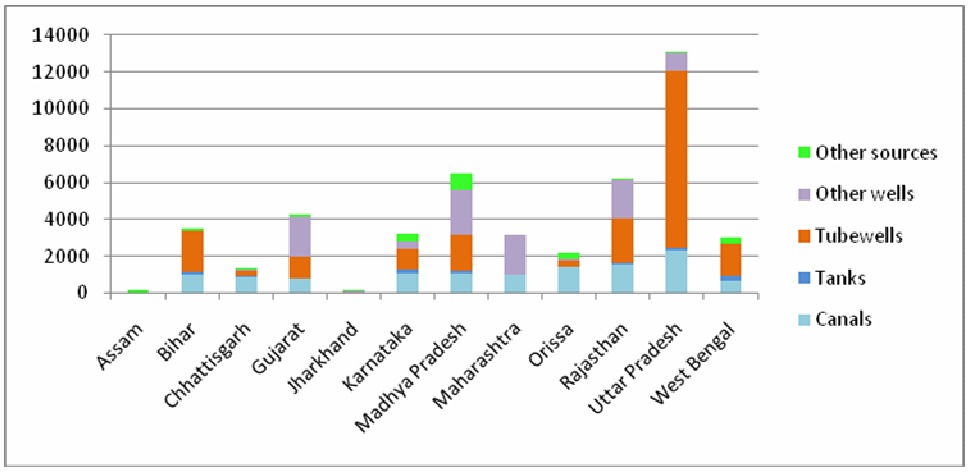


Table 2.9: Net Irrigated Area and Sources of Irrigation in Project States (2008-2009) (thousand hectares)[28]

	Canals	*Tanks*	*Tubewells*	*Other wells*	*Other sources*	*Net irrigated area*	*Net sown area*	*% of Net sown area irrigated*
Assam	33	3	0	2	101	140	2753	5%
Bihar	971	155	2264	7	132	3529	5662	62%
Chhattisgarh	887	51	288	28	84	1339	4710	28%
Gujarat	789	40	1133	2174	102	4238	9852	43%
Jharkhand	8	21	17	46	17	110	1504	7%
Karnataka	1061	206	1140	406	424	3238	10174	32%
Madhya Pradesh	1066	130	1985	2385	941	6506	14941	44%
Maharashtra	1002	0	0	2171	0	3173	17426	18%
Orissa	1418	0	331	101	341	2192	5604	39%
Rajasthan	1583	31	2437	2122	73	6245	17551	36%
Uttar Pradesh	2358	105	9576	1004	41	13085	16417	80%
West Bengal	672	289	1684	43	319	3006	5428	55%

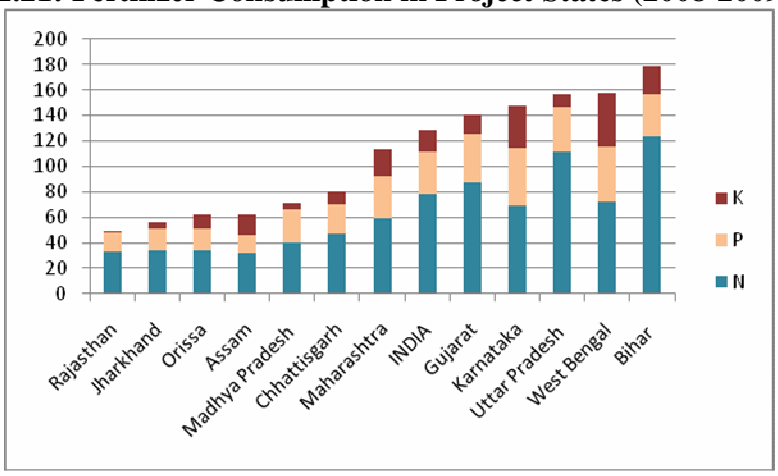
28 Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. http://dacnet.nic.in/eands

Chart 2.20: Sources of Irrigation in Project States (2008-2009) (thousand hectares)



27. The consumption of fertilizers in Gujarat, Karnataka, Uttar Pradesh, West Bengal and Bihar is higher than the national average. The use of chemical fertilizers in Rajasthan and Jharkhand is less than half of the country average.

Chart 2.21: Fertilizer Consumption in Project States (2008-2009) (kg/hectare)



28. The use of chemical pesticides in Gujarat, Karnataka and Rajasthan shows a clear declining trend. In the other states, the use of pesticides is either more or less the same or is increasing (Chhattisgarh).

Figure 2.3: Pesticide Consumption in Project States

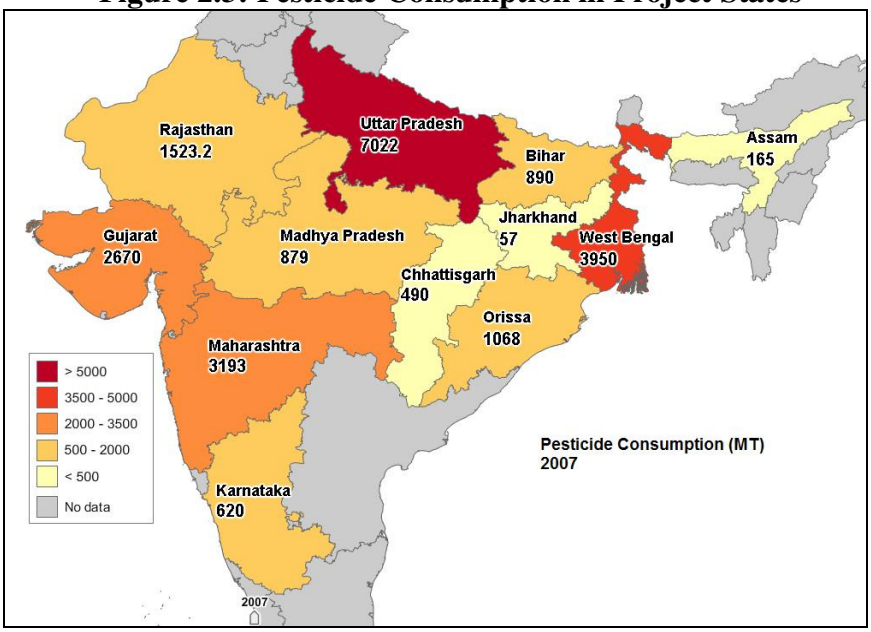
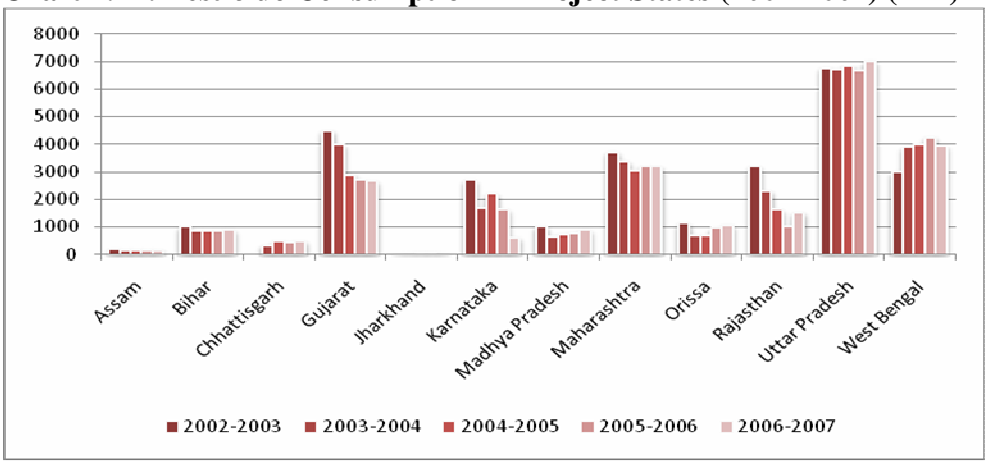


Chart 2.22: Pesticide Consumption in Project States (2002-2007) (MT)



Implications for Environmental Management

As seen in section 2.5, poor soil nutrient status – especially of the macronutrients N and P – is a concern across the project states. There is a need to promote (a) fertilizer scheduling based on soil testing (b) use of organic inputs both in states with high use of chemical fertilizers and in those that are yet to 'catch up' on their use. While pesticide consumption is on the decline in some states, it is steady or increasing in others. There is thus a need to promote non-chemical, integrated pest management in all states. The promotion of non-chemical pest and nutrient management through Self Help Groups has been successfully demonstrated by initiatives such as the Community Managed Sustainable Agriculture in Andhra Pradesh and System for Root Intensification in Bihar[29]. These need to be scaled up through the project.

29 Andhra Pradesh Rural Poverty Reduction Project and Bihar Rural Livelihoods Project.

2.8 Livestock and Fisheries

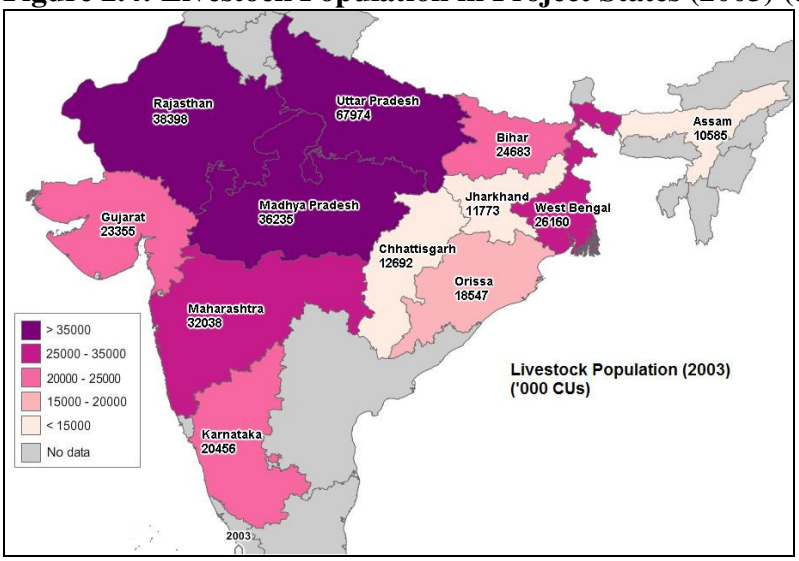
2.8.1 Livestock

29. Uttar Pradesh, West Bengal and Madhya Pradesh account for 10% of the country's cattle population followed by Maharashtra with 9%, and, Bihar and Rajasthan with 6%. Uttar Pradesh also leads in the buffalo population, accounting for 23%, followed by Rajasthan with 11% of the country's population. The highest sheep population is in Rajasthan (16% of the country's population) and Karnataka (12%) while the goat population is the highest in West Bengal (15%) and Rajasthan (14%). West Bengal has 12% and Maharashtra has 8% of the poultry population in the country.

30. The main sources of fodder are crop residues (dry fodder), cultivated fodder, pastures and grazing lands and forests[30] (green fodder). Fallows and wastelands are also important for grazing. The states of Uttar Pradesh, Madhya Pradesh, Maharashtra and Rajasthan have a greater extent of land under fodder sources – primarily due to large extent of land under food grain crops.

31. As seen in Charts 2.23 and 2.24, Rajasthan, Maharashtra, Uttar Pradesh and Gujarat lead in the production of fodder. However, there is a substantial deficit between the demand and supply of fodder in all the states (except Maharashtra) as indicated in Chart 2.25. The states of Uttar Pradesh, West Bengal, Bihar, Madhya Pradesh and Rajasthan have the widest gap between fodder demand and supply. This indicates that the current demand is being met by fodder imports (for example, from Punjab and Haryana to Rajasthan), from other crop residues (for example, use of vegetable crop residues in Bihar), from overgrazing in forests (for example, in Madhya Pradesh).

Figure 2.4: Livestock Population in Project States (2003) (thousand in Cow Units[31])



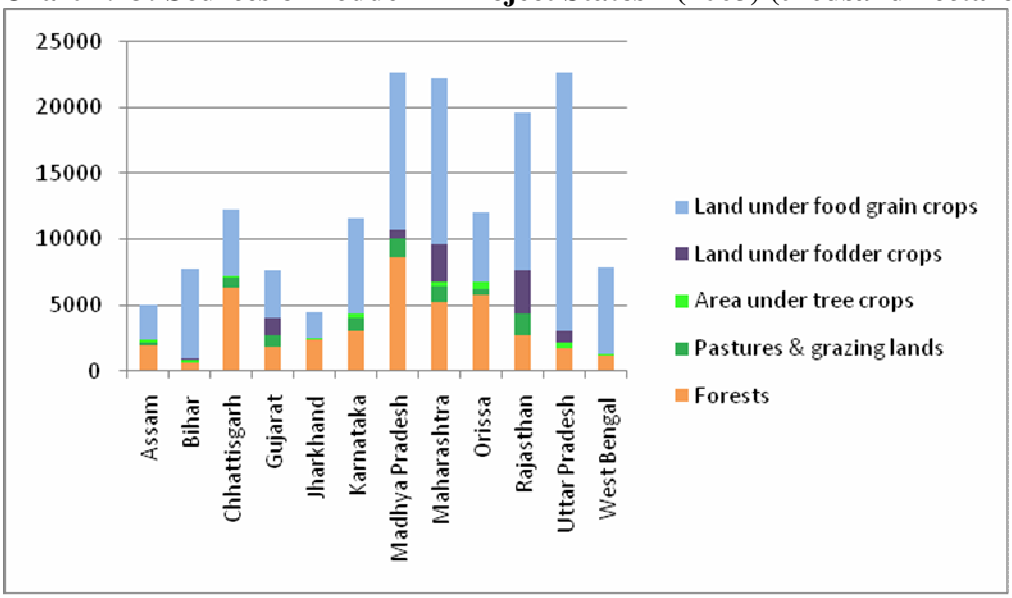
30 Forests are open to grazing in some states while in others permission from the Forest Department is required. Grazing in Reserve Forests and Wildlife Sanctuaries requires permission from the Forest Department. Grazing in National Parks is not permitted.

31 Includes population of cattle, buffaloes, sheep and goats converted to Cow Units. 1 Cow Unit = 1 cattle / 0.5 buffalo / 4 sheep / 4 goat.

Table 2.10: Livestock Population in Project States (2003) (thousands)[32]

States	*Cattle*	*Buffaloes*	*Sheep*	*Goats*	*Pigs*	*Camel*	*Poultry*
Assam	8440	678	170	2987	1543	0	21664
Bihar	10729	5743	382	9490	672	1	13911
Chhattisgarh	8882	1598	121	2336	552	0	8181
Gujarat	7424	7140	2062	4541	351	53	8153
Jharkhand	7659	1343	680	5031	1108	0.03	14429
Karnataka	9539	3991	7256	4484	312	0.04	25593
Madhya Pradesh	18913	7575	546	8142	358	8	11705
Maharashtra	16303	6145	3094	10684	439	0.32	37968
Orissa	13903	1394	1620	5803	662	0	17611
Rajasthan	10854	10414	10054	16809	338	498	6192
Uttar Pradesh	18551	22914	1437	12941	2284	16	11718
West Bengal	18913	1086	1525	18774	1301	0	60656
All India	185181	97922	61469	124358	13519	632	489012

Chart 2.23: Sources of Fodder in Project States[33] (2003) (thousand hectares)



32 17th Indian Livestock Census 2003. Department of Animal Husbandry and Dairying. Ministry of Agriculture. Government of India.

33 Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. http://dacnet.nic.in/eands; Basic Animal Husbandry Statistics, 2008, Department of Animal Husbandry & Dairying, Ministry of Agriculture, Government of India.

Chart 2.24: Production of Fodder in Project States[34] (2002-2003) (Thousand tonnes)

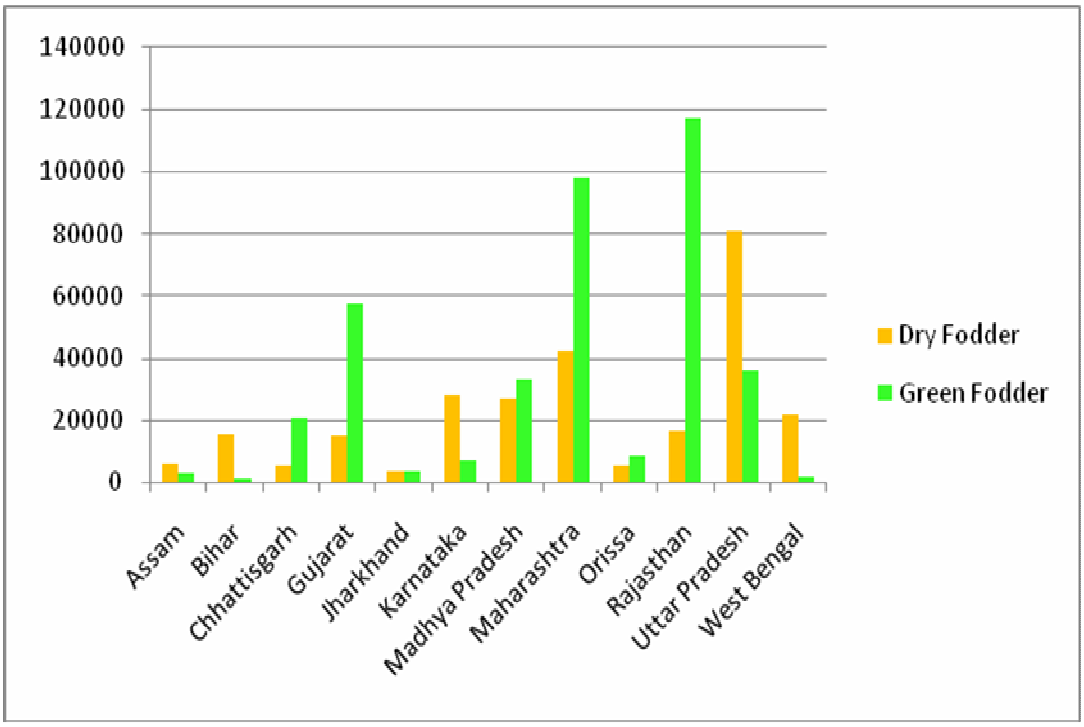
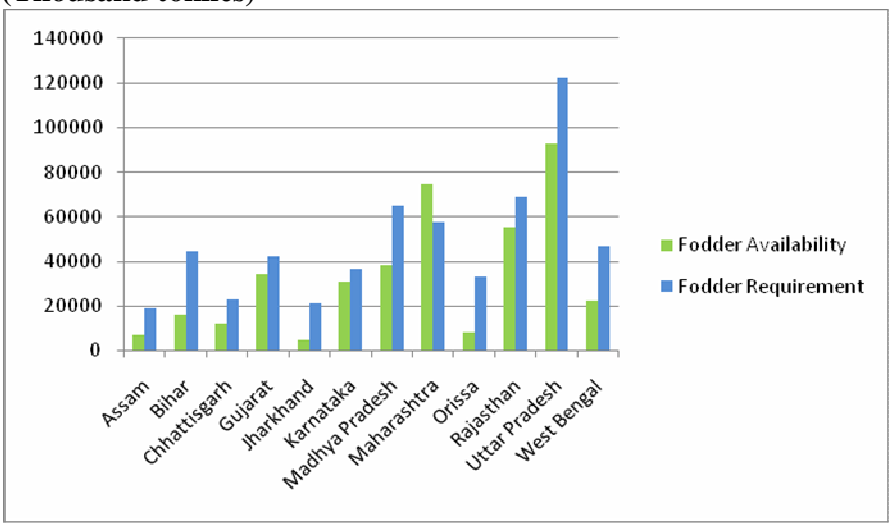


Chart 2.25: Fodder Availability and Requirement in Project States[35] (2003) (Thousand tonnes)



34 Basic Animal Husbandry Statistics, 2004, Department of Animal Husbandry & Dairying, Ministry of Agriculture, Government of India.

35 Fodder availability from: Basic Animal Husbandry Statistics, 2004, Department of Animal Husbandry & Dairying, Ministry of Agriculture, Government of India. Fodder requirement computed as 1.8 tonnes per Cow Unit based on livestock population figures from: 17th Indian Livestock Census 2003. Department of Animal Husbandry and Dairying. Ministry of Agriculture. Government of India.

2.8.2 Fisheries

32. The utilization of ponds for fish culture makes West Bengal the leading fish producing state – accounting for about 30% of the country's total inland fish production (2004-05). On the other hand, other states are heavily dependent on rivers and reservoirs for their fish catch. Uttar Pradesh, Bihar and Orissa are the other major producers of inland fish[36].

Table 2.11: Fish production in the Project States (2003-04)[37]

State	*Water bodies ('000 ha)*	*Fish production ('000 tonnes)*	*Yield (Tonnes/Ha)*
Assam	135	181	1.34
Bihar	160	266.49	1.67
Chhattisgarh	147	111.05	0.76
Gujarat	426	45.48	0.11
Jharkhand	123	75.38	0.61
Karnataka	740	70	0.09
Madhya Pradesh	287	50.82	0.18
Maharashtra	348	125.12	0.36
Orissa	980	190.02	0.19
Rajasthan	300	14.3	0.05
Uttar Pradesh	432	267	0.62
West Bengal	545	988	1.81

Implications for Environmental Management
Experience from the Bank supported livelihood projects indicates that livestock (purchase of milch animals, sheep and goats) will feature as a significant reason for which Self Help Group members take micro-credit loans. In fodder scare conditions, the anticipated returns from the enterprise will be affected, besides degrading an already scarce resource.
It is important that all micro-credit support for livestock in the project is released as part of a package that also includes fodder cultivation and/or better fodder management practices – both at the individual household as well as at the group/federation levels. It is also necessary for periodic monitoring of cumulative impacts to ensure that the growth in the livestock population does not happen without appropriate fodder management.

2.9 Energy

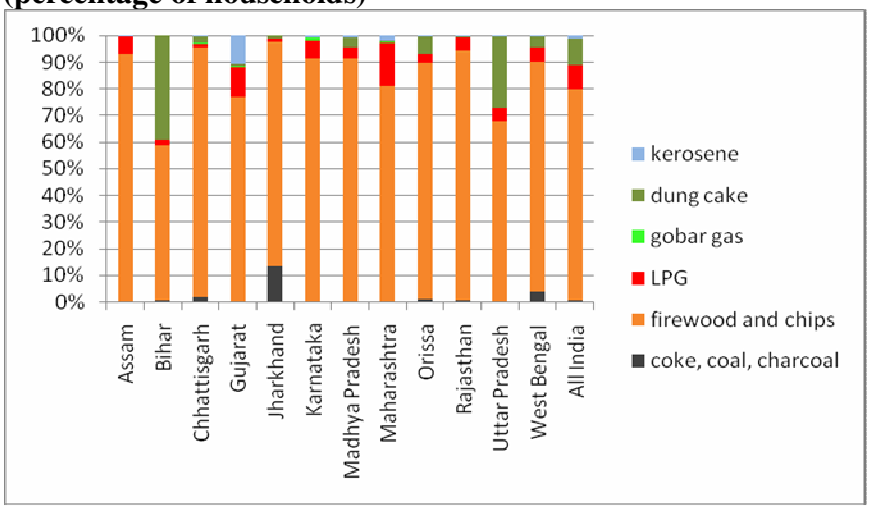
33. The dominant source of rural household energy for meeting cooking requirements is firewood followed by dung cake. The use of firewood ranges from 94% in Rajasthan to 49% in Bihar. The use of dung cake as the primary cooking fuel is the highest in Bihar (33% households) and in Uttar Pradesh.

34. The use of cleaner fuels such as LPG and kerosene is extremely limited – 14.9% of the rural households in Maharashtra and 10.5% of rural households in Gujarat use LPG,

36 Water Sector at a Glance. 2007. Central Water Commission. Government of India.
37 Water Sector at a Glance. 2007. Central Water Commission. Government of India.

10.2% households in Gujarat and 1.9% in Maharashtra use kerosene (the other states have much lesser %).

Chart 2.26: Source of Household Cooking Energy in Project States (2004-2005)[38] (percentage of households)



Implications for Environmental Management

The high use of fuel wood and dung cake has serious implications on human health (53% of tuberculosis prevalence in India is a result of exposure to cooking smoke[39]) apart from causing environmental degradation (loss of tree cover, loss of organic manure). Considering that rural households spend a significant proportion of their income on meeting cooking energy requirements, improving access to fuel efficient cooking devices, helping households with credit support and market linkages to make the switch to cleaner energy, etc., will be an important Green Opportunity for the project to explore.

2.10 Forests

35. Five of the project states have forest cover ranging from 25% to more than 40% of their geographic area. These are Chhattisgarh, Assam, Orissa, Jharkhand and Madhya Pradesh. In terms of the actual extent of forest area, the leading states are Madhya Pradesh (77700 sq km), Chhattisgarh (55810 sq km) and Maharashtra (50650 sq km).

36. As seen in Chart 2.28, the maximum extent of very dense forest[40] is in the states of Maharashtra, Orissa, Madhya Pradesh and Chhattisgarh. Large extent of degraded forest (scrub) is present in the states of Madhya Pradesh, Orissa, Rajasthan, Maharashtra and Karnataka – indicating high biotic pressure on forests in these states.

38 National Sample Survey Report No. 511. Energy Survey of Households for Cooking and Lighting. 2004-2005.

39 Vinod Mishra, et al. Effects of Cooking Smoke on Prevalence of Tuberculosis in India. No. 92, October 1997. Population Series. East West Center Working Papers. http://pdf.usaid.gov/pdf_docs/Pnack106.pdf

40 Very dense forest – canopy density above 70%, Moderately dense forest – canopy density 40-70%, Open forest – canopy density 10-40%, Scrub – degraded forest with canopy density less than 10%.

Chart 2.27: Forest Area in Project States (2007) (Percentage of geographic area)[41]

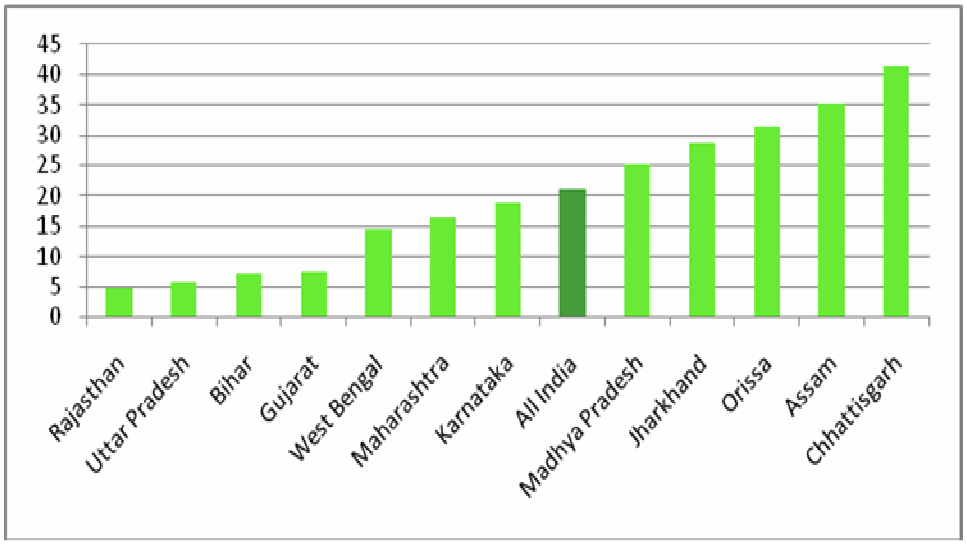
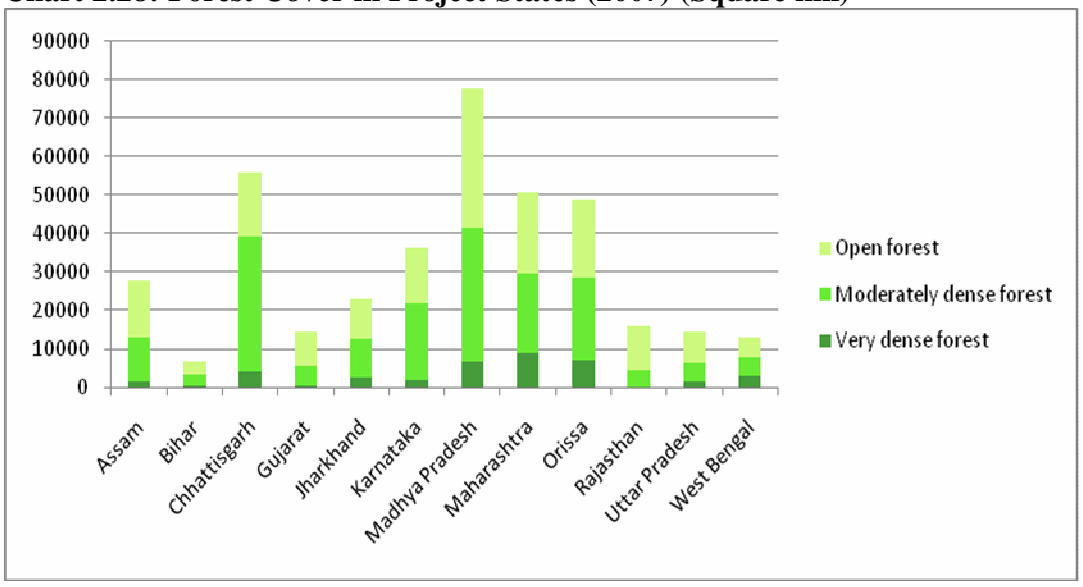
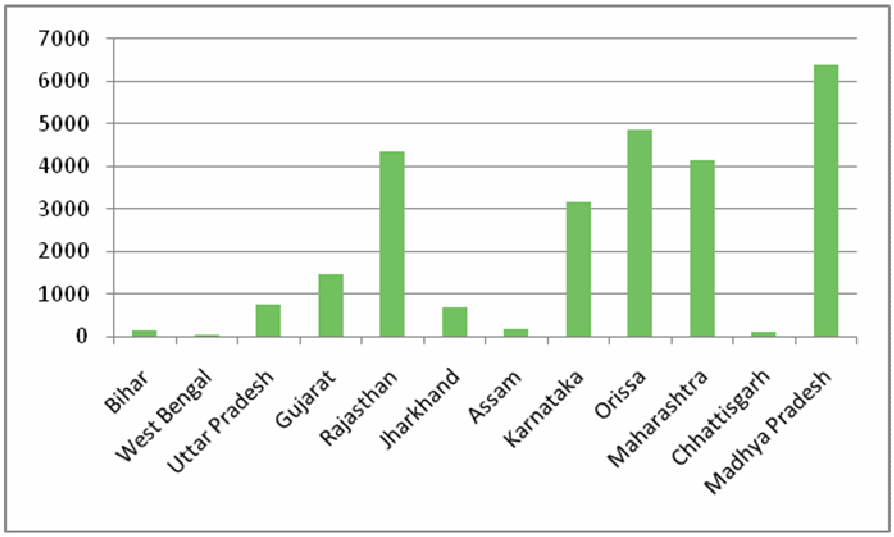


Chart 2.28: Forest Cover in Project States (2007) (Square km)[42]



41 India State of Forest Report 2009. Forest Survey of India, Ministry of Environment and Forests, Government of India.
42 India State of Forest Report 2009. Forest Survey of India, Ministry of Environment and Forests, Government of India.

Chart 2.29: Degraded Scrub Forest in Project States (2007) (Square km)[43]



37. The 12 project states house 237 Wildlife Sanctuaries and 47 National Parks. These protected areas constitute between 3.31% (Karnataka) and 8.84% (Gujarat) of the geographic area of the project states.

Table 2.12: Protected Areas in Project States

States	*Wildlife Sanctuaries*	*National Parks*
Bihar	11	1
West Bengal	15	5
Uttar Pradesh	23	1
Gujarat	24	4
Rajasthan	25	5
Jharkhand	11	1
Assam	18	5
Karnataka	21	5
Orissa	18	2
Maharashtra	35	6
Chhattisgarh	11	3
Madhya Pradesh	25	9
Total	237	47

38. Forests are central to the livelihoods of tribal communities. As seen in Table 2.13, all the project states, except Bihar, have tribal districts with significant area under forests.

43 India State of Forest Report 2009. Forest Survey of India, Ministry of Environment and Forests, Government of India.

Table 2.13: Forest Cover in Tribal Districts in the Project Area

State	*Number of tribal districts*	*% of geographical area of tribal districts under forest*
Assam	16	23.95
Chhattisgarh	9	43.40
Gujarat	8	13.98
Jharkhand	8	31.27
Karnataka	5	49.02
Madhya Pradesh	18	30.34
Maharashtra	11	21.34
Orissa	12	38.66
Rajasthan	5	16.61
Uttar Pradesh	1	17.19
West Bengal	11	17.72

Implications for Environmental Management

The forested areas in the project states (especially the 104 tribal districts) are areas with close links between livelihoods and forests. It is necessary to have a clear strategy for these areas for promoting community based forest resource management – and include it in each state's Environmental Action Plan (EAP). Training on sustainable extraction of non-timber forest produce, community norms for rotational grazing and stall feeding, sustainable management of shifting cultivation[44], etc., need to be part of this strategy. The Environmental Management Plans (EMPs) of the SHG federations in these areas need to reflect this strategy.

44 Vincent Darlong. 2008. *Harmonizing Jhum (Shifting Cultivation) with PGS Organic Standards in Northeast India: Key features and characteristics of Jhum for process harmonization*. 16th IFOAM Organic World Congress, Modena, Italy, June 16-20, 2008. Accessed at http://orgprints.org/view/projects/conference.html

3. Legal and Regulatory Framework for Environmental Management

1. It is important that the livelihood activities of the Self Help Groups and the activities of the federations and Producer Organizations are in tune with the laws and regulations of the country and the states. Compliance rather than being restrictive provides an opportunity to align the investments with sound and sustainable management of resources. This section presents a brief listing of the various Acts, Rules and Regulations of the Government of India, the state Governments (the current draft includes details from Bihar, Rajasthan, Orissa, Madhya Pradesh and West Bengal) as well as the safe guard policies of the World Bank.

2. On the basis of the alignment of the proposed NRLP interventions with respect to these laws and regulations, a *Regulatory Requirements List* has been developed. This is provided as Annex 7.

Table 3.1:

Act, Policy or Government Order	*Relevant to NRLP*	*Status*
NATIONAL REGULATIONS OF THE GOVERNMENT OF INDIA		
Environment (Protection) Act, 1986 and EIA Notification, 2006 **Amended: 1991**	Emission or discharge of pollutants beyond the specified standards is not permissible. (Environmental impact assessment (EIA) is required for specified categories of industry. 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.	
Wildlife (Protection) Act, 1972 **Amended: 1993 and No.16 of 2003, (17/1/2003) – The Wild Life (Protection) Amendment Act, 2002**	Destruction, exploitation or removal of any wild life including forest produce from a sanctuary of the destruction or diversification of habitat of any wild animal, or the diversion, stoppage or enhancement of the flow of water into or outside the sanctuary is prohibited without a permit granted by the Chief Wildlife Warden. The Act provides for protection to listed species of flora and fauna and establishes a network of ecologically-important protected areas (Pas)	
Forest (Conservation) Act, 1980	The NRLP is unlikely to involve diversion of forest land for non-forest purposes. However, while supporting activities related to mining (Stone quarrying) or brick making, it is necessary to ensure that that land is not forest land	
Insecticides Act, 1968 **Amendment: Insecticides (Amendment) Act, 1977 (24 of 1977)**	A license is required for the sale, stock or exhibition of sale or distribution of any insecticide. The use of certain insecticides are prohibited or restricted under this Act 110. 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.	
The Fertilizer (Control) Order, 1985	Registration is required for selling fertilizer at any place as wholesale dealer or retail dealer	

The Seed Act, 1966	Selling, bartering or otherwise supplying any seed of any notified kind or variety, requires that – a) Such seed is identifiable as to its kind or variety; b) Such seed conforms to the minimum limits of germination and purity specified c) The container of such seed bears in the prescribed manner, the mark or label containing the correct particulars. To provide for regulating the quality of certain seeds for sale, and for related matter
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
Public Liability Insurance Act, 1991 **Amended: 1992**	To provide for public liability- insurance for the purpose of providing immediate relief to the person affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.
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.
Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	The Act recognizes the 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. The Act can be summarized as: • *Title rights* - i.e. ownership - to land that is being farmed by tribals or forest dwellers as on December 13, 2005, subject to a maximum of 4 hectares; ownership is only for land that is actually being cultivated by the concerned family as on that date, meaning that no new lands are granted; • *Use rights* - to minor forest produce (also including ownership), to grazing areas, to pastoralist routes, etc.; • *Relief and development rights* - to rehabilitation in case of illegal eviction or forced displacement and to basic amenities, subject to restrictions for forest protection; • *Forest management rights* - to protect forests and wildlife.
Indian Forest Act, 1927	To consolidate the law relating to forests, the transit of forest-produce and the duty leviable on timber and other forest-produce
The Water (Prevention and Control of Pollution) Act 1974 **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
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.
The National Green Tribunal Act, 2010	The National Green Tribunal Act 2010 approved by the President of India on June 2, 2010. It provides for establishment

	of National Green Tribunal- a special fast-track court for speedy disposal of environment-related civil cases.	
Coastal Regulation Zone Notification 2011, and Island Protection Zone Notification 2011	The new notification replaces CRZ 1991.The Government of India declares the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action up to 500 metres from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL as Coastal Regulation Zone (CRZ) and imposes restrictions on the setting up and expansion of industries, operations or processes, etc., in the CRZ. In the latest notification the 'no development zone' is being reduced from 200 meters from the high-tide line to 100 meters only to meet the increased demands of housing of fishing and other traditional coastal communities.	
OTHERS		
The Mahatma Gandhi National Rural Employment Guarantee Act, 2005	To enhance 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	
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	
The Disaster Management Act, 2005	An Act to provide for the effective management of disasters	
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	
National Water Policy, 1987 and 202	To ensure that planning, development and management of water resources are governed by national perspectives	

ENVIRONMENTAL SAFEGUARD POLICIES OF THE WORLD BANK		
Environmental Assessment (OP 4.01)	The Bank requires environmental assessment (EA) of projects proposed for Bank financing to ensure that they are environmentally sound and sustainable, and thus to improve decision making.	**Triggered**
Natural Habitats (OP 4.04)	The Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical	**Triggered**

	natural habitats.	
Pest Management (OP 4.09)	In Bank-financed agriculture 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 the pest. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II [111,] 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.	**Triggered**
Cultural Property (OP 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 archeological (prehistoric), paleontological, historical, religious, and unique natural values.	**Not Triggered**
Indigenous Peoples (OP 4.10)	The objective at the centre of this directive is to ensure that indigenous peoples do not suffer adverse effects during the development process, particularly from Bank-financed projects, and that they receive culturally compatible social and economic benefits. For an investment project that affects indigenous peoples, the borrower should prepare in indigenous peoples development plan that is consistent with the Bank's policy. Any project that affects indigenous peoples is expected to include components or provisions that incorporate such a plan.	**Triggered**
Involuntary Resettlement (OP 4.12)	The objective of the Bank's resettlement policy is to ensure that the population displaced by a project receives benefits from it. There is no likelihood of any displacement happening as part of the project activities.	**Not Triggered**
Forests (OP 4.36)	The Bank distinguishes investment projects that are exclusively environmentally protective (e.g., management of protected areas or reforestation of degraded watersheds) or supportive of small farmers (e.g., farm and community forestry) from all other forestry operations. Projects in this limited group may be appraised on the basis of their own social, economic, and environmental merits. The Bank finances plantations only on non forested areas (including previously planted areas) or on heavily degraded forestland.	**Triggered**
Safety of Dams (OP 4.37)	Construction of any dams may not be part of the project. 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**
Projects on International Waterways (OP 7.50)	International waterways are not part of the project area.	**Not Triggered**
Projects in Disputed Areas (OP 7.60)	Disputed areas are not part of the project area.	**Not Triggered**
	STATE REGULATIONS	
BIHAR		

Indian Forest (Bihar Amendment) Act, 1989	Forest land is any area recorded as forest in the Government records, irrespective of ownership. Forest produce includes the following whether found in or brought from a forest: timber, charcoal, caouthouc, catechu, wood-oil, resin, natural varnish, bark, lac, mahua flowers, mahua seeds, kuthi and myrabolams. It also includes all trees and leaves, flowers and fruits, and all other parts or produce of trees; plants that are not trees (including grass, creepers, reeds and moss) and all parts or produce of such plants; palms, bamboos, stumps, brush-wood and canes; wild animals and all parts and produce of animals; peat, surface soil, rock and minerals (including limestone, laterite, mineral oils, and all products of mines or quarries). Articles prepared from bamboo chips are not forest produce. Veneer is a forest produce. Quicklime is a forest produce. Cane baskets prepared from cane trees growing in forests is also forest produce. The following acts are prohibited in reserved and protected forests: Clearing, kindling fire, trespassing cattle, damaging trees (feeling, girdling, lopping, topping, burning, stripping bark and leaves), Quarrying stone, burning lime or charcoal, collecting any forest produce, clearing or breaking land for cultivation, hunting, shooting, fishing, poisoning water, setting traps or snares, etc. The districts of Gaya and Nalanda include Wild Life Sanctuaries may be considered critical natural habitats.
Bihar Ground Water (Regulation and Control of Development and Management) Bill, 2006	Any user of ground water desiring to sink as well either on personal or community basis in the notified area (not specified so far), needs to apply to the Ground Water Authority for grant of a permit. This is not applicable in the case of wells that are fitted with hand operated pumps or water is proposed to be withdrawn by manual devices. Existing users of ground water are also required to register themselves with the Ground Water Authority.
The Bihar Fish Jalkar Management Bill, 2006	Fishing in rivers is prohibited from 15th June to 15th August. Fishing net or Gill net with less than 4 cm mesh size shall be prohibited in rivers Fishing of fingerlings of culturable fishes of any species shall be prohibited in rivers and reservoirs. Use of dynamite or explosives, poison and poisonous chemicals for fishing shall be prohibited. Drawing of water from tanks, reservoirs and mauns for irrigation shall be prohibited. The District Fisheries Officer may order for drawing of water for irrigation when the water level is averages a minimum of five feet in these Jalkars. Intentional water pollution, encroachment in Jalkars and disfiguration of the structure of Jalkars is prohibited
Bihar Irrigation Act, 1997	No well exclusively for domestic use, either on personal or community basis can be excavated within the distance specified by the State Government from time to time from the boundaries of an irrigation work without previous sanction by their State Government. No person has a right to fish or ply any vessel in a reservoir, pond or tank or along a canal or channel maintained or controlled by the Government without written permission of

	the State Government. No person can extract water for any purpose by the installation of pump sets or any other electrical or mechanical devices for pumping water from an irrigation work except with the permission of the Divisional Canal Officer. No person shall deposit any produce of mines or earth or any other material in or near any channel or field drain or other work, whether natural or artificial through which rain or other water flows into any irrigation work. No person shall pollute, or discharge sewage effluent or trade effluent in the water of any irrigation work which may cause injury to the irrigation work or may deteriorate the quality of water of the irrigation work or may give rise to any growth of weeds in the irrigation work.
The Bihar Restoration and Improvement of Degraded Forest Land Taxation Act, 1992	The State Government has the power to levy, assess and collect a tax called the Bihar Restoration and Improvement of Degraded Forest Land Tax for reclamation and rehabilitation of forest land from the user using forest land for non-forest purpose or indulging in developmental activities including mining.
The Bihar Forest Produce (Regulation of Trade) Act, 1984	The purchase, transport, import or export of specified forest produce in a notified area can only be done by the Government or by an appointed agent. The primary collector of a specified produce may transport his specified forest produce [112] within the unit. Retail sale of a specified forest produce is permitted only under a license. Eucalyptus trees grown on land owned by farmers is not considered forest produce.
Bihar Rules for the Establishment of Saw Pits and Establishment and Regulation of Depots, 1983	Permission from the Divisional Forest Officer is required for establishing, maintaining or running a saw pit or depot. These rules are applicable in the BRLP districts OF Gaya, Nalanda, Purnea. Saw pit means machine operated saws meant to cut, fashion or saw timber or poles. Depot is a place where timber more than 100 cft in quantity and poles more than 50 in number stored.
Bihar Saw Mils (Regulation) Act, 1990 **Bihar Saw Mill (Regulation) (Amendment) Act, 2002**	No person shall establish, operate a saw mill or saw pit except under license. Saw mill refers to sawing with the aid of electrical mechanical power. It also includes veneer plywood manufacturing units. Saw pit refers to the use of manually operated saws. No saw mil can exist within 15 km from a notified forest area.
Bihar State Water Policy 2010	The Government of Bihar will adopt a radical shift from predominantly engineering-based solutions to local community-based water and sanitation management solutions. That is, a shift towards community-level empowerment and responsibility for their own water and sanitation management .This involves a combination of 'bottom-up' decision-making and 'top-down' technical support within a much more holistic conceptual framework. Government authorities will operate as multi-disciplinary 'technical service providers' and facilitator rather than central control organizations. Many of the policy issues herein are intended to function from this new perspective.
Bihar Kendu Leaves (Control of Trade) Act, 1973	No person other than the Government or an appointed agent can purchase or transport kendu leaves.
RAJASTHAN	
Rajasthan Regulation and	This bill deals with establishment of State Ground Water

Control of the Development and Management of Ground Water Bill, 2006 (Draft)	Authority with the powers to notify areas and uses for regulation and control of the development and management of ground water
Rajasthan State Water Policy, 2010	The policy intends to function from the new perspective of Integrated Water Resources Management, which is holistic and includes a bottom up approach. The new policy document addresses issues related to: • Water supply and development • Integrated Water Resource Management • Irrigation • Water resources infrastructure • Water conservation • Water quality • Environmental management • Water pricing • Legal enablement • Capacity building • Research • Monitoring and evaluation of water policy and action plans
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
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
Breeding Policy in Rajasthan for Cattle and Buffalo, 2006, 2007	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 animals.
ORISSA	
The Orissa Forest Act, 1972	To protect and manage forests in the state. To consolidate and amend laws relating to the protection and management of forests in the state
The Ancient Monuments and Archaeological sites and remains Act, 1958	• Provide for the preservation of ancient and historical monuments and archaeological sites and remains of national importance, for the regulation of archaeological excavations and for the protection of sculptures, carvings and other like objects. • To restore the damaged monuments and materials and areas of archaeological importance.
• **Supreme Court directions for Noise Control 2005** • **Orissa fire crackers and loud speakers**	• Prevention of environmental sound pollution • Creating general awareness towards the hazardous effects of noise pollution • Motivating young children of impressionable age to desist from playing with fire crackers, use of high sound producing equipments and instruments on festival,

Act 1958 and the Noise pollution (regulation and control) Rules 2000	religious and social function, family get-together and celebrations etc. • Restricting use of loud speakers and amplifiers etc.
Govt. of Orissa Notification No. 8775 26th Oct. 1987 (for siting criteria for establishment of stone crusher and brick kilns, lime kilns and coal briquetting)	• To prevent and control pollution arising out of stone crushing, brick kilns, lime kilns and coal brequetting
Orissa Resettlement and Rehabilitation Policy 2006	• To ensure sustained development through a participatory and transparent process
The Orissa Marine Fishing regulation Act 1982	Regulates and restricts fishing by fishing vessels along with coastline of the state and lakes connected to the sea.
TAMIL NADU	
Tamil Nadu Town and Country Planning Act 1971	This act appoints and empowers local planning authorities to plan for an urban area and/or designated areas. This involves preparation/implementation of Master Plans specifying land use. The plan delineates land for residential, industrial, commercial, agriculture, recreation, forests and mineral exploitation; demarcates objects and boundaries of archaeological/historical interest; and identifies new town/cities, transportation and communication facilities, water supply, drainage, sewerage, sewage disposal and other public utilities and amenities. This act also empowers local planning authorities to assess, levy and recover development charges for the land. At an organization level, the act envisages three classes of authorities: regional planning authorities; local planning authorities; new town development authorities and the constitution of a Town and Country Planning Board.
Coastal Regulation Zone (CRZ) Notification, 1990	This notification under Environment (Protection) Act 1986 supplements the law on site clearance by declaring certain zones as CRZ. It also regulates activities in these zones. Further, GoTN has also issued orders regulating development within 500 m from the high tide level. Under the proposed activities, if there is occurrence of effluent discharges within 500m from the high tide line and other declared sensitive areas implementation of mitigation measures is required before the commencement of operation of such activities. Under this act, Tamil Nadu State Coastal Zone Management Authority came into existence in 1998.
Tamil Nadu Water (Prevention and Control of Pollution) Rules, 1974	These rules seek to control pollution of water and enhance the quality of water. Under these rules, it is mandatory to obtain consent for discharge of effluents and pay consent fees to Tamil Nadu State Pollution Control Board (TNSPCB) for any projects causing water pollution within the jurisdiction of the TNSPCB operations.
The Water (Prevention and Control of Pollution) Cess	This Act provides for levy and collection of a cess by local authorities on water consumed by persons or industries to augment

Act, 1977/Amended 2003	resources for Pollution Control Boards.
Air (Prevention and Control of Pollution) Act 1981 and Tamil Nadu Air (Prevention of Control of Pollution) Rules 1983	These rules address the prevention and control of air pollution. Under these rules it is mandatory to obtain consent for discharging emissions and pay consent fees to TNPCB for any projects causing air pollution.
Hazardous Waste (Management and Handling) Rules, 1989/2000/2003	These rules address handling of hazardous substances that fall under specified schedules. Proposed activities may require handling of specified substances wherein plans/ measures for safe handling and emergency preparedness shall be prepared for safe operations.
Solid Waste (Management and Handling) Rules, 1989/2000	These rules address management and handling of municipal solid wastes. The proposed activities may require handling of specified substances wherein plans/ measures for safe handling and emergency preparedness shall be prepared for safe operation.
Other Regulations	Other regulations, which may be applicable, are given below. * The Batteries (Management and Handling) Rules, 2001 * The Recycled Plastics Manufacture and Usage Rules, 1999/ Amendment 2003 * Prohibition on the handling of Azo dyes * The Bio-Medical Waste (Management and Handling) Rules, 1998/ 2003 * The Public Liability Insurance Act, 1991, amended 1992 * The Prevention of Cruelty to Animals Act, 1960/ The Prevention of Cruelty to Animals (Establishment and Regulation of Societies for Prevention of Cruelty to Animals) Rules, 2001 * The Prevention of Cruelty to Animals (Slaughter House) Rules, 2001 Tamil Nadu Pollution Control Board (TNPCB) looks after compliance to various environmental regulations in the state. TNPCB was constituted to enforce 8 key legislations relating to the control of pollution. The major functions of TNPCB with respect to all kinds of industrial units is to sanction, consent to establish and consent to operate: Different activities have been classified under "RED", "ORANGE" and "GREEN" categories by TNPCB. "RED" and "ORANGE categories imply that mitigation measures shall be planned to control pollution. Activities qualifying under the following criteria are labeled as "GREEN" industries. All non-obnoxious and non-hazardous industries, All such industries which do not discharge industrial effluent, All such industries which do not use fuel in their manufacturing process or in any subsidiary process and which do not emit fugitive emissions.
ANDHRA PRADESH	
Coastal Regulation Zone Notification, 1991	The Government of India declares the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action up to 500 metres from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL as Coastal Regulation Zone (CRZ) and imposes restrictions on the setting up and expansion of industries, operations or processes,

	etc., in the CRZ.
The Andhra Pradesh Forest Act 1967	The Government may constitute any land as reserved forest by publishing a notification in the Andhra Pradesh Gazette and in the District Gazette concerned specifying the details of the land, declaring the proposal to make it reserved forest, and appointing a Forest Settlement Officer to consider the objections against the declaration and to determine and settle the rights claimed to the land or to any forest produce of that land. During the interval between the publication of a notification in the Andhra Pradesh Gazette and the date fixed in the notification, without the written permission from the Forest Settlement Officer, in the land specified: • No right shall be acquired by any person in or over the land except by succession or under a grant or contract by the Government or any person who had such a right before the publication of the notification of the land to be Reserved. • No new house shall be built or plantation formed, no fresh clearing for cultivation or for any other purpose shall be made, and no trees shall be cut for the purpose of trade or manufacture. Also, No person shall set fire or kindle or leave burning any fire in such manner as to endanger or damage such land or forest produce. No *patta* in such land shall be granted by the Government. If the claim relates to a right of way, right to watercourse or to use of water, right of pasture, or a right to forest produce1, the Forest Settlement Officer may admit or reject the claim. If the claim is admitted, the Forest Settlement Officer may ensure the continued exercise of the rights subject to certain conditions agreed upon with due regard to the maintenance of the reserved forest. The following are prohibited in reserved forest (except if the act is done with the written permission of the Divisional Forest Officer or if it is done as part of the exercise of rights ensured by the Forest Settlement Officer): • Set fire, kindle fire or leave any fire burning in such manner as to endanger such forest • Kindle, keep or carry any fire except at seasons and conditions specified by the Divisional Forest Officer • Trespass, pasture cattle or allow cattle to trespass • Cause any damage, either willfully or negligently in felling or cutting any trees or dragging any timber • Fell, girdle, lop, tap or burn any tree or strip off the bark or leaves from or otherwise damage the same • Quarry stone, burn lime or charcoal • Collect or subject to any manufacturing process, any forest produce • Clear or break up or plough any land for cultivation or for any other purpose • Hunt, shoot, fish, poison water or set traps or snares • Damage, alter or remove any wall, ditch embankment, fence, hedge, or railing, or • Remove any forest produce
Andhra Pradesh Protected Forest Rules, 1970	The following are prohibited in a protected forest (except when the act is done in accordance with any Government order or with

	permission of the Chief Conservator of Forests, Conservator or Forests or Divisional Forest Officer): • Clearing, ploughing or breaking up of land for cultivation or any other purpose • Kindling of fire • Cutting, sawing, conversion and removal of trees and timber and collection and removal of natural produce • Quarrying of stone, the boiling of catechu or the burning of lime or charcoal • Cutting of grass, or the pasturing of cattle, and • Hunting, shooting, fishing, poisoning of water and setting of traps or snares Persons belonging to scheduled tribes are eligible for the following concessions: The removal of timber, bamboos, and forest produce from the protected forests for domestic and agricultural purposes on payment of the fee fixed for the purpose Agricultural purposes includes the use of: • Timber for agricultural implements • Poles and thorns for hedges • Bamboo for fencing and roofing of huts and sheds in fields, and • Leaves for green manure Domestic purposes includes the use of: • Fuel for heating and cooking • Timber and other forest produce for the erection and repair of permanent and temporary dwellings, cattle sheds, pandals and fencing of compounds and fields
The Andhra Pradesh Water, Land and Trees Act, 2002 and the Andhra Pradesh Water, Land and Trees Rules, 2002	The Andhra Pradesh Land, Water and Trees Act and Rules, 2002 are to promote water conservation and tree cover and to regulate the exploitation and use of ground and surface water for protection and conservation of water sources and land. State, District and Mandal authorities are constituted under these rules. The Ex-Officio Chairman of the District Authority is the District Collector and the Ex-Officio Member Secretary is the Project Director, Drought Prone Area Programme / District Water Management Agency. The Ex-Officio Chairman of the Mandal Authority is the Mandal Revenue Officer and the Ex-Officio Member Secretary is the Assistant Executive Engineer, Rural Water Supply.
Ground Water Protection Measures	Owners of all wells (including those which are not fitted with power driven pumps) and water bodies in the State shall register their wells/water bodies with the Village Secretaries of the Gram Panchayats. No person shall sink any well in the vicinity of a public drinking water source within a distance of 250 metres, without permission from the Authority, and if the well is to be used with a power driven pump, without permission from APTRANSCO. Sinking of any well for public drinking purpose and hand pump for public or private drinking water purpose is exempted from this. In areas declared as overexploited by the Authority, no person shall sink a well without the permission of the Authority. Every rig owner shall register his machinery with the Authority.
Land and Soil	No brick manufacturing shall be taken up in areas where the soil is prone to erosion and depletion.

	Wherever coal based thermal power plants are in operation, all constructions within a radius of 10 kilometres shall be taken up with bricks made only of fly ash. Sand mining shall not be permitted in I, II and III order streams except for local use in villages or towns bordering the stream. Transportation of sand from these notified I, II and III order streams through mechanical means out of the local jurisdiction shall be banned. In IV order streams, sand mining shall be restricted to specified areas. In V order and above rivers (eg: Godavari, Krishna, Pennar) sand mining may be permitted without affecting existing irrigation, drinking water or industrial uses. Sand mining shall not be carried out within 500 metres of any existing structure (such as bridges, dams, weirs, or any other cross drainage structure) and within 500 metres of any groundwater extraction structures (either for irrigation or drinking water purposes). Sand mining shall not be permitted within 15 metres or 1/5th of the width of the stream bed from the bank, whichever is more. In streams and rivers where the thickness of sand is quite good (more than 8 metres), the depth of removal may be extended up to 2 metres. Sand mining shall not be permitted in streams where the thickness of sand deposition is less than 2 metres. In minor streams, where the thickness of sand deposition is more than 3 metres and less than 8 metres, the depth of removal of sand shall be restricted to one metre. Sand mining shall be restricted to depths above the water table recorded during monsoon and in no case shall effect/disturb the water table.
Surface Water	No undesirable wastes including liquid wastes shall be allowed to be dumped in the water bodies by any person or organization
Trees	Tree plantation and landscaping shall be adopted in all public and private premises. No felling of the trees or branches is permitted without prior permission of the Authority. Compulsory planting in residential areas, commercial/institutional areas and industrial areas as per the following details is to be taken up: For residential areas with an area of: Below 100 sq. metres 3 trees 101 to 200 sq. metres 5 trees 201 to 300 sq. metres 10 trees More than 301 sq. metres 10 trees, plus 5 trees for every increase of 100 sq. metres For commercial and institutional areas with an area of: Below 200 sq. metres 2 trees 201 to 500 sq. metres 4 trees 501 to 1000 sq. metres 6 trees, plus 2 trees for every increase of 100 sq. metres
The Andhra Pradesh Saw Mills (Regulation) Rules, 1969	Saw mill means a mechanical contrivance for sawing, cutting or conversion of timber with the aid of electrical or mechanical power but does not include a contrivance operated solely by manual power. No person shall install, erect or operate a Saw Mill for cutting, converting or sawing of timber without obtaining a licence for such installation from the Divisional Forest Officer.

	No licence for setting up fresh saw mills within a distance of 5 km. from the boundary of any Forest under the control of the Forest Department shall be granted.
Andhra Pradesh Forest Produce Transit Rules, 1970	No forest produce shall be moved into or from or within the State by land or water unless such produce is accompanied by a permit. Timber exceeding 25 cms in girth at its thickest part and one metre in length, except timber sawn into sizes shall not be moved into or from or within the State of Andhra Pradesh, unless such timber bears a distinguishable Government transit mark authorizing the transit. (Firewood means all timber below 25 cms in girth at it thickest end and one metre in length.)
The Andhra Pradesh Minor Forest Produce (Regulation of Trade) Act, 1971	Minor Forest Produce means any forest produce other than timber, trees (excluding bamboos) and charcoal. No person other than the Government, or an authorized officer of the Government or an agent appointed by the Government shall sell or purchase or cure or otherwise process or collect or store or transport any minor forest produce. Any sale to or purchase from the Government, the authorized officer or the agent appointed by the Government of a minor forest produce is permitted. Every grower3, other than the Government, shall, if the quantity of the minor forest produce grown by him during a year is likely to exceed such quantity as may be prescribed, get himself registered with the Divisional Forest Officer. A registered grower may collect any minor forest produce from any land belonging to him on which such produce is grown and may transport the minor forest produce to the nearest depot. No grower shall carry on any trade or business in or any industry with the use of the minor forest produce except in accordance with the provisions of this Act and the rules made thereunder. Every manufacturer of finished goods using minor forest produce, and every exporter of minor forest produce shall get himself registered.
The Andhra Pradesh Scheduled Areas Minor Forest Produce (Regulation of Trade) Regulation, 1979	The object and purpose of the Regulation was to create a State monopoly in the trade of minor forest produce in Scheduled Areas through Andhra Pradesh. No person other than the Girijan Cooperative Corporation, Ltd., shall sell or purchase or cure or otherwise process or collect or store or transport any minor forest produce. Any sale to or purchase from the Corporation of a minor forest produce is permitted.
The Andhra Pradesh Preservation of Private Forest Rules, 1978	The Forest area situated in Patta land is a Private Forest. No permission to fell the following 'prohibited trees' is granted: 1. Vepa (*Azadirachta indica*) 2. Ippa (*Madhuka latifolia*) 3. Mamidi (*Mangifera indica*) 4. Kunkudu (*Sapindus emarginatus*) 5. Mushti (*Strychnos nuxvomica*) 6. Chinta (*Tamarindus indica*) 7. Panasa (*Artocarpus integrifolia* and *Artocarpus hirsuta*) 8. Karaka (*Termalia chebula*) 9. Tuniki (*Diospyros malonaxylon*) 10. Kaniga (*Pongamia glabra*) Permission to cut the following reserved trees shall not be granted unless the trees exceed 120 cms. in girth at 1.3 mtrs. height from

	ground level (Also, the felling should be as close to the ground as possible): 1. Bandaru (*Adina cordifolia*) 2. Billudu (*Chloroxylon swietenia*) 3. Jittegi (*Dalbergia latifolia*) 4. Yepi (*Hardwickia binata*) 5. Raktachandanam (*Pterocarpus santalinus*) 6. Yegisa (*Pterocarpus marsupium*) 7. Chandanam (*Santalum album*) 8. Salwa (*Shorea robusta*) 9. Kusum (*Schleichera trijuga*) 10. Teku (*Tectona grandis*) 11. Maddi (*Terminalia tomentosa*) 12. Konda Tangedu (*Xylya dolabriformis*)
Andhra Pradesh (Protection of Trees and Timber in Public Premises) Rules, 1989	Public premises means any area under the control of Government Department and includes road sides; premises of institutions and public buildings, public gardens, porambokes, beroon lands, Panchayat lands, irrigation project sites and canal banks, tank bunds, tank spread and foreshores, etc. Unless it is in accordance with any order issued by the Government or with prior written permission of the Forest Officer, the following is not allowed in public premises: • Felling, girdling, lopping, tapping or burning of any trees • Stripping off the bark or collecting leaves or otherwise damaging a tree • Removing any produce from such trees existing in public premises • Damaging, altering, removing any fence or live hedge fence
The Andhra Pradesh Charcoal (Production and Transport) Rules, 1992	No person shall make charcoal, or cut or cause to cut trees for the purposes of making charcoal, without the previous written permission of the Divisional Forest Officer concerned.
MADHYA PRADESH	
Water (Prevention and Control of Pollution) Madhya Pradesh Rules, 1975	**The rule states** any person who is discharging sewage or trade effluent in to stream or well or sewer or on land shall apply in the form appended to these rules to the Member Secretary, Madhya Pradesh Pollution Control Board.
Lok Vaniki Act 2001	This act is to give a boost to scientific management of privately owned 'forests' and other 'tree clad areas' in the state. The Act provides an opportunity to the willing landholders to take up management of their tree-clad holdings for optimizing economic returns to themselves and simultaneously ensuring environmental benefits to the society. The Act is voluntary in it's' application.

4. Environmental Management Framework

1. The EMF for the NRLP describes the strategy and plan for implementing environmental safeguards in the project.

4.1 Rationale and Objectives

2. The development objective of the proposed NRLP project is to establish efficient and effective institutional platforms of the rural poor that enable them to increase household incomes through livelihood enhancements and improved access to financial and public services. The focus of the EMF will be to introduce and strengthen environmental management by the institutions of the rural poor so as to contribute to the sustainability of the livelihood enhancements undertaken.

3. The objectives of the EMF:
   - contribute to livelihood security through better of management of natural resources
   - facilitate compliance with Bank's environmental safeguard policies and with laws/regulations of the Government of India and state Governments
   - facilitate adoption of environment-friendly livelihood activities
   - institutionalize environmental management in the community institutions supported by the NRLP

4.2 Process of Development of the EMF

4. The process of development of the EMF included:
   - Secondary research on environmental status of the 12 states
   - Review of the relevant legal and regulatory provisions
   - Review of EMFs and other relevant documents from existing Bank supported livelihood projects
   - Field study in 4 states (Karnataka, Andhra Pradesh, Bihar, Tamil Nadu) primarily to document strategy for promotion of environment-friendly livelihood activities
   - Consultation with key stakeholders from all 12 states through a national workshop.

4.3 Learnings from Bank Supported Livelihood Projects

5. The Bank has been supporting projects on poverty reduction and rural livelihoods in the states of Andhra Pradesh, Madhya Pradesh, Rajasthan, Chhattisgarh, Bihar and Tamil Nadu. These projects have yielded valuable experience and learnings on the implementation of environmental safeguards. These include:

   - The two models in the Bank livelihood projects – the earlier CIGs[45] and the later SHGs[46] – are unique with respect to their implications on environmental safeguards. CIGs are financed by the project through a one-time grant for a common livelihood activity. SHGs are provided a loan, based on the micro-credit/investment plan which

[45] CIG – Common Interest Group
[46] SHG – Self Help Group

may contain multiple activities, by a larger SHG federation which is financed through a grant by the project. The challenge in the CIG model was to ensure that the CIG activities undergo screening for potential environmental impacts and that required mitigation measures are implemented. The challenge in the SHG model is to institutionalize in the SHG federation, the systems which will ensure that environmental considerations are integral to the process of appraisal of the SHG micro-credit/investment plans. This also expands the responsibility of environmental safeguards from the project alone to include the community institutions. Another key difference in the CIG and SHG models pertains to the financing of mitigation measures. In the CIG model, the cost of the mitigation measures is built into the sub-project budget. In the SHG model, doing so will increase the 'loan burden' on the SHG member – and this has often been a road block to implementation of mitigation measures in livelihood projects. Thus, a different strategy is needed to ensure implementation of the required measures for mitigation of negative environmental impacts.

- As the nature and scale of livelihood activities undertaken by individual households is environmentally benign and small in scale, the potential impacts are also localized and manageable. Therefore, rather than place emphasis on micro-managing micro-impacts through appraisal of every individual household activity – it is more meaningful and efficient to (a) focus on introducing/improving the systems in community institutions for environmental management (b) periodically monitor cumulative impacts to provide pointers on required interventions.
- The livelihood projects are unique in two ways: (a) they have limited negative environmental consequences (b) they have immense, demonstrated potential for interventions that can lead to positive environmental impacts. Thus, the EMF for these projects cannot limit its scope to the mitigation of negative impacts alone. It needs to spell out a strategy for pro-active interventions that will promote environment-friendly livelihoods.
- Role of external agencies: Internalization of EMF in the project is better achieved when the responsibility for regular supervision rests with project staff as compared to a situation where it is outsourced to an external agency. External agencies can provide invaluable technical support for promoting environment-friendly livelihoods and for capacity building.

6. Annex 1 gives an overview of EMF implementation in recent Bank supported livelihood projects.

4.4 Scope of Application of EMF

7. The EMF applies across the board to all components under the project. The following table presents the mapping of its various elements to the project components.

Table 4.1: Application of EMF to the NRLP components

Component	*Activities*	*Relevant provisions in EMF*
Component 1: Institutional and Human Capacity Development	Human resource development	National Environmental Management Coordinator in the NMMU Technical assistance on developing Environment Action Plans as part of the State Perspective and Implementation Plans and Annual Action Plans Capacity-building of state teams (training, exposure visits) on environmental management
	Training and capacity building	Development of operational manuals and training modules for state teams and community professionals on environmental management
Component 2: State Livelihood Support	State Rural Livelihood Missions	Institutions arrangements for EMF implementation at state, district and block levels
	Institution building and capacity building	Capacity building of community institutions including Green Community Resource Persons (Green CRPs)
	Community investment support	Environmental Management Plan by SHG federations
	Special programs	
Component 3: Innovation and Partnership Support	Innovation Forums and Action Pilots	Inclusion of Green Innovations in Innovation Forums
	Social Entrepreneurship Development	
	Public-Private Community Partnership	
Component 4: Project Implementation Support	National Mission Management Unit	Management of EMF implementation
	Monitoring and Evaluation	
	Governance and accountability framework	
	Knowledge management and communication	

4.5 Components

4.5.1 Development of State Environment Action Plans and Locally Relevant EMPs

4.5.1.1 *Environment Action Plan in the State Perspective and Implementation Plans and Annual Action Plans*

8. The sub-component 1.1 of the NRLP is Technical Assistance to all states for rolling out and implementing the NRLM. Under this subcomponent, technical assistance will be provided to the State Rural Livelihood Missions (SRLMs) of 25 states to undertake a situational analysis (poverty diagnostic study) and to develop State Perspective and Implementation Plan (SPIP) and Annual Action Plans (AAPs). An Environmental Action Plan (EAP) will be developed by each State Mission Management Unit (SMMU) as part of the SPIP.

Technical Assistance to States

9. The Technical Assistance from NRLM/NMMU for facilitating preparatory work on environment would be for:
   - Development of operational manuals on EMF – including EMPs of primary

federations, CoPs of producer collectives, Green CRPs, Green Opportunities

- Development of a repository of Green Opportunities and Resource Institutions
- Exposure visits to SRLM teams to best practices in facilitating environment-friendly livelihoods other states
- Recruiting, if required, the services of a consultant firm to undertake Situation Analysis and assist in development of the EAP for inclusion in the SPIP
- National workshop/s to facilitate cross-learning/exchange that will contribute to development of robust EAPs
- Stakeholders' consultations in each state including meetings, workshops, focus group discussions
- Induction and capacity building of key staff at the SMMUs
- Integration of EMF requirements into the Initial Action Plan
- Appraisal and approval of the EAP in the SPIP and AAPs

10. The Environmental Management Coordinator in the NMMU will be responsible for providing the required technical assistance. Each of the spearhead teams will have an Environment Specialist who will provide technical assistance for formulation and implementation of the EAPs. The Bank environment team will provide guidance and oversight. The EAP will be developed by each SMMU through a participatory process that will include secondary research, field data collection, consultations with key stakeholders (including NGOs, line departments, and community institutions), consultation on the draft EAP, finalization of the draft EAP and its integration into the SPIP. The plan for the implementation in the first year will include field testing of the process of development and implementation of the Federation EMPs in at least 5 existing federations per state.

11. A template for the Environment section of the Situational Analysis is provided in Annex 2. A template for the EAP that is part of the SPIP is provided in Annex 3. Indicative terms of reference for the consultant firm that will prepare the EAP are provided in Annex 4.

Readiness filter for SPIP with respect to Environmental Safeguards

12. The NRLM/NMMU, on receipt of SPIP, will screen the SPIP through a desk-appraisal for compliance and readiness. This screening process will include checking if:

- The SPIP includes an EAP developed through the process described in this section.
- The state has an Environmental Management Coordinator as part of the core team supporting the preparatory work for transiting to NRLM.

13. After clearing screening, NRLM would field a multidisciplinary Joint Appraisal Mission. This Appraisal Mission will include an expert on environmental management who will use a range of methodologies including field visits, meetings and discussions with key stakeholders to review and refine the EAP. Based on the agreed actions with the Appraisal Mission, SRLM would submit its revised EAP (as part of the SPIP). For the subsequent years, the appraisal of the EAPs in the Annual Action Plans will be based on the feedback provided by supervision missions, monitoring reports, external audit reports, etc. The EAPs will be disclosed by each state on the Government website as well as through circulation to the project districts.

4.5.2 EMPs by SHG Federations

14. The NRLP seeks to build institutional platforms for livelihood enhancement and improved access to services. In tune with this purpose, the orientation of the EMF is on infusing the environmental management agenda into these platforms. The SHG Federation EMPs are a tool to enable this. The SHG primary federation (village organization or VO) is the channel for routing and monitoring project funds to SHGs. Its role is to perform functions that an individual SHG cannot – environmental management is such a higher order function.

15. The approach of having an EMP will enable the following:
- Making the EMF locale-specific – relevant to the issues and actions needed in the specific village.
- Giving the EMF continued relevance – beyond the 2 tranches of the start-up and Livelihood Investment Fund loans to SHGs (micro-credit is an on-going activity).
- Provide opportunity for village level norms on resource use to emerge and/or be strengthened.
- Provide opportunity for the SHG federation to take up environmental management (in the context of the livelihoods and well-being of its members) as one of its core functions.
- Function as a 'bottom-up' process for generating demand on Green Opportunities.

16. The EMP will be a simple 2-page document containing:
- Actions required at individual household level, SHG level, primary federation level including community norms on use of the natural resources and environmental management
- Plan for implementation of required actions including awareness building, training and extension support activities that will be facilitated by the federation
- Institutional arrangements in the federations and SHGs for implementation of the EMP
- Plan for monitoring implementation of the EMP
- Sources of support for implementation of the EMP (these include convergence with existing Government schemes such as MNREGS as well as support from the NRLP).

17. A template for the EMP is provided in Annex 5. The EMP will be prepared by the VO with facilitation by the PFTs. It will be prepared prior to the micro-credit plan preparation process in the affiliate SHGs and will be updated annually. The executive committee of the VO will include an Environmental Management Committee.

Process of EMP

Green CRP facilitates development of EMP by Federation
↓
Sources of support for implementation of actions in EMP are identified
(e.g., MNREGS, IWMP, line department schemes, NRLP, etc.)
↓
Green CRP provides/facilitates required support to the Federation for implementation of the EMP
↓
EMP is reviewed annually and updated

Application of EMP to SHG M/LPs

Federation communicates on EMP to all affiliate SHGs
↓
SHGs prepare micro-investment / livelihood plans (M/LP)
↓
SHGs ensure that the activities included in the M/LP are in compliance with the 'regulatory requirements list' and are in accordance with the EMP
↓
Primary federation (VO) checks and confirms that the SHG M/LP is in compliance with the 'regulatory requirements list' and EMP before release of funds to the SHG. The Green CRP facilitates this process and seeks any required guidance from Block PFT
↓
SHG implements the M/LP; Primary federation provides/facilitates required support to the SHGs for implementation

18. Any activity/business plans that the primary federation undertakes will also follow the same process to ensure compliance with the 'regulatory requirements list' and with the EMP. Support for implementation of actions identified in EMP:

Table 4.2: Support for implementation of actions identified in EMP

Support required for implementation of identified actions	***Implementing entity***		
	Individual	*SHG*	*Primary federation*
Technical support (training, extension) Management support (community norms)	1	2	3
	E.g. Improved method of composting (maintaining moisture, periodic turning, etc.)	E.g. Preparation of botanical extracts for pest control	E.g. Community norms for rotational grazing, sustainable NTFP harvesting, etc.
Technical support (training, extension) Management support (community norms) Financial support	A	B	C
	E.g. Drip irrigation equipment	E.g. Hiring centre of efficient spraying equipment and safety kit	E.g. Fodder bank

- For actions in categories 1, 2 and 3: No financial support is required. Technical support (training, exposure visit, extension service) is provided on basis of the requirements outlined in the EMP.
- For actions in category A: Financial support (loan) to SHG member on the basis of SHG MIP.
- For actions in category B: Financial support (loan) to SHG from VO on the basis of SHG MIP.
- For actions in category C: Financial support to VO that can be sourced from existing Government schemes such as MNREGS, IWMP, line department schemes or from the NRLP.

19. The DMMU Environment Management Coordinator will review the EMPs of the VOs. The purpose of the review is two-fold: (a) to ensure quality in the development of the EMPs (b) to identify and provide support for the EMP operationalization.

20. In order to ensure the quality of the EMPs, the review will use the following criteria:

a. Adherence to the regulatory requirements list

b. Comprehensiveness and relevance of the livelihoods, issues and actions identified

c. Implementable plan for identified actions

d. Clear institutional arrangements in VO for EMP implementation

e. Detailed plan for monitoring

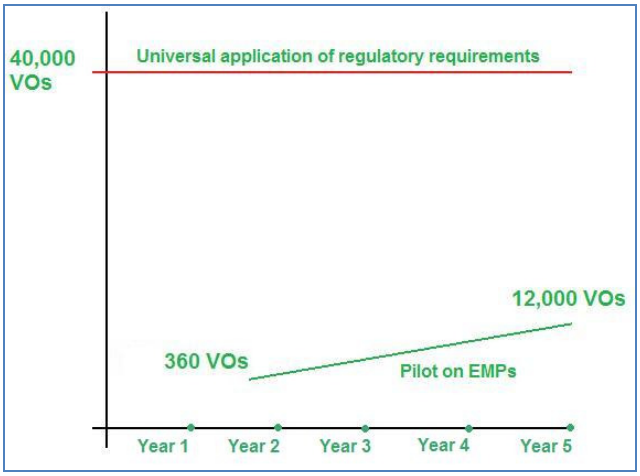
f. Identification of relevant indicators

21. In case the EMP is not of satisfactory quality, the DMMU will ensure that it is appropriately revised by the primary federation through a process facilitated by the Green CRP/Block team.

22. The DMMU Environment Management Coordinator will identify the nature of the support required for the implementation of the mitigation measures, identify possible sources for meeting the technical support requirements (line departments, Krishi Vignan Kendras, NGOs, etc.) and the financial support requirements (for example, MNREGS), and identify the residual financial support requirements that need to be supported through the NRLP. A primary focus of this review will be on identification of Green Opportunities (need and scope for environment-friendly interventions).

23. The application of EMP as a tool for decentralized environmental management is innovative. Hence, this approach will be implemented as a pilot that reaches 30% of the primary federations in the project in a phased manner. The section 4.5.9 describes the implementation roll out strategy. The NMMU and SMMU Environment Management Coordinators will closely monitor the implementation of this tool and devise an appropriate strategy for scaling it up to all primary federations involved in the project in year 3.

Figure 4.1: Scale of application of EMF



24. The purpose of the pilot is 'learning by doing'. The pilot experience will help in shaping the strategy for rolling out the EMPs, and, the capacity building program for the Green CRPs and primary federations. Technical support agencies will be hired to provide on-

going support to the Green CRPs. The selection of the village federations for the pilot will be based on well-defined criteria to ensure that the pilots are not affected by implementation set-backs. These will also be clustered in a limited number of blocks to ensure that focused and intensive support is provided through TA agencies where needed. With the cluster approach, the pilot will reach 30% of the districts (30 out of 100), blocks (120 out of 400) and federations (1,200 out of 40,000).

4.5.2.1 Code of Practice by Producer Collectives

25. The NRLP under the State Livelihood Support component will support producer collectives. These collectives of primary producers may be formed on agriculture, dairy, non-timber forest produce, etc. and will consist of SHG members involved in that particular livelihood activity. The producer collectives typically engage in activities such as procurement and retail of inputs, processing, marketing, technical support, etc. The producer collectives supported through the NRLP will be facilitated (by the DMMU Environment Management Coordinator) to develop and implement a Code of Practice (CoP) for environmental management. The CoP will be based on the EMF but will incorporate locally relevant and activity specific codes. The CoP will be evolved through a participatory process and will be on the lines of the Participatory Guarantee System for Organic Produce or the Responsible Soya programmes. The approach of having a CoP will enable the EMF to have continued relevance – beyond the 2 tranches of sectoral funds to POs. A template for the CoP is provided in Annex 6.

Application of CoP:

Producer Collective prepares its CoP. DMMU Environment Management Coordinator facilitates the process and ensures that the CoP is in compliance with the 'regulatory requirements list'

↓

Producer Collective prepares activity/business plan (A/BP)

↓

Producer Collective ensures that the activities included in the A/BP are in accordance with the CoP

↓

DMMU Environment Management Coordinator checks and confirms that the Producer Collective A/BP is in compliance with the CoP before release of funds to the Producer Collective; arranges for technical support on environmental management by technically qualified personnel for activities requiring the same

↓

Producer Collective monitors implementation of the CoP practices by its members

↓

DMMU provides/facilitates required support to the Producer Collective for implementation of the CoP

4.5.2.2 Mapping of the EMF interventions with the institution building and micro-credit/livelihood interventions

26. The following table provides a mapping of the EMF interventions with the institution building and micro-credit/livelihood interventions.

Table 4.3: Mapping of the EMF interventions with the institution building and micro-

credit/livelihood interventions

Phase	*A*	*B*	*C*	*D*	*E*
Institution building	Village entry	• SHG formation	• SHG strengthening • Primary Federation (VO) formation	• SHG strengthening • Primary Federation (VO) strengthening • Producer Collective formation	• SHG strengthening • Primary Federation (VO) strengthening • Producer collective strengthening
EMF intervention			• Preparation and implementation of VO EMP	• Implementation of VO EMP • Preparation and implementation of Code of Practice for producer collective	• Implementation of VO EMP • Implementation of Code of Practice for producer collective
Micro-credit / Livelihood intervention		• On-going micro-credit lending in SHGs • Release of Seed Grant	• On-going micro-credit lending in SHGs • Preparation of Micro-investment / Livelihood Plans of SHGs • Release of Livelihood Support Fund	• On-going micro-credit lending in SHGs and Federation • Release of Livelihood Support Fund • Preparation of Business Plans of Producer Collectives • Release of Sector Support Fund	• On-going micro-credit lending in SHGs and Federation • Release of Sector Support Fund

4.5.2 Environmental Management Toolkit

23. The experience of implementation of livelihood projects has led to the development of a comprehensive toolkit to guide identification of measures to mitigate potential negative environmental impacts in rural livelihoods.

4.5.3.1 Contents of the toolkit

24. The toolkit contains the following:

- A 'regulatory requirements list': This list is drawn up on the basis of a review of the existing law and regulations of the Government of India, the 12 state Governments and the safeguard policies of the World Bank. The list is provided at Annex 7. This initial list needs to be validated by each of the 12 SMMUs in consultation with the respective line departments. State specific regulations that are relevant to the environment-rural livelihood context need to be added to this list.
- Activities that require detailed environmental appraisal by technically qualified personnel: This list has been drawn up on the basis on implementation experience in the Bank's existing livelihood projects. The list along with a recommendation on the technical qualifications of the personnel who will undertake the detailed environmental appraisal is provided at Annex 8.
- Environmental guidelines for rural livelihoods: Guidelines are provided for four major livelihoods – agriculture, livestock, non-timber forest produce and fishery. These include a listing of the possible impacts and the relevant mitigation measures. The guidelines are provided at Annex 14.

4.5.3.2 Further action required to make the toolkit usable:

25. The toolkit provided in this EMF (Annexes 7, 8, 9 and 10) will be used as basic reference material by SMMU Environment Management Coordinator to validate the regulatory requirements list and the environmental guidelines in consultation with the relevant line departments and technical support institutions (Krishi Vignan Kendras, NGOs, etc.). These will subsequently be translated into the local language and made available to all the sub-district Project Facilitating Teams and SHG primary federations in an appropriate form (simple language, illustrations, flipchart format, etc.).

4.5.3.3 Use of toolkit:

26. The 'regulatory requirements list' will need to be complied with by all the SHG primary federations, SHGs and producer collectives in the project. It will be part of the Community Operational Manual and relevant project communications to the state, district, block teams and community institutions. The toolkit will be used by the Green CRPs as basic reference material in facilitating development of EMPs by SHG primary federations.

4.5.4 Promotion of Green Opportunities (environment-friendly livelihood activities)

27. The experience from the Bank's livelihood projects has been that promulgation of good environmental management in livelihoods is best achieved through demonstration of eco-friendly practices – initially through pilots followed by scaled-up interventions. Examples on this include the Community Managed Sustainable Agriculture (CMSA) in Andhra Pradesh, the System for Rice Intensification (SRI) in Bihar, and the Responsible Soya initiative in Madhya Pradesh. The strategy for promotion of Green Opportunities in the NRLP is described in Chapter 5.

4.5.5 Climate Change Management

4.5.5.1 Climate change & adaptation

28. Climate change impacts livelihoods, often by making it more risky. The EMP and especially Green Opportunities address these risks. For example, increased incidence of drought leading to loss of crops and thereby loss of income is a likely scenario in many parts of India. Green Opportunities such as CMSA (Community Managed Sustainable Agriculture) by reducing the cost of cultivation and TBFS (Tree-based Farming Systems) by diversifying cropping portfolio[47] and spreading the risk of crop loss help the marginal farmers adapt better to drought conditions. Floods are a recurring problem in some of the NRLP states (Bihar, West Bengal) and the severity and frequency of these events is likely to get accentuated with Climate Change. The process of developing the EAP for the SPIPs will involve identification of relevant interventions for drought and flood adaptation (those with livelihood benefits and without negative environmental impacts) that may be considered through the channel of innovation fund or as part of mainstream livelihood programme. Annex 14 gives details of climate change and adaptation strategies.

4.5.5.2 Clean Development Mechanism

29. Many of the Green Opportunities result in reduction of Greenhouse Gas emissions, which

[47] Annual crops & trees are grown together. Trees are more tolerant of droughts than annual crops and thus an income is guaranteed to the farmer even during droughts.

can be claimed as CERs48 (Certified Emission Reduction Units) under the Clean Development Mechanism. Funds from the sale of these CERs can be used to part-finance the interventions or the benefits may be channelized to the Green enterprises. The chapter on Green Opportunities highlights one such programme where CERs/VERs have been sold to part-finance the capital cost of biogas plants as well as the associated cost of delivering the programme.

30. However, there is a need to systematically pursue the CDM potential of interventions made in the NRLP, which need not be restricted to Green Opportunities alone. Every component of the NRLP should be scanned for CDM potential, the CERs quantified and a system instituted to claim them and channelize the benefits. The NEMC and the SEMCs should be entrusted with this task.

31. During the first year of the NRLP, the NEMC should organize trainings to all SEMCs and thematic heads at the NMMU and the SMMU on CDM. Special focus should be given to the SEMCs and those that would be managing the Innovative Projects. Curriculum for the training should be developed from an analysis of existing livelihood projects as well as the bouquet of Green Opportunities presented in this report. The NEMC may hire a consultant to carry out this initial analysis and prepare a training module. Wide-spread awareness of the CMD potential would help the entire implementation mechanism to be tuned to this opportunity better.

32. Simultaneously, efforts should be made to devise a system for quantifying, claiming and channelizing the benefits. The NMMU should collaborate with the CDM wings of the World Bank such as Community Development Carbon Fund (CDCF), Bio Carbon Fund (BCF), etc., to tap their expertise for assessing the CDM potential of NRLP.

33. Thus, by the end of the first year, key personnel in the NMMU and the SMMU should have a clear understanding of the potential and the process of CDM and its applicability to projects being supported by the NRLP. In addition, the NMMU should be able to institute a system of implementing CDM in its projects.

34. During the 2nd year the aim should be to pilot these systems and ensure that some interventions result in CERs claims. The NMMU should also establish links with CER/VER buyers during the 2nd year to organize sale of the carbon credits.

4.5.6 Institutional Arrangements

35. Institutional arrangements for the EMF are detailed both in the project structure as well as in the community institutions.

4.5.6.1 Institutional Arrangements in the Project Structure at National, State, District and Sub-district levels

36. The effective implementation of the EMF will require relevant institutional arrangements at the national, state, district and sub-district levels. The roles and responsibilities of the key staff at the national, state, district and sub-district levels are spelt out in this section. The roles and responsibilities of the key staff at the national, state, district and sub-district levels are as follows (Table 4.4).

[48] They may also be claimed as Verified Emission Reduction Units (VERs) outside the CDM.

37. The overall responsibility for EMF implementation in the NRLP lies with the CEO in the NMMU. The CEO will ensure that the processes, institutional arrangements, procurement requirements, etc., as detailed in this EMF are met with on a timely basis and are executed with quality.

4.5.6.2 Institutional Arrangements in the Community Institutions

38. As mentioned earlier, the EMF focuses on infusing environmental management as a core responsibility of the institutions of the rural poor – with an understanding that sustaining the quality and quantity of local natural resources sustains the productivity of existing livelihoods as well as the range of livelihood options available to the poor. Identifying relevant institutional arrangements in the community institutions supported by the NRLP is a part of this. The roles and responsibilities of the key individuals/entities in the SHG federations and producer collectives are spelt out in this section. The roles and responsibilities are as follows (Table 4.5).

39. In about 50% of the districts in each state, the Livelihoods Coordinator will also function as the District Environment Coordinator (in the other 50% districts, this will be an exclusive position). This arrangement will be reviewed at the MTR (mid-term review) of the project when the decision on having the District Environment Coordinator position as exclusive or as an additional function of the Livelihood Coordinator will be taken.

Table 4.4 Institutional arrangements in Project structure

Level	*Post*	*Responsibilities*	*Profile*
National	National Environment Management Coordinator	Provide strategic guidance to NRLM in the area of environmental management (including scouting and operationalizing Green Opportunities) including identification of: focus areas for intervention, needs emerging from EMPs, technical and capacity building requirements, etc. Provide technical assistance to states in preparatory work on environment for transiting to NRLP (preparation of SPIPs and AAPs) Coordinate closely with relevant thematic counterparts in the NMMU team (livelihoods, capacity building, etc.) for mainstreaming of environmental management (including Green Opportunities)	10-15 years of experience in environmental/NRM management in the rural context (or in a related field). Post-graduate qualification in Natural Resources Management, Agriculture, Environmental Science, Forest Management, Rural Management or a relevant discipline.
	Environment Management Associate	Assist in providing technical assistance to states in preparatory work on environment for transiting to NRLP (preparation of SPIPs and AAPs) Coordinate with capacity building resource agency to ensure timely delivery of quality capacity building services to SRLM/SMMU teams in environmental management (including Green Opportunities) Undertake monitoring visits to states to get feedback and provide support on EMF	7-10 years of experience in environmental/NRM management in the rural context (or in a related field). Post-graduate qualification in Natural Resources Management, Agriculture, Environmental Science, Forest Management, Rural Management or a relevant discipline.

		implementation Coordinate with external audit agency to ensure quality outputs Dissemination of best practices and cross learning across states Assist the National Environment Management Coordinator in all responsibilities	
State	State Environment Management Coordinator	Ensure quality outputs for the Situational Analysis and EAP preparation and its integration into the SPIP and AAPs Validate the approach to development of the Federation EMPs (through field testing) Validate the EMF toolkit (regulatory requirements list, environmental guidelines) in consultation with the relevant line departments and technical support institutions (academic institutions, NGOs, etc.) in the state Ensure quality in implementation of the EMF in the state Coordinate closely with relevant thematic counterparts in the SMMU team (livelihoods, capacity building, etc.) for mainstreaming of environmental management (including Green Opportunities) Commission and ensure quality outputs from state capacity building resource agency. Commission and ensure quality outputs from technical support institutions for pilots on Green Opportunities Undertake monitoring visits to districts to get feedback and provide support on EMF implementation Ensure regular district level monitoring of EMF implementation Dissemination of best practices and cross learning across districts	7-10 years of experience in environmental/NRM management in the rural context (or in a related field). Post-graduate qualification in Natural Resources Management, Agriculture, Environmental Science, Forest Management, Rural Management or a relevant discipline.
District	District Environment Management Coordinator	Ensure quality in implementation of the EMF in the district Facilitation of detailed environmental appraisal by technically qualified personnel for activities requiring the same (as indicated in Annex 8) Coordinate with state capacity building resource agency/agencies to ensure timely delivery of quality capacity building services to district/block teams, Green CRPs and SHG federations/producer collectives Coordinate with technical support institutions for quality and timeliness in implementation of pilots on Green Opportunities Undertake regular district level monitoring of EMF implementation Dissemination of best practices and cross learning across the district	5-7 years of experience in environmental/NRM management in the rural context (or in a related field). Post-graduate qualification in Natural Resources Management, Agriculture, Environmental Science or a relevant discipline.

Sub-district	Project Facilitating Team (all members)	Ensure quality in implementation of the EMF at the sub-district level Support all SHG federations in adhering to the 'regulatory requirements list' Support SHG federations and producer collectives in development and implementation of EMPs and Codes of Practice Dissemination of best practices and cross learning across the SHGs and SHG federations	

Table 4.5: Institutional arrangements in community institutions

Level	*Key persons*	*Responsibilities*	*Profile*
Sub-District / Block	Green Community Resource Person (Green CRPs)	Build capacity of SHG members in environmental management in the context of the key livelihoods identified in the sub-district (block/mandal) Dissemination of best practices and cross learning across the SHGs in the sub-district (block/mandal) Facilitate the development of the EMP for the federations (with the support of the sub-district PFT) Assist the federations in liaison with the village institutions (Gram Panchayat, user groups such as Joint Forest Management Committee, fisheries and dairy cooperatives, Watershed Committee, etc.) for developing and implementing village-level norms on resource management Assist in identification of best-practitioners on environmental management among SHG members Organize technical support and training for SHG members (with the support of the sub-district PFT)	Members of the community who have: • eco-friendly practices in their own livelihoods • potential to be change-makers in the community • willingness to spend at least 150 days annually visiting villages in the block and providing on-site support to federations and SHGs • willingness to invest time and effort in their initial and on-going training • high school education
Sub-District / Block	Community Resource Person (CRPs) facilitating M/LI Plans	Support all SHG federations in adhering to the 'regulatory requirements list' through building awareness, facilitation for any required permissions, etc. Build capacity of SHG members in environmental management in the context of the key livelihoods identified in the sub-district (block/mandal) in coordination with the Green CRP Dissemination of best practices and cross learning across the SHGs in the sub-district (block/mandal) Organize technical support and training for SHG members (with the support of the sub-district PFT and Green CRP)	
SHG	Environment	Develop and implement the EMP for the	Members of the Executive

primary federation (VO)	Management Committee (with the facilitation of the sub-district Project Facilitating Team)	federation Liaison with the village institutions (Gram Panchayat, user groups such as Joint Forest Management Committee, fisheries and dairy cooperatives, Watershed Committee, etc.) for developing and implementing village-level norms on resource management Organize technical support and training for SHG members Undertake monitoring of implementation of EMP and any emerging cumulative environmental impact on a regular basis	Committee of the primary SHG federation who have demonstrated good practices and/or recognize the value of natural resource management in their livelihoods.
Producer collective	Environment Management Committee (with the facilitation of the DMMU/sub-district Project Facilitating Team)	Develop and implement the CoP for the producer collective Organize technical support and training for members of the producer collective (with the facilitation of the sub-district SRLM team) Undertake monitoring of implementation of the CoP by its members	Members of the Executive Committee of the producer collective who have demonstrated good practices and/or recognize the value of natural resource management in the activity.

4.5.7 Capacity Building

40. The orientation of this EMF is to strengthen the capacity for environmental management in (a) the independent institutional structures at the national level and at the 12 states, and (b) the community institutions – SHGs, SHG federations, producer collectives. This will be achieved through:

- Training of livelihood professionals in state, district and block teams
- Training of community members.

Annex 13 gives the Terms of Reference for the National Capacity Building Agency on Environmental Management.

4.5.7.1 Training of livelihood professionals in state, district and block teams

41. The strategy for this will include: (a) Integration of environmental management into induction training programmes for SRLM staff (SMMU, DMMU and block levels): a sub-module on 'environmental management in rural livelihoods' will be included as part of the module on livelihoods in all the training programmes for the SRLM staff. This sub-module will be part of the MDP for the SMMU staff. The sub-module will cover the following themes:

- Opportunities for better environmental management in existing livelihoods
- Green Opportunities for new environment-friendly rural livelihoods
- Key provisions of the EMF of the NRLP – including the 'regulatory requirements list'

(b) Specialized training on environmental management for Environment Management Coordinators at State and District levels. The details of these training programmes are as follows:

Table 4.6: Thematic areas for training of Environment Management Coordinators

Course	*Level*	*Thematic areas for training*	*Methodology*	*Duration*

T1	State	Environmental issues in the rural livelihood activities Promotion of better environmental management in existing livelihoods (including climate change management) Promotion of Green Opportunities (new environment-friendly livelihoods) Key provisions of the EMF of the NRLP Preparatory work on environment for development of EAP for inclusion in the SPIP and AAPs	Field exposure visits Case studies Class room sessions	2 weeks (initial training, exposure visits) Annual refresher training/review
T2	District	Environmental issues in the rural livelihood activities Promotion of better environmental management in existing livelihoods (including climate change management) Promotion of Green Opportunities (new environment-friendly livelihoods) Key provisions of the EMF of the NRLP Facilitating adherence to 'regulatory requirements list' by all SHG federations and producer collectives Facilitating development and implementation of EMPs by SHG federations and CoPs by producer collectives	Class room sessions Field exposure visits Field exercises	2 weeks (initial training, exposure visits) Annual refresher training/review

(c) Training to sub-district (block) level Project Facilitating Teams (PFTs):

Table 4.7: Thematic areas for training of Project Facilitating Teams

Course	*Level*	*Thematic areas for training*	*Methodology*	*Duration*
T3	Sub-district	Environmental issues in the rural livelihood activities Promotion of better environmental management in existing livelihoods (including climate change management) Promotion of Green Opportunities (new environment-friendly livelihoods) Key provisions of the EMF of the NRLP Facilitating adherence to 'regulatory requirements list' by all SHG federations Facilitating development and implementation of EMPs by SHG federations	Class room sessions Field exposure visits	3-4 days (initial training) Annual refresher training/review

4.5.7.2 Training of community members

42. Specialized training on environmental management for a cadre of Community Resource Persons specializing on environmental management in rural livelihoods referred to as 'Green CRPs' in this document. The details of this training are as follows:

Table 4.8: Thematic areas for training of community members

Course	*Level*	*Thematic areas for training*	*Methodology*	*Duration*
T4	District	Environmental issues in the key rural livelihood activities Facilitating development of EMPs by SHG federations Promotion of environment-friendly practices in the key livelihood activities (agriculture, livestock, NTFP, fisheries) Monitoring of environmental status and of adoption of environment-friendly practices in the key livelihood activities (agriculture, livestock, NTFP) by the SHG members	Class room sessions Field exposure visits Field exercises	8 weeks (initial training, exposure visits) Ongoing refresher training/review

43. Over the NRLP duration, the Green CRPs will receive multiple doses of skill-building training and will organize both formal training sessions as well as provide on-the site training to SHG members to transfer their skills.

Table 4.9: Thematic areas for training of SHGs

Course	*Level*	*Thematic areas for training*	*Methodology*	*Duration*
T5	SHG primary federation	Environment-friendly practices in the key livelihood activities (agriculture, livestock, NTFP) New environment-friendly livelihood opportunities Development and implementation of EMP Periodic monitoring of implementation of EMP	Demonstrations Participatory discussions Exposure visits	2-3 days initial training followed by on-going support by Green CRP
T6	Producer collective	Environment-friendly practices in the key livelihood activity (agriculture, livestock, NTFP) Development and implementation of CoP for producer collective Periodic monitoring of implementation of CoP	Demonstrations Participatory discussions Exposure visits	2-3 days initial training followed by on-going support

4.5.8 Monitoring

44. The focus of monitoring is three fold: (a) the implementation of the EMF, (b) the adoption of environmental management in livelihood activities, (c) the environmental status. Monitoring is planned at 3 levels: community monitoring, internal monitoring and external audit.

4.5.8.1 Community Monitoring

45. The Green CRPs will monitor the implementation of the EMPs and CoPs. The monitoring will be done bi-annually through a participatory mode involving the members of the primary federation / producer collective based on indicators identified during the preparation of the EMPs/CoPs. These may include:

Table 4.10: Indicators for monitoring environmental status

Indicators of environmental status	*Indicators of adoption of environmental management in livelihood activities*
Soil nutrient status Visible signs of soil erosion Groundwater level Availability of green and dry fodder Livestock density NTFP yield	Ratio of N:P:K use Amount of organic manure used Number of improved compost units (pit, vermicompost, NADEP, etc.) Area treated with green manure Area under crop rotation Area under intercrops Expenditure on chemical pesticides Amount of pesticides in classes Ia, Ib, II (WHO classification) used Area under drip or sprinkler irrigation Area treated with soil moisture conservation practices Number of percolation/recharge pits Number of water harvesting structures Percentage of livestock that is stall-fed Number of chaff-cutters Area under fodder cultivation Area under pasture development/protection Visible signs of unsustainable NTFP extraction

4.5.8.2 Internal monitoring

46. The environmental specialists at the national, state and district levels will conduct internal monitoring of the implementation of the EMF. The details of this monitoring are provided here:

Table 4.11: Internal monitoring of implementation of EMF

Level	*Key responsibility for monitoring*	*Aspects covered under monitoring*	*Sample to be covered annually*
District	Environment Management Coordinator in DMMU	Desk and field review of quality of EMPs of SHG federations Review of Green Opportunities emerging from EMPs of SHG federations Desk and field review of quality of CoP of producer collectives Desk and field review of compliance with the regulatory requirements list Desk and field review of outputs from community monitoring	20% primary federations 100% producer collectives
State	Environment Management Coordinator in SMMU	Desk review of outputs of district monitoring Desk and field review of quality of EMPs of SHG federations Review of Green Opportunities emerging from EMPs of SHG federations Desk and field review of quality of CoP of producer collectives Desk and field review of outputs from community monitoring Desk and field review of compliance with the regulatory requirements list of activities that are not to be supported Desk review to check if environmental appraisal by technically qualified personnel is being done for activities identified in the EMF as requiring the same Desk and field review of implementation of pilots and scale-up on Green Opportunities (eco-friendly livelihood activities)	2% primary federations 10% producer collectives 100% pilots on eco-friendly activities
National	Environment Management Coordinator in NMMU	Desk review of outputs of state monitoring Desk review of outputs of external environmental audit Desk and field review of quality of EMPs of SHG federations and CoP of producer collectives, and, their implementation Desk and field review of implementation of pilots and scale-up on Green Opportunities (eco-friendly livelihood activities)	100% states 30% districts

4.5.8.3 External Environmental Audit (including cumulative impact assessment)

47. An external audit of the environmental performance of the NRLP will be undertaken annually during the project period – in years 2, 3, 4 and 5. An external agency will be hired by the NMMU for the purpose. The objectives of the audits are:

- To assess the overall effectiveness of the design and implementation of the EMF
- To assess the adverse environmental impacts of the project-supported activities (individual, as well as cumulative)
- To provide practical recommends for strengthening the EMF.

48. The scope of the audit will include:

- Quality of the EAPs of the states and their integration into the SPIPs and AAPs.
- Effectiveness of implementation of the EMF at the state level.
- Quality of the SHG federation EMPs and the CoPs of producer collectives.
- Effectiveness of implementation of the SHG federation EMPs and the CoPs of

producer collectives.

- Cumulative impacts of the livelihood activities supported by the NRLP (in key sectors such as agriculture, livestock, fisheries, NTFP, etc.)
- Promotion of eco-friendly livelihood activities.
- Adequacy of institutional arrangements in the project structure and in the community institutions.
- Capacity of the project staff for implementation of the EMF.
- Capacity of the community institutions for environmental management of livelihoods.
- Effectiveness of community monitoring and internal monitoring.

49. The sample will cover about 30% of the districts in all the 12 states (about 24 districts). In each district, the sample covered will include 5% of the primary federations. At least 2-3 producer collectives per state will be covered. All the pilots being implemented in the states on Green Opportunities (eco-friendly livelihood activities) will be covered in the sample.

50. The sample will cover both the SHG federations that receive support for development of EMPs as well as other SHG federations in the project (which will be treated as control). A comparative analysis of these with respect to environmental outcomes will help to understand the value-addition achieved by the EMP approach. The methodology of the audit will include both desk reviews and field visits. Annex 12 provides guidance on the cumulative impact assessment.

- Desk review: The desk review will include a review of the state EMPs, SHG federation EMPs and the CoPs of producer collectives, the internal monitoring reports, the training reports, reports on detailed environmental assessment undertaken by technical experts, the micro/livelihood investment plans of the SHGs, etc.
- Field visits: In each state, the sample of SHG primary federations and producer collectives will be covered through field visits. The visits are meant to be site visits to the locations where the activities are undertaken.
- Consultations: Focussed discussions will be held with members of SHGs, SHG federations, representatives of Gram Panchayat and user groups, relevant line departments, and, project staff at sub-district, district and state levels. The findings of the audit will be discussed with the NMMU and SMMUs.
- Disclosure: The findings of each annual audit will be disclosed through the SMMU website and by circulation to all the project districts. The DMMUs will ensure that the feedback from the audits is shared with the SHG federations and producer collectives through the Block teams and the Green CRPs.

51. As a follow-up to the audit report, and especially in cases where the audit indicates that the implementation of the EMF is weak and/or that there are significant environmental impacts of the project-supported activities, the following actions will be taken by the NMMU:

- Identify appropriate actions to be taken by the NMMU and the SMMUs to address the concerns raised in the audit
- Ensure that the AAPs of the 12 project states clearly mention the actions that will be taken in view of the audit findings of the preceding year
- Strengthen training and other capacity building efforts to ensure that adequate

capacity is built at all levels for effective implementation of the EMF
- Strengthen internal monitoring at all levels to follow-up on implementation of the identified actions

4.5.8.4 Performance indicators

52. This section provides indicative performance indicators that are to be used during the external environmental audits. The indicators are as follows:

Environmental outcomes

- Number of SHGs and SHG members who have adopted environment-friendly livelihood practices
- Percentage of producer collective members in compliance with the CoP of their collective
- Number of SHGs and SHG members undertaking activities that are not in compliance with the regulatory requirements list

Thematic performance indicators

Agriculture:

- Number of SHG members implementing sustainable agriculture practices as a percentage of the total members in the sampled SHGs
- Extent of area under sustainable agriculture practices supported by the project as a percentage of all agricultural area supported by the project in the sample villages
- 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 SHG members undertaking water conservation measures as a percentage of the total members in the sampled SHGs
- 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 in the sample villages
- Percentage increase in number of tubewells (in sample villages) as a result of the tubewells funded through the project support.

Livestock:

- Number of SHG members undertaking better fodder management as a percentage of the total members in the sampled SHGs
- 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.

Institutional arrangements and capacity building

- Percentage of project staff trained in EMF (to total staff).
- Percentage of primary federations that have received the training on environmental management of livelihoods.
- Percentage of producer collectives that have received the training on environmental

management of livelihoods.

Processes

- Percentage of primary federations with EMPs
- Percentage of producer collectives with CoPs
- Number of activities requiring detailed environmental appraisal by qualified technical expert having gone through such appraisal
- Percentage of indicated samples covered as part of the internal monitoring

4.5.9 Implementation roll-out strategy

53. The EMF of the NRLP builds on the experience of existing livelihoods projects in the country. However, it has certain elements that are novel – for example, the SHG federation EMPs and the CoPs of the producer collectives. It is necessary to phase out the implementation of the federation EMPs in the NRLP to ensure that innovative elements are put on trial before they are scaled up. The roll out of the federation EMPs is planned as follows:

Table 4.12: Phasing of EMF implementation

	Year 1	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Establishing Training System	Identification of national capacity building support agency (for training SRLM/SMMU state staff) Development of operational manuals and training modules				
TA to states	12 states				
	Roll out of training to NMMU staff and SRLMs National level experience sharing workshops (two workshops – pre and post EAP development) Development and appraisal of state EAPs and their integration into the SPIPs and AAPs	National/regional and state level experience sharing workshop Development and appraisal of state EAPs and their integration into the SPIPs and AAPs	National/regional and state level experience sharing workshop	National/regional and state level experience sharing workshop	National/regional and state level experience sharing workshop

Setting up SMMU	6 states	12 states			
	SMMU Environment Specialist in each of 6 states	SMMU Environment Specialist in each of 12 states			
Training of staff at state level	6 states	12 states			
	Training to 6 SMMU Environment Specialists Identification of state technical support agency Training for DMMU staff, Block teams, Green CRPs	Training to 12 SMMU Environment Specialists Identification of state technical support agency Training for DMMU staff, Block teams, Green CRPs			
Universal implementation	33 districts	77 districts	100 districts	100 districts	100 districts
	District level Environment Specialist in each of the districts Roll out of training programs to DMMU staff and Block teams	District level Environment Specialist in each of the districts Training to DMMU staff and Block teams Universal application of regulatory requirements Pilots on eco-friendly livelihood activities Internal monitoring External audit	District level Environment Specialist in each of the districts Training to DMMU staff and Block teams Universal application of regulatory requirements Pilots on eco-friendly livelihood activities Internal monitoring External audit	District level Environment Specialist in each of the districts Universal application of regulatory requirements Pilots on eco-friendly livelihood activities Internal monitoring External audit	District level Environment Specialist in each of the districts Universal application of regulatory requirements Pilots on eco-friendly livelihood activities Internal monitoring External audit
Pilot implementation of EMP	6 districts 12 blocks 72 Green CRPs	18 districts 36 blocks 216 Green CRPs 360 SHG federations	30 districts 120 blocks 1200 Green CRPs 1440 SHG federations	30 districts 120 blocks 1200 Green CRPs 7080 SHG federations	30 districts 120 blocks 1200 Green CRPs 12000 SHG federations

4.6 Budget

54. The estimated budget for the EMF implementation is $ 7 million. The detailed budget is presented in Annex 16.

Table 4.13: Addressing the Bank's safeguards policies through the EMF in NRLP

Safeguards policy	*How EMF addresses the Bank's safeguards policy*
Environment Assessment OP 4.01	The project addresses critical environmental issues such as water scarcity, depletion of ground water, salinity of ground water, poor soil fertility, poor forest cover; and air pollution from small mining activities. However, at an individual level these will not be major concerns. Only if there is a large aggregation of such activities, concerns could magnify, especially on water and livestock To address the above, the EMF has relevant thematic indicators of performance that are reflective of these environmental concerns. In addition, (a) the EMP is an integral part of the livelihood plan development process (b) proactive or green opportunities will be identified and demonstrated in each project district. The annual external environment audit, which includes a cumulative impact assessment will assess project performance, particularly on livestock and water related subprojects.
Forests and Natural Habitats OP 4.36, OP 4.04	Negative pressures on the forests and wildlife as a result of these community driven activities is not expected. The regulatory requirements list and the mitigation measures included in the EGs - (especially those relating to fodder management and to activities in forest areas) - will contribute to wildlife conservation. In addition, periodic assessment of cumulative impacts will help to take any required corrective measures from time to time.
Pest Management OP 4.09	Use of (a) banned/non-permissible pesticides and (b) pesticides in classes Ia, Ib, II (WHO) is not permitted in the project and included in the regulatory requirements list. Also, training on safe use of pesticides and convergence with Government schemes on IPM is included in the EGs. Low external input sustainable agriculture based on non pesticide management is the flagship program of NRLP. Therefore the project will address OP 4.09 adequately and proactively.

5. Green Opportunities for Proactive Interventions for Ensuring Sustainability of Livelihoods

5.1 Introduction

1. The Ministry of Rural Development (MoRD), Government of India, set up the National Rural Livelihood Mission (NRLM) in June 2010. The Mission's primary objective is to reduce poverty by promoting diversified and gainful self-employment and wage employment opportunities for sustainable income increases. The proposed World Bank-supported National Rural Livelihoods Project (NRLP) is a part of the NRLM and will be implemented in 150 selected districts of 12 high priority states of India.

2. As part of the preparatory phase of the NRLP, it is mandatory to prepare an Environmental Management Framework (EMF) for assessing and managing the impact of the proposed livelihood activities of the NRLP. However, the World Bank wishes to go beyond the mere preparation of an EMF. It proposes to identify opportunity sets that are based on sound environmental practices/technologies and proactively promote them to ensure the environmental sustainability of livelihood activities. In addition, it also seeks to identify and promote livelihood opportunities that are based on such sound environmental practices /technologies.

5.2 Methodology

3. This section presents a set of "Green Opportunities" that have been identified in the area of sustainable agriculture, irrigation and renewable energy.

4. Based on a desk review and discussions with the World Bank Team working on the environmental management and safeguards support to the NRLP, the following projects/organizations were identified for further study:

5. These projects were chosen so as to cover the major livelihood options of agriculture (of which irrigation and non-chemical fertilizers and pesticides are vital components) and animal husbandry. Further, energy was also included since it is a key factor in improving livelihood options in rural areas. Often, the choice of energy (especially for lighting) in rural areas is diesel or kerosene, both of which are polluting sources of energy. Hence, renewable energy was included in the opportunity sets.

6. Of these projects studied, field visits were made to the CSMA, SRI/SWI, CER/VER Financed Biogas+ and the Affordable Drip Irrigation Technology Intervention. The rest are based on desk review and the author's knowledge from previous visits to and/or association with those projects.

Table 5.1: List of Opportunity Sets Studied

Name of Project / Intervention / Technology	*Name of Organization*	*Description of Project / Intervention / Technology*	*Livelihood Area*	*Coverage Area*
Community Managed Sustainable Agriculture (CSMA)	Society for Eradication of Poverty (SERP)	Low external input, low cost and non-pesticide based crop management for higher profits to farmers	Agriculture	Several districts of Andhra Pradesh
Tree-based Farming	Bharatiya Agroindustries Foundation (BAIF) & BAIF Institute of Rural Development – Karnataka (BIRD-K)	Innovative use of land to ensure multiple crops in rainfed conditions that meet food, fuel and fodder requirements of a small farmer	Agriculture	Several states
System of Rice & Wheat Intensification (SRI & SWI)	Bihar Rural Livelihoods Project	Innovative paddy and wheat cultivation practices for substantially higher yields	Agriculture	Several districts of Bihar
Affordable Drip Irrigation Technology Intervention (ADITI)	International Development Enterprises, India (IDE-I)	Low cost alternatives to high cost conventional drip technology	Agriculture - Irrigation	Several states
Eco-tech based community enterprise	JRD TATA Eco-technology Centre, MS Swaminathan Research Foundation, Chennai	Demystification of bio-technology, its adaptation for manufacture and marketing by women SHGs, leading to formation of a community-based eco-enterprise	Agriculture-Chemical-free inputs	Madurai & Dindigul districts of Tamil Nadu
Parampara Herbal Producer's Company	Foundation for Revitalization of Local Health Tradition (FRLHT)	Use of low cost local veterinary medical knowledge to identify, test and market products to treat diseases of dairy animals	Animal husbandry	Udupi & Dakshina Kannada districts of Karnataka
CER/VER Financed Biogas+ Projects	SKG Sangha	Innovative use of CDM to part finance promotion, installation and maintenance of biogas+ vermicompost plants	Renewable Energy	Karnataka
Light A Billion Lights (LABL)	The Energy & Resources Institute	A Fee-for-Service model to provide SPV-based lighting solutions to rural India	Renewable Energy	Several states
Rural electricity supply service	Husk Power Systems	Generating renewable power from rice gasifiers coupled to producer gas engines and supplying to villages in Bihar	Renewable energy	Bihar & Uttar Pradesh

5.3 Integrating Green Opportunities into NRLP

5.3.1 Introduction

7. Nine different "Green Opportunities" based on 3 broad thematic areas have been described in this report. Detail case studies on these Green Opportunities are presented in Annex 15. These Green Opportunities not only help better sustain existing livelihoods but also create new "Green Enterprises" and "Green Jobs". For example, KB Drip (low cost drip from IDE-India) not only helps conserve water at the farm level thereby making farming more secure, but also creates Green Enterprises in the form of KB Dealers and Green Jobs in the form of BAs employed by IDE-India and Fitters & Helpers employed by the KB Dealer.

5.3.2 Thematic Area 1 – Agriculture

8. Agriculture is the primary livelihood for a vast majority of rural Indians, either as farming households (if they have land) or as agricultural laborers. Therefore, any intervention in this thematic area that helps improve productivity, net returns, cost reduction or diversification of risk would help sustain and secure the livelihood for a vast majority of the rural poor.

9. The Green Opportunities presented in this thematic area cover the following:

Table 5.2: Green Opportunities - Agriculture

Sub-theme	***Green Opportunity***	***Description***
Cropping System	CMSA	Low external input, low cost and non-pesticide based crop management for higher profits to farmers
Farming Systems	Tree Based Farming	Innovative use of land to ensure multiple crops in rainfed conditions that meet food, fuel and fodder requirements of a small farmer
Crop Production Technology	SRI /SWI	Innovative paddy and wheat cultivation practices for substantially higher yields
Efficient Irrigation	Affordable Drip Technology Intervention (ADITI)	Low cost alternatives to high cost conventional drip technology
Eco-inputs for agriculture	Eco-enterprises based on biofertilizers & biopesticides	Demystification of bio-technology, its adaptation for manufacture and marketing by women SHGs, leading to formation of a community-based eco-enterprise

10. CMSA, as already mentioned in the NRLM Implementation Framework is the flagship intervention in the area of agriculture. It forms the backbone on which the rest of the Green Opportunities in this thematic area can be pegged. For example, in dry land areas, while the approach would be based on CMSA principles, the farming system would be based on trees as an integral component of farming. Similarly, in areas where ground water is being used for irrigation, ADITI would be an integral component of CMSA.

11. However, unless CMSA is integrated with dairying, it is unlike to be successful, since it demands a constant supply of cow dung and urine. Therefore, incorporating a fodder component in farming systems as TBFS does is vital to ensuring sustainability of both

CMSA (cropping) as well as dairying.

5.3.3 Thematic Area 2 – Animal Husbandry

12. After agriculture, animal husbandry is the most sought after livelihood option. Often, loans are taken for costly crossbreed cows without providing for adequate vetcare. The result is either poor performance of the cow or loss of the asset (cow) itself. Even where vetcare is available, it is unaffordable and often not available in time.

13. Use of local remedies (ethno-veterinary remedies) based on a careful appraisal and clinical trial process, can reduce the cost of vetcare and more importantly, reduce the dependence on outside expertise. The Parampara Herbal Producers' Company is a successful example of mass producing and marketing ethno-veterinary remedies for common cattle diseases.

14. Integrating ethno-remedies into animal husbandry after careful trial and selection as is detailed in the case study, would go a long way in securing this livelihood. Further, if the remedies are mass produced and marketed, a new Green Enterprise could be set up. Needless to say, if home herbal gardens are set up to supply the raw materials for the remedies, Green livelihood opportunities would open up.

5.3.4 Thematic Area 3 – Renewable Energy

15. Energy, especially, electricity is driver of modern civilization. Lack of access to energy can stunt development and growth of a whole community. With more than 400 million Indians, mainly the rural poor, having little or no access to electricity, this thematic area assumes strategic importance in alleviating poverty.

16. Three Green Opportunities are covered in this thematic area:

Table 5.3: Green Opportunities - Renewable Energy

Sub-theme	***Green Opportunity***	***Description***
Cooking energy	CER/VER financed biogas-cum-vermicomposting	Innovative use of CDM to part finance promotion, installation and maintenance of biogas+ vermicompost plants
Lighting	Lighting a Billion Lives	A Fee-for-Service model to provide SPV-based lighting solutions to rural India
Grid quality electricity	Rice husk powered mini powergrids	Generating renewable power from rice gasifiers coupled to producer gas engines and supplying to villages in Bihar

17. While energy per se can be provided from multiple sources, providing it from renewable energy sources calls for a great deal of technical, financial and organizational innovations. The three case studies present various aspects of innovations in these areas.

18. All of them apart from benefiting the end-users also create jobs and enterprises. For example, LaBL delivers its solar lighting solutions through LaBL Entrepreneurs who are local unemployed youth. Similarly, Husk Power Systems provides direct employment to local youth, apart from creating small-time service providers who supply rice husk to the power plants.

19. Unlike the other two thematic areas, Green Opportunities in this thematic area may not

find universal application. They would be more suitable where lighting /electricity services do not exist.

20. However, the biogas-cum-vermicompost Green Opportunity would be feasible wherever dairying is taken up and should be integrated with it to make it more economically and environmentally sustainable. If a 1000 biogas plants are done in a district, then seeking CDM financing would be feasible.

5.4 Phasing the Way Forward

21. In the preceding section (also see each individual case study) the relevance and ways of integrating the Green Opportunities into livelihood interventions has been presented. However, the challenge is to integrate its implementation with the NRLP Implementation Mechanism. This section presents a way forward in this direction.

Table 5.4: Steps in integrating Green Opportunities into NRLP

Step	*Action*	*Details*	*Timeframe from inception of NRLP*
Step 1	Sensitizing NMMU to Green Opportunities	• Presenting the bouquet of Green Opportunities to the NMMU through a workshop • Preferably, the proponents of these opportunities should be invited to present to the NMMU	0-3 months
Step 2	Creating awareness about Green Opportunities among SMMUs	• Presenting the bouquet of Green Opportunities through a series of regional/state workshops	0-3 months
Step 3	NMMU to identify and delineate, Green Opportunities of nation-wide application and strategic importance	• CMSA+dairying would be such a Green Opportunity of nation-wide importance. Integrating ethno-vetcare would enhance its sustainability	4 months
Step 4	NMMU to collaborate with proponents of such Green Opportunities to build knowledge among its staff and prepare for launching it		6 months
Step 5	SMMUs to look for application of Green Opportunities during preparation of SPIPs	• For example, lighting could be a need in many areas of Jharkhand. Therefore Green Opportunities from the Energy Thematic Area may be explored in preparation of the SPIP	8-12 months
Step 6	SMMUS to collaborate with proponents of Green Opportunities chosen by them in the SPIP to build knowledge among its staff	• Prepare and/or revise Green Opportunities section in the SPIP based on the guidance received by collaborating with the Green Opportunities proponents • Build capacity of the district and block level staff before launching the programme	12-16 months
Step 7	Build a national repository of Green Opportunities.	• Use all sources to build a repository of Green Opportunities and constantly communicate to the SMMUs and encourage them to have their own repositories.	Continuous

22. Overall the strategy would be to use the first 12 months to educate the NMMU and the SMMU, collaborate with proponents of Green Opportunities, and integrate strategic ones into the SPIPs or the national program. During this period, when the states are preparing

their SPIPs, they should be supported and guided to look for potential to Green Opportunities not only from the bouquet presented here but from other sources as well.

23. Having chosen the Green Opportunities, capacity building should be carried out in preparation of the launch of a pilot (in case the Green Opportunity has not been tried before) or scale-up or introduction in a new area.

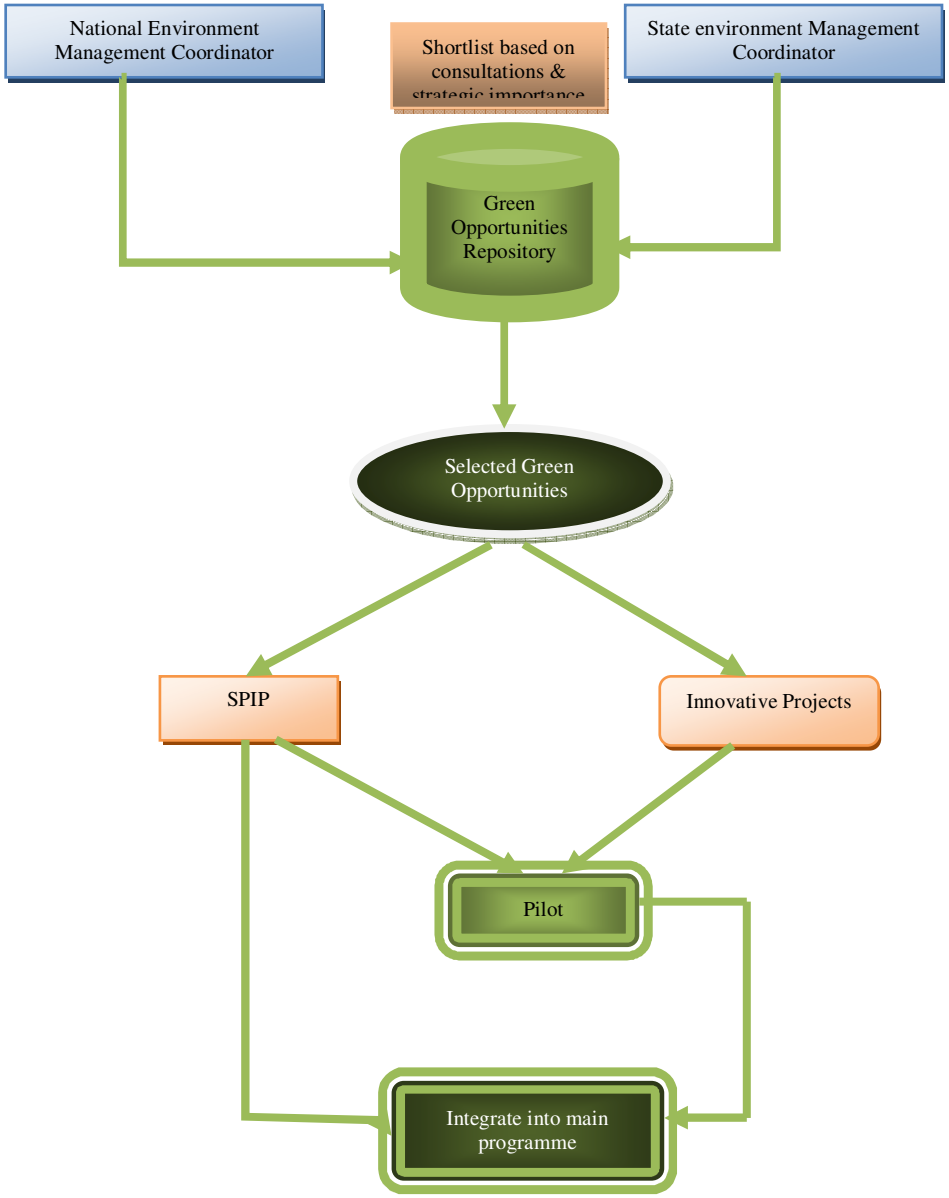
24. Thus, at the end of the first year, the NRLP should be in a position to launch at least TBFS, ethno-vetcare along with CMSA+dairying and SRI/SWI. Other Green Opportunities may be explored in the subsequent years, unless they feature as high priorities in the SPIPs.

5.4.1 Pathways to mainstream Green Opportunities

25. The following schematic (Fig 5.1), which is self-explanatory, tries to depict based on the NRLM Implementation Framework, as to how the Green opportunities could be mainstreamed.

26. The focus would be to mainstream and scale-up Green Opportunities rather than continue doing them as stand-alone projects of interest. It is only by mainstreaming that the Green Opportunity would get the benefit of the entire implementation mechanism's focus and resources.

Figure 5.1: Pathways to Mainstream Green Opportunities

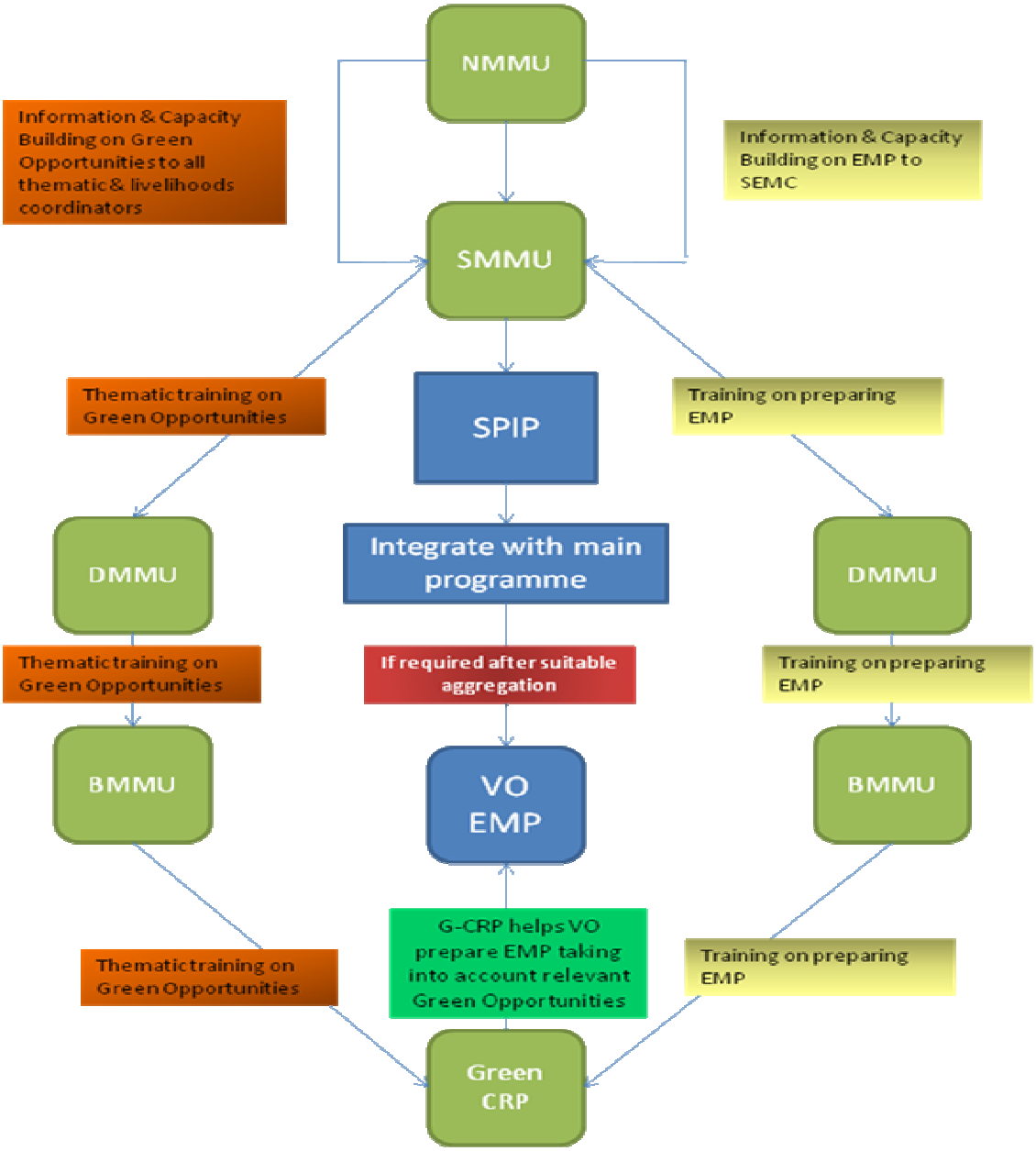


5.4.2 Integrating EMP and Green Opportunities

27. The Environmental Management Framework has made a radical change in how environmental management is secured in the NRLP. Each Village Organization with the help of G-CRPs (Green Community Resource Persons) would prepare an Environmental Management Plan (EMP) based on the livelihood activities that their members propose to pursue.

28. Figure 5.2 presents a pathway for building the capacity of the G-CRP so that s/he can help the VO prepare an EMP which also takes into account the Green Opportunities that might make the basic livelihood more secure.

Figure 5.2: Integrating Green Opportunities into EMPs



29. It is quite likely, though that the Green Opportunity might not be feasible at the level of aggregation of a VO. In such a case, the Block Level Managers should explore the feasibility at block level of aggregation.

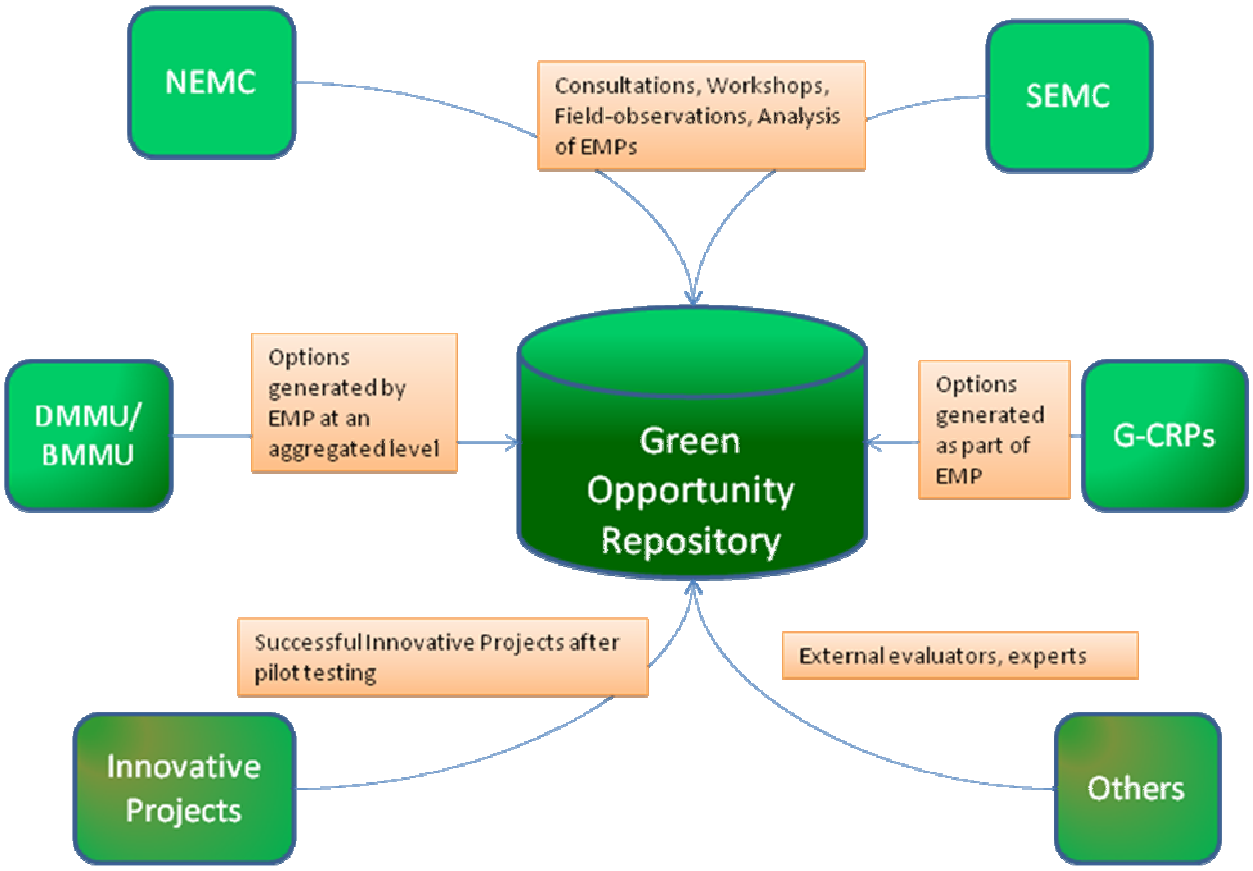
30. Needless to say, scouring through EMPs to identify problems and likely solutions should be a key task of the Environment Management team at all levels.

5.4.3 Source of Green Opportunities

31. The bouquet of Green Opportunities presented in this report is neither exhaustive nor exclusive. It must be the constant endeavor of the Environmental Management team at both the NMMU and the SMMU to build up the Green Opportunities Repository.

32. Figure 5.3 shows possible ways of filling up the Green Opportunities Repository. Specifically, to enable wide-spread contribution and create visibility and awareness about the Green Opportunities Repository, a national ***Green Opportunities Marketplace*** should be organized annually on the lines of the Development Marketplace of the World Bank.

Figure 5.3: Sources of Green Opportunities



33. Thus, we envisage a National Environment Management Coordinator who is not only well-aware of environmental issues but views problems as potential opportunities to present Green Solutions which make economic sense. Indeed, we would strongly urge that one of the key metrics to measure the performance of the NEMC and SEMC should be to linked to no. of Green Opportunities that have either been piloted or mainstreamed. We are confident that a strong focus on the performance in this area would go a long way in ensuring that environmental management functions do not merely become monitoring of environmental check-lists.