SFG2058

ENVIRONMENT MANAGEMENT FRAMEWORK

BIHAR TRANSFORMATIVE DEVELOPMENT PROJECT

(P159576)

BIHAR RURAL LIVELIHOODS PROMOTION SOCIETY

Draft version for Consultation

Contents

List of Tables

List of Annexures

1. Bihar Transformative Development Project

1.1 Background of the Project

The Government of Bihar is proposing Bihar Transformative Development Project which would be the scaling up of the approach successfully piloted under (Bihar Rural Livelihood Project) BRLP. At present priorities of the Govt. of Bihar (GoB) include Socio-economic empowerment of Women, Agricultural productivity enhancement of small & marginal farmers, Improved access to human development services including Health, Nutrition and Sanitation, and Skill Development and Placement for youth. Promotion of strong and sustainable Self-Help Groups and their federations continues to be a central strategy to achieving these outcomes. To ensure implementation in mission mode and monitoring of achievement against program targets in the above areas, GoB has instituted the Bihar Vikas Mission consisting of 7 sub-missions or focus areas viz. Agriculture, Human Development, Drinking Water-Sanitation-Rural Development, Industry-Business, Infrastructure, Youth and Governance.

GoB has been implementing the World Bank supported Bihar Rural Livelihoods Project (JEEViKA), for poverty alleviation across 6 districts and 42 blocks of Bihar since 2007. The project was further provided with additional finance in 2012 and the geographic scope expanded by 60 blocks. The project is currently operational across 6 districts and 102 blocks. JEEViKA has also been designated as the State Rural Livelihoods Mission (SRLM) for implementing the World Bank supported National Rural Livelihoods Project (NRLP) implemented in 77 blocks. JEEVIKA has successfully scaled up promotion of productivity enhancement approaches like the System of Crop Intensification, reaching out to more than 400,000 small and marginal farmers. The project has been able to develop a robust community based extension system with more than 4000 Village Resource Persons (VRPs) providing training and extension services to the small and marginal farmers. The project has successfully mobilized more than 100,000 producers into nearly 1800 activity based Producer Groups centred on commodities. Under BRLP, significant efforts have also been made for improved access to some key Human Development services..

Based on the successful implementation of Bihar Rural Livelihoods Project (BRLP), GoB has proposed a Bihar Transformative Development Project to scale up similar development model to 300 blocks in 30 districts of Biha**r.**

1.2 Proposed Development Objectives (PDOs)

The proposed Project Development Objective (PDO) is to “Diversify & enhance incomes and increase practice of nutrition & sanitation behaviors for targeted households” The project seeks to accomplish this PDO through the following five components (a) Community Institutional Development; (b) Community Investment Funds; (c) Human Development; (d) Partnerships, Innovations and Technical Assistance; and (e) Project Management

The project's beneficiaries will include nearly 5 million rural households across 300 blocks of Bihar's 32 districts.

1.3 Project Components

The project has 5 components further described below;

Component 1: Community Institutional Development

The objective of this component is to expand the formation of strong and sustainable self-help groups and their higher level federations and farmer producer organizations (FPOs) and build their capacities in terms of livelihood activities, e-bookkeeping, financial literacy, and business education, among others. The component will consist of two specific sub components

Development of Self Help Groups and their Federations: This sub component will support the identification, selection, and mobilization of poor rural households into self-managed institutions, such as Self Help Groups (SHGs) and their federations. At the village level, the SHGs will be federated to form the village organizations and at the cluster level (sub block) these will be federated into cluster level federations. This component will enable the placement of project teams at the block and sub-block levels that will identify and train resource persons from the community in order to undertake the mobilization and capacity building at the village level. One of the key objectives is for the SHGs to develop and manage finances including group savings, interest accrual, loans from commercial banks and community investment funds to be provided by the project. In order to develop the above capacity, the focus will be on a) undertaking good quality micro plans for accessing both bank finance and project funds; b) developing and adopting quality monitoring protocols like ratings of SHGs and VOs not only to enhance confidence of partner banks/ microfinance institutions but also to provide inputs to capacity building activities; and c) introduce alternate banking models like the business correspondents based models combined with financial literacy and counselling that will enable the SHG households to get access to a range of financial services including, savings, credit and insurance at their doorstep.

Development of Producer Organizations: This sub component will support the mobilization of those SHG households that already have access to some basic financial services and productivity enhancement services into producer organizations (POs) in specific commodity clusters (based on the commercial potential and economies of scale) across agriculture, livestock and the non-farm sub sectors. Potentially these producer organizations will be centred on high value commodities like maize, vegetables, milk, poultry, honey and some specific crafts. The objective is to enable them access to high quality of support services like technology, credit, extension, marketing, etc.

Component 2: Community Investment Funds

The objective of this component is to provide financing to (a) SHGs, VOs and Cluster level Federations to catalyze larger investments from the commercial banks and to enable them to implement a range of livelihood activities[1] that are outlined in their micro investment plans and (b) Producer Organizations for undertaking interventions across the value chain (both input services and market linkage related) in high value agriculture, livestock and non-farm sectors based on business plans developed by them.

[1] These activities include agriculture productivity enhancement, productivity enhancement in agriculture and livestock sectors, non-farm activities, specific skill development activities , Health , Nutrition and Sanitation related activities among others

There are three main sub components under this component

Community Investment Support: This sub-component will primarily focus on financing catalytic investments at the SHG level and higher federations with the primary objective of enabling larger inflow of institutional credit from formal financial institutions. Financing will also be provided to Village Organizations and Cluster level federations towards specific livelihood activities like productivity enhancements in the agriculture and livestock sectors and towards specific skill development activities. Investments made under this sub-component will be based on micro-investment plans prepared by the SHGs.

Support towards Health, Nutrition and Sanitation Interventions: This sub-component will enable financing to the Village organizations and Cluster Level Federations towards specific health, food security, nutrition and sanitation related interventions based on specific micro plans developed by them. As mentioned in paragraphs 11 and 12 in the sections above, JEEViKA has already successfully demonstrated the implementation of the Food Security Fund (FSF) and the Sanitation, Health and Nutrition Fund (SHAN) in the initial project (across 6 districts). Through this sub component, this approach will be scaled up across the 300 blocks.

Support towards Value Chain Interventions: This sub-component will focus on financing business plans and value chain initiatives carried out by Producer organizations. Areas for financial support under this component will include community level infrastructure, small equipment and working capital with a focus on enhancing incomes of the households. Producer organizations financed under the component will serve as institutional platforms through which a range of interventions across the value chain— like access to good quality inputs, access to finance, extension services, pricing norms, grading and sorting, storage and warehousing and access to markets— will be implemented.

Component-3: Access to Nutrition and Sanitation Services

The main objective of this component is to leverage the SHG platforms for undertaking behavioral change through communication strategies towards better health, nutrition and sanitation outcomes at the household level and concurrently undertake specific efforts to ensure convergence with the government programs in these sectors. There are two main sub components under this component. (i) Behavioural change communication activities at the community level (ii) Capacity building of the community institutions for convergence with pre-existing Government of Bihar programs.

Communication for Behaviour and Social Change**:** To influence household level behaviour change, various activities will be carried out to affect improved health, nutrition and sanitation outcomes. The key areas of focus for the behaviour change communication (BCC) strategies would include early registration of pregnancy, ante and post natal check-ups, identification of high risk cases, counselling for maternal nutrition, birth planning, institutional delivery, early initiation and exclusive breastfeeding, infant and young child feeding practices, immunization, and sanitation and hygiene. The project will also ensure counselling for farmers, through Farmer Field Schools (FFS) to grow and consume diversified food crops. The project will work closely with the Bill and Melinda Gates Foundation to develop a suitable communication strategy and material/tools to sensitize the

communities on critical health, nutrition and sanitation issues and support VOs, CLFs and other identified community members in carrying out the above.

Capacity building of the Community Institutions for Convergence: The strong institutional platforms of the poor in the form of women's Self Help Groups (SHGs) and their federations apart from offering a variety of livelihood services to their members are also ideally placed to facilitate their access to services related to health, nutrition and sanitation as well as entitlements like social security pensions, food entitlements and wage employment. These entitlements can strengthen the household economy by ensuring reduction in health shocks and also additional cash inflows. As part of this sub component, specific capacity building for SHG federations and other technical support at the block, sub block and village level shall be provided to enable member households to access their entitlements and services through different programs like the Mahatma Gandhi Rural Employment Guarantee Scheme, Swacch Bharat Mission, Integrated Child Development Scheme, and the Public Distribution System. As described in sections above, the convergence approach with the above programs has already been established and initial results have been achieved. These initiatives will be further scaled up as part of the project.

Component 4: Innovations, Partnerships and Technical Assistance

As part of this component, productive partnerships will be developed with technical support agencies, best practice institutions in public, private and social enterprise sectors across the areas of community mobilisation, financial inclusion, value chain development in agriculture, livestock and non-farm sectors, skills development, access to health, nutrition and sanitation services etc. A framework that will enable the development of such productive partnerships will be developed and rolled out. This framework will elaborate, inter-alia, the identification process, technical appraisal, capacity assessment, implementation arrangements including financial management and fiduciary systems, price discovery, performance indicators and outcome measurement systems.

Activities under this component will include a focus on skills training, including partnerships with a range of stakeholders to strengthen provision of market-led skills training programs to youth from poor families leading to positive placement and income outcomes. Activities will include conducting market scans to develop labour market demand and opportunity assessments; partner with stakeholders to develop training capacity in target areas relevant to the Bihar context, particularly in higher-value agriculture and allied sectors; link with community institutions promoted by the project to mobilize poor youth and connect them to training provision; develop partnerships with employers and industry associations for inputs into program design and for post-training placements; and post-placement support activities to support transition to formal employment.

Component 5: Project Management

The objective of this component is to strengthen the project implementation at the state, district and block levels. It will finance dedicated staffing for the project activities, consultancies, training and related material, office equipment, and operational costs at the state level and the district level teams across 32 project districts. It will also support the further strengthening of the Monitoring, Evaluation and Learning (MEL) systems, Financial Management systems, Procurement Management, and Knowledge Management and Communications.

1.4 Environment Management Framework (EMF)

The project is classified as Category 'B' as per Bank's Operational Policy (OP) 4.01. The productivity enhancement activities in agriculture and livestock, processing activities under value chains, health nutrition and sanitation interventions could have some minor negative impacts on environment. To mitigate the potential negative impacts, the project has developed an Environmental Management Framework (EMF).

The EMF for the Bihar Transformative Development Project (BTDP) is an integral part of the implementation arrangements for project interventions that may have an impact on the environment

1.4.1 *Objective of the EMF*

The objective of EMF is to ensure environmental sustainability of various Livelihoods and Human Development interventions proposed under BTDP and to contribute to economic enhancement by adopting environment friendly practices in design and implementation of these interventions.

The approach is to incorporate environment friendly practices into the productivity enhancement and value chain interventions, promoting Green Business Opportunities and integrating environmental management into the interventions focused on Nutrition and Sanitation.

1.4.2 Approach to Development of Environment Management Framework (EMF)

The proposed EMF has been designed in participatory discussion with project team, concerned government line departments and community representatives. Relevant information from the secondary sources such as EMF documents of BRLP, Additional Financing, NRLP and thematic review has also been factored in. Key thematic teams involved in development and implementation of the EMF include farm, off-farm, non-farm & micro-enterprise based livelihoods teams and social development teams. The EMF of Bihar Rural Livelihoods Project (BRLP), State Perspective & Implementation Plan (SPIP) of Bihar for National Rural Livelihoods Mission (NRLM) are also been consulted during EMF designing. A stakeholder workshop will be organised for sharing the EMF and the draft will be disclosed on the website inviting comments.

1.4.3 *Applicability of EMF to the components of BTDP*

The EMF is applicable to 3 components of the project viz. Components 2, 3 and 4 i.e., Community Investment Funds; Access to Nutrition and Sanitation Services and Innovations Partnerships and Technical Assistance.

Table 1: *Applicability of EMF to components of BTDP*

Component	**Sub-sector**	**Key Interventions**
Component-2: Community Investment Funds	Livelihood Interventions	• Greening the Productivity Enhancement Interventions in agriculture and livestock • Greening the business plan implementation in value chain interventions in maize, vegetable, milk, poultry, honey and some specific crafts
	Renewable Energy Interventions	• Community managed Solar photovoltaic pump based micro irrigation systems • Solar based energy access for individual

		household • Solar cook stoves and biogas based stoves for individual households
Component-3: Access to Nutrition and Sanitation	Health, Nutrition and WASH interventions	• Micro Plans covering nutrition garden, vermi-compost pit, construction of individual household latrine & safe drinking water • Agriculture based nutrition interventions focusing on diversification and enrichment of household diets
Component-4: Partnerships, Innovations and Technical Assistance	Partnerships with best practising organizations and innovators across livelihoods and social development sub-sectors	• Scouting for, and promotion of green Business Opportunities that are replicable under the project

The report is divided into three major sections, further described below:

***Section 1- BTDP**:* This section lays down the key aspects of the new project Bihar Transformative Development Project. Apart from describing the key components under the new project, this section also summarizes the key implementation experiences and lessons for the BTDP.

Section 2- Environmental Profile and Legal Framework: Spread over two chapters, this section focuses on summarizing the key environmental aspects in the proposed project geographies. Also, the section undertakes a thorough assessment of various policies prescribed by the Govt. of India, Govt. of Bihar and The World Bank and assesses the applicability of each policy in the context of the new project.

Section 3- Environmental Impacts and Mitigation Measures: Based on the project's implementation experience as well as preliminary environmental assessment, this section proposes mitigation measures for potential environmental impacts related to the proposed interventions. This section further details out the implementation arrangements at each levels for the environment management framework.

1.5 Implementation Experience and Key Lessons from previous project

Greening the Productivity enhancement programs in agriculture and livestock

Promotion of eco-friendly agriculture interventions in productivity enhancement:

In Bihar Rural Livelihoods Project (BRLP); productivity enhancement interventions such as System of Rice Intensification (SRI) and System of Wheat Intensification (SWI) was

successfully piloted & scaled up. Recognizing the success of SRI & SWI under BRLP; the Government of Bihar has launched SRI Kranthi in 2011and undertaken SRI in 10% of paddy area and 20% of wheat cultivated area. At the same time; SRI & SWI were included in the Agriculture Roadmap of Bihar. Under the productivity enhancement program; BRLP has successfully scaled up SRI, SWI and System of Crop Intensification (SCI) in oilseed, pulses & vegetables with more than 400000 SHG households till date with support from more than 4000 Village Resource Persons (VRPs). These practices require less water. In SRI, SWI & SCI; the project has promoted use of vermi-compost, farm yard manure. The yield is increased to 87% - 96% in most of the crops.

The project has promoted eco-friendly agriculture activities such as Zero Budget Natural Farming (ZBNF) i.e., farming done with inputs prepared from excreta of cattle and botanical extracts from plants. Apart from this; the project has also promoted mulching to improve the water retention capacity of soil, advised farmers to use non chemical method of insect/pest control. Presently, the project is piloting Sustainable and Resilient Farming Systems Intensification (SRFSI) with nearly 50 SHG households in 2 districts with support from Australian Centre for International and Agricultural Research (ACIAR) and Australian Aid. The technologies are zero tillage farming in cereals & pulses. This practice also requires less water. The results are quite encouraging.

The Global Environment Facility (GEF) of The World Bank is currently promoting Sustainable Livelihoods and Adaptation to Climate Change (SLACC) under in Bihar Rural Livelihoods Project. This project is operational in 100 villages of 4 blocks in 2 districts. Under this project; the climate change action plan (CCAP) will be developed along with contingency plan. Automated Weather Stations will be installed in every 5 villages and Automated Rain Gauges will be installed in every village with technical support from the Indian Meteorological Department (IMD). The weather information and crop advisory will be provided to farmers for pursuing weather based cropping pattern and climate smart agriculture. The whole process will develop climate resilience among farmers.

Lessons for BTDP: Most productivity enhancement interventions under previous project has had no significant negative impact on environment and have rather helped in promoting eco-friendly agriculture interventions to improve the quality of soil, use less water for crop production and also promote animal and plant based extracts use to fulfill plant's nutrient requirement and reduce disease and pest attack. These interventions are low cost and enhance productivity and have resulted in ensuring food security and increasing income for poor and marginalized smallholders. Similar eco-friendly agriculture interventions, climate smart agriculture, conservation agriculture will be scaled up in BTDP and community managed solar photovoltaic pump based micro irrigation systems will be promoted. The proposed project will invest in bringing more cow dung for vermi-compost production by motivating farmers to use solar based cooking stove or biogas for cooking, so that more cow dung will be available for vermi-composting and farm yard manure production. This will help in further minimizing the use of synthetic pesticides and fertilizers.

Community Managed Extension System*:*

The project has pioneered in establishing Community Managed Extension System by identifying and selecting Village Resource Persons (VRPs) among the community by the Village Organizations (VOs) and built their capacity through modular training. These VRPs are engaged in motivating and handholding the SHG households to carry out the eco-friendly productivity enhancement programs. More than 4000 VRPs are working in the project villages to support more than 400000 SHG households for practicing eco-friendly agriculture

interventions in productivity enhancement. The better performing VRPs are elevated to Skilled Extension Workers (SEWs) to support and manage more than 5 VRPs. The SEWs are managed by the CLF level.

Lessons for BTDP: In the Bihar Transformative Development Project (BTDP); the project will follow this community managed extension system to scale up the agriculture based livelihoods intervention. Also, the resource persons will be trained and oriented on climate smart agriculture practices for wider dissemination and demonstration plots will be developed within the village to clearly communicate benefits of adopting environment friendly practices.

Productivity Enhancement in Livestock Interventions

Considering the declining production trend of dry fodder and green fodder; the project has organized Animal Health and Awareness Camps and introduced provision of mineral mixture, feed, de-warming & vaccination resulting into increased productivity. However, in certain areas of the state; due to high mortality of small ruminants such as goats due to high temperature; the community has shifted to large animals and also made it a practice to spare a small patch of their agriculture land for green fodder cultivation. Animal Health Resource Persons at the village level identified by the community institution and trained by Bihar State Co-operative Milk Producers' Federation Limited (COMFED) for supporting the dairy farmers. Dairy intervention has successfully demonstrated with more than 50000 SHG households.

In poultry interventions; vaccination and proper feeding schedules in the earlier 28 days has also reduced the household level mortality among the chicks. During the extreme cold climate; the SHG households suggested their mother units to stop supplying chicks during this period. The Poultry Resource Persons (PRPs) are trained to vaccinate all the chicks by visiting all the poultry households. Poultry intervention includes more than 80000 SHG households.

Lessons for BTDP: In the livestock interventions; the Animal Health Awareness Camp, regular & timely vaccination and provision of feed, green fodder & dry fodder improves the yield and thereby increasing the income of poor households. While scaling up these interventions in Bihar Transformative Development Project (BTDP); more cultivable or waste land needs to be contributed for green fodder cultivation to avoid excessive or disproportionate grazing on pasture land. Also, the community members need to be suitable trained on better utilization of farm waste for provision of supplementary nutrition to cattle.

Greening the business plans of value chain interventions in maize, vegetable, milk, poultry, honey and some specific crafts

In value chain interventions; maize intervention was carried out with 299 SHG households belonging to 10 Producers' Groups. In this intervention; maize was procured from maize producers by maintaining required moisture percentage and sold in NCDEX platform through District level Women Farmers Producers' Company. Each of the farmers got an additional income of 50-75/- per quintal apart from 15 lakhs profit to Producers' Company. This is carried out in BRLP. Similar interventions will be scaled up in the BTDP. In this intervention, the backward integration will further be improved with provision of good quality seeds and introduction of Integrated Pest Management (IPM) and Integrated Nutrient Management (INM). Presently, potato & onion interventions are carried out in BRLP. Similar kinds of cluster based value chain interventions in vegetable will be scaled up in the BTDP.

Lessons for BTDP: In this project, the water budgeting for all crops will be calculated and shared among the farmers for their education on water requirement vs water use, farmers will be educated on drip irrigation for promoting drip irrigation. More crops can be produced from less water. The project will also scale up community managed solar photovoltaic micro irrigation systems to reduce irrigation cost and improve water table as it will prevent individuals to pursue for individual bore well.

The Producers' Groups will be supported by the concerned project team members from BPIU & DPCU to develop business plans of vegetable, milk, goat, poultry, honey, etc. The community cadres & project team members of these interventions will be trained on environment safeguards. Environment Guidelines will be integrated into the value chains developed by the producers' groups. Livelihoods Specialist at block level will be the block anchor person of EMF. The federation of the Producers' Group i.e., Producers Company will aggregate the business plans of Producers Groups and execute business to fulfill the demands of the PGs. These Producers Companies will be run by Board of Directors (BoDs) and Community Cadres i.e., VRPs from the community side whereas the PC will be supported by its Chief Executive (CE), Operational Manager (OM) from the project side. The BoDs, VRPs, CE & OM will be trained on environment safeguard to follow environment guidelines for all its intervention. The technical agency on the specific commodity will also take part in this process to provide necessary technical inputs on environmental safeguard.

Renewable Energy Based Interventions in BRLP

The project is implementing solar photovoltaic pump based micro irrigation systems under Mahila Kisan Sashaktikaran Pariyojana (MKSP) and Sustainable Livelihoods and Adaptation to Climate Change (SLACC). This system of irrigation will be installed for a group of farmers ranging from 15 to 25 farming households. This helps in ensuring irrigation, use of drip irrigation, increasing cropping density, increasing productivity thereby increasing income of smallholders. This also prevents excessive use of ground water by installing individual bore well by individual households. The project has installed 5000 solar home lighting systems among 5000 SHG households. This energy access has increased study time of children, increased timing for livelihoods interventions such as opening of village stalls, rural markets and other livestock based interventions. The SHG households engaged in chopping of green fodder by using manual chopper during evening time. The use of solar lantern also allows farmers to visit their plot during evening.

The project is also promoting clean fuel usage at household level in BRLP areas. The project has piloted solar cook stoves in the Community managed Health & Nutrition Care Centers (CHNCC) to cook food for the pregnant and lactating mothers. This method of cooking will reduce the carbon emission.

Lessons for BTDP: In this proposed project, bio gas units will be constructed for individual and community level to promote cooking in smokeless condition. The use of biogas will reduce carbon emission and good volume of decomposed cow dung will be available for making vermi-compost and farm yard manure.

Nutrition garden, vermi-compost pit, individual household latrine & safe drinking water

The project has promoted use of vermi-compost in agriculture intervention. The increased use of vermi-compost among the SHG households created demand for establishing individual vermi-compost pits in the backyard of SHG households. Nearly 100000 SHG households have vermi-compost pits. Vermi-compost pit making is now covered under MGNREGS. In the SLACC project; vermi-compost pit is also promoted for use in agriculture to improve the soil health. Normally, the SHG households are using vermi-compost, farm yard manure & household wastes in the Nutrition Garden.

Nutrition gardens at household level will be promoted under the newly proposed BTDP. The Village Resource Persons (VRPs) will work as an extension worker for nutrition garden at village level with support from the Health & Nutrition Manager of the DPCU to implement Nutrition Garden. Kitchen gardens, backyard poultry can play an important role in dietary diversity and in increasing the consumption of micronutrient-rich foods. This component will introduce a diversity of crops, locally, affordable and easily adopted by communities.

The project will support the Village Organizations (VOs) to work on mobilization around sanitation, open defecation free villages and access to sanitation services. Apart from this the project will support the VOs in creating community assets for providing safe drinking water in the arsenic and fluoride contaminated area.

Partnership with innovators of 2nd Bihar Innovation Forum & best practitioners in livelihoods and GBOs

The project will partner with innovators in livelihoods and Green Business Opportunities of 2nd Bihar Innovation Forum or best practitioners of the same, who were not captured during the 2nd Bihar Innovation Forum. The best practicing organizations of biogas, solar photovoltaic micro irrigation system, solar home lighting systems, solar cook stoves, etc. will be invited for partnership. Through these partnerships, the proposed interventions will be implemented by adhering to the Environment Management Guidelines.

2. Environment Profile and Base Line

This section presents a brief overview of the environmental status and issues vis-à-vis key livelihoods in Bihar. The key environmental issues in the state mapped to the livelihood activities of the rural poor are presented in the following table.

***Table 2**- Key livelihood activities and associated environmental issues in Bihar*

Key Livelihoods Activities	**Environment Issues**
Agriculture	Imbalanced use of chemical fertilizers Over 1550 sq km of water logged area Over 70% of flood-prone area
Livestock	Limited Fodder Resources
Human Development	Poor water quality in 24420 habitations (Iron, Flouride and Arsenic) High dependence on cooking fuels that cause indoor-air pollution

2.1 Agriculture: Of the total geographic area of 94.16 lakh ha, about 60% is cropped. About 35% of the net sown area is cropped twice. Across the state soil texture is varies from sandy loam to heavy clay. However, owing to prevalence of multiple river basins, the majority type belongs to loam category which is extremely good for crop cultivation. The net irrigated area is 34.61 lakh ha (61% of the net sown area). Of this, 64% is irrigated by tube wells and 27% is irrigated by canals. The use of nitrogenous fertilizers in Bihar is much higher than the national average (also, the N: P: K ratio is about 8 : 2 : 1 compared to the optimum ratio of 4 : 2 : 1 recommended for Indian soils). Despite being endowed with good quality soil and generally adequate rainfall; Bihar is yet to realize its full potential in agriculture. The crop productivity in the state is one of the lowest in the country due to multiple factors including Low quality inputs, low levels of technology uptake, minimal value addition and processing, high susceptibility to weather extremes and lack of quality extension services at grass-root level.

2.2 Fodder resource: The area under pastures and grazing lands is extremely scarce (0.18% of the total geographic area). Of all rural households owning cattle and/or buffalo in Bihar, more than three-quarters are either landless or have less than 1 hectare of land. Sheep and goats tend to be even more concentrated among landless and marginal rural households. The estimated green fodder production from forests, permanent pastures, grazing lands and cultivated areas has declined from 13.77 lakh tonnes in 2000-2001 to 13.46 lakh tonnes in 2002-03. Dry fodder production (crop residue of cereals, pulses and oil seeds) over the same period declined from 195.23 lakh tonnes to 156.12 lakh tonnes.

2.3 Wastelands: Wastelands are spread over an area of 6841 sq.km (7.26% of the total geographic area). Of the total wasteland in the state, land with scrub (dense and open) accounts for 3715 sq km, waterlogged area (permanent and seasonal) accounts for 1564 sq km and degraded forest land with scrub accounts for about 1200 sq km. Jamui, Banka, West Champaran and Katihar have the maximum area under degraded scrub land. The districts most affected by permanent waterlogging are Saran, Siwan, Vaishali and Muzaffarpur and those affected by seasonal waterlogging are Purnia, Madhepura and Saharsa.

2.4 Forests: Forest area is limited (6.6% of the total geographic area). The districts with more than 50,000 ha under forests are Bhabua, Jamui, West Champaran, Gaya, Rohtas and Nawadha. The state has 1 national park and 12 sanctuaries comprising a protected area of 3208.47 sq km.

Table 3- Classification of land use pattern in Bihar

Statistics of Land Use Pattern of Bihar[2]		
Sl. No.	**Category**	**Area in Hectare**
1	Forest Land	6,76,400.00
2	Land Under Misc. Tree, Groves	2,11,709.00
3	Current Fallow	2,56,783.00
	Other Fallow	6,87,570.00
	Cultivable Waste	79,319.00
4	Net Area under Cultivation	56,05,798.00
5	Barren Land and Permanent Pasture	5,03,381.00
6	Area under Non Agricultural use	13,95,340.00
Total		**94,16,300.00**

2.5 Floods and Drought: Bihar is the most flood affected state of the country, accounting around 17.2% of the flood prone area of the country. Out of 94.16 lakh ha of geographical area, 68.80 lakh ha (76% of North Bihar and 73% of South Bihar) is flood prone. Presently 28 out of 38 districts of Bihar are flood-prone. The districts of Saran, Darbhanga, Patna and Muzaffarpur have a higher probability of drought (15% or more).

Table 4*: Flood Prone districts, area & inundation (in sq. km) in Bihar*[3]

SL	**Flood Prone District**	**Geographical Area (Sq. Km)**	**Maximum Inundation in any particular year (from 1995 to 2010) (Sq. Km)**
North Bihar			
1	Araria	2830	1690
2	Begusarai	1918	820
3	Darbhanga	2279	2020
4	Purvi-Champaran	3968	2600
5	Gopalganj	2033	1970
6	Katihar	3057	1850
7	Khagaria	1486	1150
8	Kishanganj	1884	490
9	Madhepura	1788	1030
10	Mudhubani	3501	2460

[2] Major & Medium Irrigation Sector, Water Resources Department, Govt. of Bihar http://wrd.bih.nic.in/Activities.html

[3] Flood Management Sector, Water Resources Department, Govt. of Bihar, http://wrd.bih.nic.in/Activities.html

11	Muzaffarpur	3172	2330
12	Purnia	3229	1260
13	Saharsa	1692	1680
14	Samastipur	2904	1620
14	Saran	2641	950
16	Sheohar	443	330
17	Sitamarhi	2200	2180
18	Siwan	2219	450
19	Supaul	2420	1930
20	Vaishali	2036	1220
21	Pashchim Champaran	5228	1930
	Total (A)	**52928**	**31960**
South Bihar			
22	Bhagalpur	2570	1130
23	Bhojpur	2474	475
24	Buxar	1624	435
25	Lakhisaray	1299	340
26	Nalanda	2367	903
27	Patna	3202	878
28	Shekhpura	606	400
	Total (B)	**14142**	**4561**
	Total (A+B)	**67070**	**36521**

2.6 Surface water: The surface water resource in the state includes 69000 ha of ponds and tanks, 9000 ha of oxbow lakes, 7200 ha of reservoirs, 3200 km of rivers and 1 lakh ha of riverine and other flood plains.

2.7 Groundwater: The stage of ground water development is 39%. None of the blocks in the state are classified as Over Exploited, Critical or Semi-critical with respect to the groundwater status. The stage of groundwater development exceeds 50% in Nalanda, Jehanabad, Begusarai, Siwan, Saran and Patna.

2.8 Water quality: The drinking water supply in the state is primarily dependent upon the ground water. There are 13 arsenic prevalence districts, 11 fluoride prevalence districts and 9 iron prevalence districts. Groundwater quality in parts of the state is affected by high Fluoride (4157 habitations), Iron (18673 habitations) and Arsenic (1590). Most habitations in the state are dependent on public sources of water like Hand pumps and Bore-wells and less than 4 percent households, mostly urban, have piped water supply. The names of districts, nos. of blocks and block wise habitations affected by arsenic, fluoride and iron are as follows;

Table 5*- Water Quality Affected Districts*

Water Quality Affected Districts		
13 Arsenic Prevalence Districts	*11 Fluoride Prevalence Districts*	*9 Iron Prevalence Districts*
1. Saran	1. Kaimur	1. Supaul

2. Vaishali	2. Rohtas	2. Araria
3. Samastipur	3. Aurangabad	3. Kishanganj
4. Darbhanga	4. Gaya	4. Saharsa
5. Buxar	5. Nalanda	5. Purnea
6. Bhojpur	6. Shiekhpura	6. Katihar
7. Patna	7. Jamui	7. Madhepura
8. Begusarai	8. Banka	8. Begusarai
9. Khagaria	9. Munger	9. Khagaria
10. Lakhisarai	10. Bhagalpur	
11. Munger	11. Nawada	
12. Bhagalpur		
13. Katihar		

***Table 6**: Arsenic Affected Blocks*

SL	District Name	Total Blocks	Total Affected Blocks	Total Affected Habitations
1	Begusarai	18	4	84
2	Bhagalpur	16	4	159
3	Bhojpur	14	4	31
4	Buxar	11	4	385
5	Darbhanga	18	1	5
6	Katihar	16	5	26
7	Khagaria	7	4	246
8	Lakhisarai	7	3	204
9	Munger	9	4	118
10	Patna	23	4	65
11	Samastipur	20	4	154
12	Saran	20	4	37
13	Vaishali	16	5	76
	Total	**195**	**50**	**1,590**

***Table 7:** Fluoride Affected Blocks*

SL	District Name	Total Blocks	Total Affected Blocks	Total Affected Habitations
1	Nalanda	20	20	213
2	Aurangabad	11	8	37
3	Bhagalpur	16	1	224
4	Nawada	14	5	108
5	Rohtas	19	6	106
6	Kaimur	11	11	81
7	Gaya	24	24	129
8	Munger	9	9	101
9	Banka	11	6	1,812
10	Jamui	10	10	1,153

11	Sheikhpura	6	6	193
	Total	**151**	**98**	**4,157**

***Table 8**: Iron Affected Blocks*

SL	District Name	Total Blocks	Total Affected Blocks	Total Affected Habitations
1	Khagaria	7	3	417
2	Purnea	14	14	3,505
3	Katihar	16	16	766
4	Araria	9	9	2,069
5	Supaul	11	11	3,397
6	Kishanganj	7	7	1,593
7	Begusarai	18	18	2,206
8	Madhepura	13	13	2,445
9	Saharsa	10	10	2,275
	Total	**105**	**101**	**18,673**

2.9 Cooking energy: The majority of rural household in the state depends on firewood (49%) and dung-cake (33%) for cooking the food. The poor people rely on burning cow dung-cake for cooking. They continue to burn cow dung for cooking energy resulting in the release of both toxic fumes and greenhouse gases. It is observed that the burning of biomass for heating and cooking results in high indoor particle concentrations. Smoke from cooking stoves burning biomass fuels contains carbon monoxide, fine particulates, nitrogen dioxide and hydrocarbons. The fine particles derived from the burning of the dung cake are highly oxidizing and damaging to the health of the inhabitants. Long-term exposure to airborne particulate matter has been associated with increased rates of acute respiratory infections (ARI), chronic obstructive lung disease and cancer. World Health Organization estimates suggest that up to 6.5 percent of the annual disease burden in developing nations is attributable to the burning of solid fuels in the indoor environment. Indoor air pollution is the degradation of indoor air quality by harmful chemicals and other materials; it can be up to 10 times worse than outdoor air pollution. This is because contained areas enable potential pollutants to build up more than open spaces.

3. Legal and Regulatory Framework

This section focuses on reviewing the overall policy environment including key policies prescribed by the Govt. of India, Govt. of Bihar and The World Bank. Given below is a summary of the legal and regulatory framework and potential applicability of each policy in the context of interventions proposed under BTDP

***Table 9**: Legal & Regulatory Framework of GoI, The World Bank, GoB*

Government of India		
Policy/Act	***Key Regulations***	***Applicability & Actions under BTDP***
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. 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.	Not Applicable. BTDP will not involve in activities like procurement, stocking and sale of insecticides. The project will promote use of eco-agriculture practices for all its agriculture interventions.
The Fertilizer (Control) Order, 1985	Registration is required for selling fertilizer at any place as wholesale dealer or retail dealer.	Applicable. The Producers' Groups may involve in selling of fertilizers at a very small scale. Also applicable where collective procurement and distribution happens through Producer Companies.
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	Applicable. BTDP will promote certified and truthfully level seed production by adopting seed village program through its Producers' Groups (PGs). Producers' Companies will procure Foundation seed & Certified seed in bulk quantity from Agriculture Universities & other genuine seed

	containing the correct particulars. To provide for regulating the quality of certain seeds for sale, and for related matter	companies/organizations to undertake seed production with selected farmers in selected PGs.
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.	Applicable. BTDP may involve in setting up of processing mills and food processing units which may require following prescribed standards as per the Act.
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.	Not Applicable. Activities under BTDP are not likely to involve in handling of any hazardous substances.
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.	Applicable. Activities under BTDP such as mills and processing units and construction activities shall take into consideration all aspects of noise pollution to avoid noise menace.
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.	Applicable. Applicable to BTDP where collection of minor forest produce and processing is involved. Use of traditional varieties may also be promoted to preserve local diversity and hardy varieties.
The National Green Tribunal Act, 2010	The National Green Tribunal Act 2010 is 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.	Applicable. Applicable in areas where damage to property, environment happens due any to development activities.

	Industrial operations and processes shall be carried out as per the safeguards under Environment Protection Act 1986. Compensation and relief for any damage to people (death or injury), property and environment.	
Indian Fisheries Act 1897	Use of dynamites or explosives or poison for fishing is an offence.	Applicable. Applicable to BTDP where capture fisheries is involved.
Agricultural Produce (Grading and Marking) Act, 1937 (Act No. 1 of 1937) (as amended up to 1986)	To Provide for the grading and marketing of agricultural and other produce.	Applicable. Applicable to agricultural produce marketing under BTDP.
The Bureau of Indian Standards Act 1986.	An Act to provide for the establishment of a Bureau for the harmonious development of the activities of the standardisation, marking and quality certification of goods and for matters connected thereto.	Applicable Applicable to agricultural produce marketing under BTDP.
The Export Inspection Council of India and the Export (Quality Control and Inspection) Act 1963	The Export Inspection Council (EIC) was set up by the Government of India under Section 3 of Export (Quality Control and Inspection) Act, 1963 (22 of 1963), in order to ensure sound development of export trade of India through Quality Control and Inspection and for matters connected thereof.	Applicable. Applicable to value chains where export of commodities or processed products is planned under BTDP.
Indian Standard for Drinking Water Specification IS 10500: 2012	Provides standards for drinking water including physical parameters, limits for undesirable and toxic substances, pesticide residues and bacteriological qualities	Applicable The project will orient communities on preservation of local water resources and will sensitize the CBOs on the importance of undertaking periodic quality checks on drinking water.

The World Bank		
Policy/Act	***Key Regulations***	***Applicability & Actions under BTDP***
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.	Applicable.
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, if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.	Not Applicable. BTDP will not finance pesticide procurement, but there is possibility of pesticide use by farmers as part of productivity enhancement efforts. The commonly used pesticide in India and their status as per WHO classification list is attached as *Annexe 1*.
Government of Bihar		
Policy/Act	***Key Regulations***	***Applicability & Actions under BTDP***
Bihar Ground Water (Regulation & Control of Development and Management) Act, 2006	Rain water harvesting structures are (RTRWH) mandatory for structures in the building plan in an area of 1000 sq. m. or more. Existing users of ground water are also required to register themselves with the Ground Water Authority.	**Not Applicable**

	Any user of ground water desiring to sink a well or replacement of defunct bore well in the notified areas either on personal or community basis shall get permit from Sate Ground Water Authority. Permit is not required if the well is proposed to be fitted with a hand operated manual pump or water is proposed to be with drawn by manual devices.	
Air (Prevention and Control of Pollution) Act, 1981	The act provides for the prevention, control and abatement of air pollution. The liability/obligations imposed on the concerned persons under the scheme of this Act	Applicable. BTDP will promote primary level value addition of selected commodities before processing / selling, where dehusking, winnowing, etc. will be managed in a controlled environment to reduce air pollution
Environment Protection Act, 1986	It provides for the protection and improvement of environment and the matters connected therewith. This legislative piece was brought into existence by the Parliament, as Umbrella Act, which intended to cover all the specific and general provisions left by the earlier enactments. The instant Act, being broader in approach, has broader catch also in creating liabilities and obligations on the Nation.	Applicable.

4. Environmental Impacts and Mitigation measures

This section describes in detail the various environmental impacts potentially envisaged under the project and key mitigation measures to be adopted by the project as part of design and implementation.

4.1 Agriculture value chain and Productivity Enhancement Interventions

***Table 10**: Impacts and Measures of Agriculture value chain and Productivity Enhancement Interventions*

S. No	Interventions	Environmental Impacts	Measures
1	Seed Production through Seed village concept and building capacities to produce own seed of selected varieties.	Improper Varietal selection may have impact on local biodiversity besides input cost and yield.	Suitable varieties based on soil and climatic conditions as recommended by Agriculture dept to be selected. Participatory Varietal Selection & Promotion (PVSP) method of seed variety selection may be promoted. Good yielding traditional varieties having demand in market to be encouraged for seed with the help of suitable technical agencies and agriculture department.
2	Productivity enhancement	Interventions for productivity enhancement might lead to the following impacts:	
	Seed	Use of Hybrid seed requires application of more chemical fertilizer thereby increasing cost of agriculture inputs. Use of excessive chemical fertilizer leads to soil degradation	Use of high yielding varieties and cultivation through System of Crop Intensification (SCI) methodology increases the productivity is the alternative option to be promoted.
	Selection of varieties	Varieties not suitable to local conditions and hybrids may not provide better nutrition but may increase costs for pest and disease management.	Grow locally available good yielding varieties.
	Irrigation	Excess use of ground water for intensive cropping depleting the ground water resource.	SCI methods of cultivation demands less water. Use water efficient methods of irrigation like drip especially for horticultural crops.

			Community managed Solar Photovoltaic Micro Irrigation System need to be followed. This prevents more numbers of bore well in a village.
		Flood method of irrigation need more quantities of water.	Drip method or IDA drip method can be followed to conserve water.
	Pest management	Excessive use of chemical pesticides to prevent insect-pest attack and diseases will develop resistance and also contaminate the produce and unhealthy for table purpose.	Restrict to the approved and proven best Agricultural practices that include rationale Integrated Pest Management such as cultural practices, suitable Resistant varieties, sowing times, physical methods like setting traps and trap crops and biological control methods including bio control agents and botanical extracts.
		Use of chemicals for nutrient, pest and disease will lead to harmful chemical residues in food and soil, affect local biodiversity	The kitchen garden should be grown by organic methods only
		Use of pesticides (in case of pesticides are used by some farmers) in more quantities than desired leading to runoff into water bodies and polluting them and polluting environment, negative effects on health etc.	Avoid use of Internationally banned or restricted pesticides such as the ones classifies as WHO Classes Ia and Ib (Annexe 1). The use of WHO class III pesticides should be always associated with proper training on handling and use as well as adequate protective gears.
		Use of chemical pesticides without following safety precautions while mixing and spraying and unsafe disposal of containers will lead to health hazards and pollute the environment, may turn hazardous to cattle and aquatic life.	When pesticide use is unavoidable use the pesticides that are permitted with necessary safety precautions prescribed by the Agriculture Department and follow the International Code of Conduct on Pesticide Management[4]. Detailed training modules and communication material is required to integrate into

[4] International Code of Conduct on the Distribution and Use of Pesticides, viewed at ftp://ftp.fao.org/docrep/fao/005/y4544e/y4544e00.pdf, on 3rd October 2014.

			the productivity enhancement trainings.
		Use of pesticides just before harvest, especially on vegetables and greens will lead to ill effects on health of consumer.	Follow the waiting periods for use of pesticides for the crops as suggested by Agriculture department.
		Open disposal of pesticide container and reuse may lead to health hazards to cattle and humans.	Strictly avoid reuse of pesticide containers, and dispose them safely by burying in landfills or in field away from water resources after triple rinsing and crushing.
	Fertilizer use	Washing the sprayers in water bodies may lead to contamination and pose health hazards to cattle and people using the water source.	Wash the sprayers near the field by drawing water from water bodies nearby.
		Soil degradation due to fertilizer use in more quantities and high uptake of nutrients due to high responding varieties.	Adopt SCI methodology & use organic manuring practices as far as possible. Any chemical fertilizer application should be based on soil testing.
		Lack of information on weather updates may lead to untimely operations leading to crop loss due to unexpected dry spells or rains.	The member farmers can be linked with SMS (short message service) based weather update systems to avoid untimely operations. The awareness program for following weather based crop calendar instead of annual crop calendar. Eg: Sustainable Livelihoods and Adaptation to Climate Change (SLACC) project.
3	Adoption of environment guidelines	Lack of awareness may lead to non adoption of the guidelines	Awareness and training programmes need to be organized for community and involved stakeholders.

Good practices that enhance the value:

- Demonstration of practices in Plots – The demonstration of above mentioned practices should be accurate based on scientific explanation to enhance adoption. Any mistakes or loopholes will reduce confidence among farmers.
- Standardizing the practices for each crop under eco-agriculture practices and thorough trainings need to be imparted to community members and training materials need to be developed in local language may ensure the adoption of such practice

4.2 Value Addition Interventions

***Table 11**: Impacts and Measures of Agriculture Value Chain*

S. No	Interventions	Environmental Impacts	Measures
1	Drying	Storage of grains and other agriculture produce such as maize, potato, etc. needs drying to attain prescribed moisture level to avoid pest and disease infestation which may call for chemical use for management. Drying on open grounds may contaminate the produce with dirt, microbes etc. which will reduce the quality of produce will have an impact on health.	Dry the product to attain prescribed moisture level. Drying on cement platforms, mats etc. will protect the produce from contamination. Use solar driers wherever possible.
2	Storage	Storage facilities when not properly ventilated will attract pest and moisture which will spoil the produce. And pest infestation may lead to pesticide use which may leave harmful residues on produce. Storage pest infestation is a common problem during storage. Stored product pest control involves use of fumigants which leave residues on food products and are harmful for health. Chemicals stored along with food commodities may contaminate the produce or give off flavors. Organic produce stored along with non organic produce may lead to adulteration.	Storage facility should be well ventilated and free of moisture seepage. Care must be taken to ensure this during construction or renting of such facilities. Dry the produce to recommended moisture level to avoid pest infestation. Keep the storage area clean and dry. Repair all crevices cracks in the godown to eliminate pest breeding. Follow natural methods of storage pest control such as impregnating gunny sacks in neem oil, using dried neem leaves along with the produce, etc. Chemicals / pesticides / weedicides / fertilizers should not be stored along with food commodities It is advisable to store organic produce separately. Community members will be suitable oriented on special storage mechanisms for organic produce.
3	Milling	Noise pollution to the workers and in the neighborhood due to milling.	Noise protective equipment should be provided to the operator of the machines. Silencer should be attached to the

			equipment to reduce noise from the equipment to surrounding areas.
		Fine dust during milling will lead to health issues like allergy, asthma in long run.	Person using these machines must wear mask for preventing the problem related to inhalation.
4	Processing and value addition	Processing and value addition may require high amount of energy and water depleting local fuel and water resources and increasing emissions due to energy use.	Use energy efficient equiepment for processing.
		Accidents and health hazards are possible during processing involving machinery.	Take safety precautions and use safety gear during processing.
		Unhygienic environment or practices at processing will contaminate the food products.	The processing environment should be kept clean and personal hygiene is must among the workers.
5	Transport	Organic produce may get contaminated when transported along with other non food commodities like fertilizers, pesticides etc.	Vehicles used for transport for chemicals should not be used for transport of edible produce. The vehicle should be cleaned and dried before transportation of food grains etc.
6	Waste disposal	Disposal of wastes openly after milling or waste (water, seed coats, peels, etc.) after processing may create unhygienic environment due to decomposition.	Explore the alternate uses for the wastes or waste management, in cases where they cannot be put to alternate use dispose the wastes as per the prescribed procedures.
7	Upgraded Custom Hiring Centres	Spread of weeds and pathogens from one field to other field through uncleaned farm machinery and implements. This will further encourage use of fungicides and weedicides.	Clean machinery and tools after every use to ensure no weed seed, pathogens etc. are carried over to next field.
		Use of some of the machinery such as Power Weeders, Power sprayers and Power tillers will increase use of fuels and will cause emission of GHGs (Green House Gases). The exhaust fumes from this farm machinery pollute local environment quality.	Ensure purchase of fuel efficient models of this equipment. Proper maintenance (regular cleaning and service) would lead to enhanced efficiency.
		There can be some safety hazards owing to use of machinery.	Awareness on safe use and first aid requirements to be ensured.
8	Hiring transportation agency for aggregation	Transportation agency with old and ill serviced vehicles may cause more emissions.	Collective transportation by transportation agency using well serviced vehicles will lead to efficient utilization of vehicles, will minimise

	and transportation.		fuel consumption and will ultimately lead to less emission of green house gases.
9	Storage in ware house	Water leakage in godowns will encourage molds and there by chemical use. Improper storage may lead to spoilage of produce through mold infestation, pest attack and may encourage use of chemicals and fumigants. Flocking of vehicles around the warehouse will generate air pollution and noise pollution. Lighting equipment in storage houses with high energy consumption leads to GHG emissions.	Storage location should be high and not prone to flooding. Store the grains on elevated structures (dunnage) to avoid direct contact with floor and to provide aeration. Bags should not touch the walls to prevent the absorption of moisture and serve as hiding places for rats. Fix Zinc sheets at the bottom of the wooden doors to prevent entry of rats. Block all drainage holes with wired mesh and use rat traps. Rats can be killed with bait of balls made of horse gram flour and cotton thread or flour mixed with cement. Mix leaves of Neem, Karanj, Custard apple, Adathoda and Tulsi to protect grains from storage insects. Regulate traffic to avoid inconvenience, use clean fuels. Use of LED lighting can reduce the electricity consumption drastically. Providing adequate natural ventilation during construction will reduce the need for energy consumption for lighting.
10	Adoption of environment guidelines	Lack of awareness may lead to non adoption of the guidelines	Awareness and training programmes need to be organized for community and involved stakeholders.

4.3 Livestock Interventions

***Table 12**: Impacts and Measures of Livestock Interventions*

S. No	Interventions	Environmental Impacts	Measures
1	Selection of breeds and varieties (in dairy, small ruminants, poultry and fisheries)	Breeds and varieties that are not suitable to the location may not perform well and increase the cost and effort on resources like and fodder, water, feed etc. for maintenance.	Select locally suitable breeds and varieties that respond well to the local conditions there by reducing external inputs and maintenance costs
2	Shed, spacing stocking density etc.	Improper spacing, over stocking leads to disease spreads and there by use of curative drugs etc.	Recommended ratio of spacing, stocking etc. to be followed for health of the animals.
3	Feed management	Over grazing livestock or wastage during stall feeding leads to stress on environment.	Grazing or feeding of livestock should be as per the recommendations
4	Waste management (in dairy and poultry)	Open disposal of wastes leads to unhygienic environment.	Waste disposal should be through composting or putting to alternate use etc.
5	Disposal of carcasses (dairy and poultry)	Open disposal leads to contamination of water resources and leads to spread of diseases in case of diseased animals.	Recommended methods of disposal such as burying or burning should be followed.
6	Value addition (milk cooling, fish processing etc.	Energy use and waste disposal could be an environmental issue in value addition	Prescribed standards are to be followed
7	Adoption of environment guidelines	Lack of awareness may lead to non adoption of the guidelines	Awareness and training programs need to be organized for community and involved stakeholders.

4.4 Health and Sanitation

***Table 13**: Impacts and Measures of Health and Sanitation*

S. No	Interventions	Environmental Impacts	Measures
1	Location of the toilet	Toilet location near to the drinking water source has high chances of contaminating the water. Location too far from the house or too near to the house may deter the use.	Safe distance from drinking water sources to be followed. The location of the septic tank should be downhill from the water source depending on feasibility. The safe distance depends on local hydrological conditions, however 30 mts is treated as safe distance[5]. Appropriate location should be selected which will not discourage the use in consultation with the household.
2	Water facility inside toilet	Lack of water facility inside discourages the use and affects cleanliness.	Water facility should be provided inside to the extent possible. 2 pit system toilet with Pan with steep slope 25^0-28^0 and trap with 20 mm water seal as designed by Sulabh International will reduce the usage of water (required 1-1.5 lits for flushing)[6]. In areas with water scarcity water efficient toilets like ecosan toilets can be constructed.
3	Hand wash facility	Practice of not washing hands after toilet use will cause fecal contamination of food and water while handling, eating etc.	Hand wash facility outside the toilet should be made integral part of design or facility of water and soap should be made available outside.
4	Ventilation	Poor ventilation discourages use by children and affects cleanliness and maintenance.	Proper ventilation to be ensured as lack of ventilation or electricity discourages the use
5	Construction models	Cost and availability of space and water is a constraint for toilet construction in many areas.	The following low cost options can be explored based on need: Plinth level toilet with temporary super structure can be constructed which is of low cost. Use of hollow bricks will reduce cost Eco san toilets – in water scarce

[5] Septic Tanks, http://www.who.int/water_sanitation_health/hygiene/emergencies/fs3_9.pdf viewed on 28th March 2014.

[6] Two Pit System, viewed at http://www.sulabhinternational.org/content/two-pit-system, on 28th March 2014.

		Anganwadi toilets are not used when not designed specific to child needs.	areas. Biogas linked toilets depending on acceptability. Child friendly anganwadi toilets with easy access to water tub, provision of opening from inside and outside, small 14 inches pan, water storage at 1 feet ht.
6	Disposal of construction debris	Open disposal of debris near the toilet itself sometimes block the access and acts as hiding place for snakes etc. Debris disposed near drains leads to stagnation obstructing the flow.	The debris should be disposed away from the site preferably though land filling.
7	Use and maintenance	Improper use and maintenance will lead to defunct facilities	Awareness programmes should be organized for community on proper use and maintenance.
8	Adoption of environment guidelines	Lack of awareness may lead to non adoption of the guidelines	Awareness and training programmes need to be organized for community and involved stakeholders.

4.5 Generic Guidelines for Drinking water supply:

4.5.1 Location of water source:

- Water source should not be closer than 15 m to the nearest leach pit or drain
- It should not be closer than 300 m from nearest significantly used well
- It should not be located in a notified groundwater stress areas identified by the State Government without obtaining requisite permission
- It should not be located in an area having absence / inadequacy of drainage
- It should not be closer than 100 m from the nearest sewage / industrial effluent disposal facility / land fill site
- In case of surface water sources, it should be ensured that construction activity does not cause land erosion, subsidence, instability or alteration of natural drainage
- It should not be located near or within any designated Natural habitat, wetland, sensitive ecosystems such as National Parks, Wildlife Sanctuaries without written permission from Forest Department
- It should not be located in a waterlogged area
- No displacement of local inhabitants is required for setting up the scheme

4.5.2 Ensuring Water Quality:

- Conformation with Indian Standard for Drinking Water – Specification IS 10500: 2012 before commencing the supply
- Ensure the water quality testing of the source before planning of the water supply. Make sure that any water quality issues identified in the report are addressed suitably before any further work is undertaken.
- Ensure periodic monitoring of water quality with help of nearest water testing labs and facilitate disinfection or water treatment when ever required.

5. EMF Implementation Arrangements

5.1 Environmental Appraisal

With a number of livelihoods and human development interventions proposed across a range of sub-sectors, the project will need to stay alert at all times in recognizing the possible environmental impacts of any particular intervention in a specific geography and build in suitable mitigation measures for the same. Most of the project interventions in new areas will be based on Community Level Plans developed in a participatory manner by the local community identifying a particular activity to be undertaken. Most such plans are further consolidated at VO level and then at CLF level before initiating implementation. The project will build in mechanisms to ensure that environment appraisal in built in at multiple levels of planning.

The process of environment appraisal or *Greening the Plans* entails identification of potential environmental impacts of a proposed intervention or activity and also provision of suitable mitigation measures for any negative impacts envisaged under the activity. In the process, the stakeholders also become more aware of the indirect implications of an intervention on the larger environment and bear responsibility in reducing the negative impact as much as possible. JEEVIKA will allow for environment appraisal to take place at 2 levels. Firstly, Micro-plans or Human Development plans aggregated at CLFs will be appraised at the cluster level in a participatory manner with community members and livelihoods specialist jointly undertaking the appraisal. The consolidated plans along with EA will be submitted to the Block Project Manager who will ensure that the appraisals are undertaken properly and all relevant formats are filled. The District Livelihoods Manager will support the BPM in this activity and will consolidate the block level plans and send it to the state thematic team. In case of interventions pertaining to nutrition or sanitation, Manager- Health and Nutrition will also be involved in first level EA of the proposed plans. Subsequently, the State thematic teams responsible for the proposed intervention will undertake a second level Environment Assessment to validate initial assessment and provide corrective measures if any. The state team headed by the respective State Project Manager will also recommend suitable budgetary provisions for mitigation measures if needed. Two major types of Environment Appraisals to be undertaken during project implementation will include

- Environment Appraisal of Business Plans and Micro-investment plans pertaining to livelihoods esp. value chain interventions in farm, non-farm and off-farm sector.
- Environment Appraisal of Human development plans and WASH plans developed by the community

A comprehensive uniform format for collecting data and undertaking EA will be developed to facilitate the process at ground level (Draft in Annexure-2). Also given below are the key roles and responsibilities for project staffs as well as CBOs in implementation of the proposed EMF.

***Table 14**: EMF Implementation Arrangement*

Level	Position	Key Responsibilities
State	State Project Manager Livelihoods – Farm as State Environment Coordinator with support from SLACC coordinator	• Ensure quality in implementation of the EAP in the state in close coordination with relevant thematic counter parts in the SMMU team (livelihoods, capacity building, etc.) for implementation of the EMF • Validate the approach to development of the PG based business plans for value chain, VO based livelihoods micro-plans for Productivity Enhancement and Codes of Practice • Scout for and design pilots on Green Opportunities Commission and ensure quality outputs from technical support institutions for capacity building of Green VRPs, project staff at district and block levels and community resource persons. • Commission and ensure quality outputs from technical support institutions for pilots on Green Opportunities • Monitor the implementation of mitigation measures recommended after any detailed environmental assessment. • Undertake monitoring visits to districts to get feedback and provide support on EAP implementation • Ensure regular district level monitoring of EMF implementation • Dissemination of best practices and cross learning across districts
	Consultant – Environment Innovations	To support the State Environment Innovations Coordinator in all the tasks mentioned above – specifically: • Regularly monitor the regulatory requirements list and environmental guidelines in consultation with the relevant line departments and technical support institutions (academic institutions, NGOs, etc.) in the state and Codes of Practice (through field testing). • Scout for and design pilots on Green Opportunities. • Ensure quality outputs from technical support institutions for capacity building of Green VRPs, project staff at district and block levels and community resource persons • 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 • Dissemination of best practices and cross learning across districts
District	Manager – Livelihoods (Farm) as District Environment	• Ensure quality in implementation of the EAP in the district • Coordinate with SMMU and technical support institution to ensure timely delivery of quality capacity building services to block teams, Green VRPs and SHG

	Coordinator	federations/producers groups/producers companies • 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 • Facilitation of detailed environmental assessment by external technical experts for activities requiring the same
Block	Livelihoods Specialist as Block Environment Coordinator	• Ensure quality in implementation of the EAP at the block level • Support all SHG federations (VOs, cluster federations, etc.) and Producers Companies, Producers Groups, in formulating and adhering to the CoPs based on the regulatory requirements list • Support SHG federations in development and implementation • Dissemination of best practices and cross learning across the SHGs and SHG federations
Village Organization	VRP to be developed as Green VRP	• Facilitate the development of the EAP by the VO (with the support of the block team) • Assist in identification of best-practitioners on environmental management among SHG members • Dissemination of best practices in environmental management and cross learning across the SHGs • Provide field support to block team for organizing technical support and training for SHG members on environment-friendly livelihood practices
	Livelihoods sub-committee as Environment Management sub-committee	• Development and implementation of the EAP (with the support of the Green VRP and the block team) • Develop the CoP for the Federation (including the regulatory requirements + community norms) • Liaison with the village institutions (Gram Panchayat and natural resource user groups such as fisheries and dairy cooperatives, watershed committee, etc.) for developing and implementing community norms on resource management • Undertake monitoring of implementation of CoP on a regular basis
Producer Company	Environment sub-committee at PC	• Develop and implement the CoP for the producer collective (including regulatory requirements + other voluntary norms) • Undertake monitoring of implementation of the CoP by its members

5.2 Capacity Building Plan for EMF

The project will undertake suitable capacity building measures for both the project staffs as well as community cadres to ensure that they are well equipped in fulfilling their roles and responsibilities in implementing the project in the most environment friendly manner. Given below is a list of indicative capacity building activities to be undertaken as part of the project.

Staff	CB requirement	Duration and frequency
Block Livelihood Coordinator/ CLF leaders/VO leaders	**Conducting EA** • Training on sectoral best practices and key aspects of Environment Assessment • Training on incorporating best practices in livelihood planning	One main training initially and refresher trainings every 2 years and on need basis One main training initially and refresher trainings every 2 years and on need basis
District Livelihood Manager/Manager H&N	**Conducting EA** • Training on sectoral best practices and key aspects of Environment Assessment • Training on incorporating best practices in livelihood planning • Training on legal and regulatory framework applicable under EMF and monitoring mechanisms for the same • Exposure visit to best practising organizations	One main training initially and refresher trainings every 2 years and on need basis One main training initially and refresher trainings every 2 years and on need basis One main training initially and refresher trainings every 2 years and on need basis Once every 2 years
State Livelihood Manager/Project Manager	**Conducting EA** • Training on sectoral best practices and key aspects of Environment Assessment • Training of Trainers for developing best practice managers • Training on legal and regulatory framework applicable under EMF and monitoring mechanisms for the same • Exposure visits to best practising organizations	One main training initially and refresher trainings every 2 years and on need basis One main training initially and refresher trainings every 2 years and on need basis One main training initially and refresher trainings every 2 years and on need basis Once every 2 years

5.3 Monitoring Plan and Periodic Assessments

The project will build in checks to ensure that suitable environment appraisal, esp. for large scale livelihood or sanitation pilots in undertaken so that initially unexpected impacts are suitably accounted for. Also, the project will undertake periodic checks with the help of process monitoring teams to assess the rigor in EA at block and district level. Given below is a list of key aspects under monitoring for EMF.

Monitoring aspect	**Responsibility / Key Activities**	**Frequency**
EA of all MIPs	District Manager and Block Project Manager • Ensuring all consolidated intervention plans have a corresponding EA • Undertake regular field visits to monitor implementation in accordance with the approved EA	Once every year, BPM with the help of corresponding district manager will prepare a report on key observation as part of EAs undertaken and any emerging trends from the field. District Manager will collate all block level reports and submit a district report to the SPMU
EA of HNS and WASH micro-plans	District Manager and Block Project Manager • Ensuring all consolidated intervention plans have a corresponding EA • Undertake regular field visits to monitor implementation in accordance with the approved EA	Once every year, BPM with the help of corresponding district manager will prepare a report on key observation as part of EAs undertaken and any emerging trends from the field. District Manager will collate all block level reports and submit a district report to the SPMU
EA of business plans	District Manager and Block Project Manager • Ensuring all consolidated intervention plans have a corresponding EA • Undertake regular field visits to monitor implementation in accordance with the approved EA	Once every year, BPM with the help of corresponding district manager will prepare a report on key observation as part of EAs undertaken and any emerging trends from the field. District Manager will collate all block level reports and submit a district report to the SPMU

For all these reports received from District Managers, State Project Managers and the state thematic teams will undertake detailed analysis, provide feedback and also undertake field assessments to monitor adherence to the measures as detailed in the EA for each intervention.

6. Budget

The overall budget for EMF implementation is estimated to be Rs. 12, 00, 00,000 (rupees Twelve crore only). The breakup is provided in the table below:

Table 15: Key activities and proposed budget for EMF related activities

Head	Unit cost (Rs.)	Total Cost
Staff Cost State Project Manager – Livelihoods (Farm) & SLACC Coordinator	Rs. 1,00,000 per month for 6 years Rs. 75,000 per month for 3 years	72,00,000 27,00,000
Costs of Consultant – Environment Innovations		
Staff costs Senior Consultant (with more than 15 years experience) – part time	Rs. 15,000 per day for 450 days (25% days of the project period)	67,50,000
IEC material development (manual on environmental assessment, booklets, posters, video documentation of best practices etc.)	Lumpsum (including printing).	50,00,000
State level orientation on EMF, its application and appraisal of Business Plans of PGs, PCs and VOs for SPMU & DPCU staff (Manager – Livelihoods Farm) and half-yearly refresher programmes – Imparted by Consultant Environment & Innovations	Rs. 20,000 per orientation for 12 programmes	2,40,000
Orientation of Block Environment Coordinator (Livelihoods Specialists) and half yearly	Rs. 7,500 per orientation (30 LHs per unit) for 10 units for 12 times (half yearly)	9,00,000
State Level orientation on EMF, its application and appraisal of Business Plans of PGs, PCs and VOs for for SPMU & DPCU staffs Manager – Health & Nutrition at district level for WASH program on EMF and half yearly	Rs. 20,000 per orientation for 12 programmes	2,40,000

Training of VRPs for Green Opportunities such as Vermi-compost, FYM, NADEP, non-pesticide management, application of plant & animal extract based manures & pesticides to become Green VRPs	Rs. 4,500 per training for 1000 units in 300 blocks and half yearly	5,40,00,000
Training of Community Health & Nutrition Worker (CHNW) on EMF application in WASH	Rs. 4,500 per training for 500 units in 300 blocks and half yearly	2,70,00,000
Internal monitoring	Rs. 10,000 per district per monitoring visit for 30 districts for 8 rounds of monitoring visits	24,00,000
Administration, reporting, documentation and other miscellaneous charges	Lumpsum	10,00,000
External monitoring		
Costs of External Monitoring and certification by third party agency	Rs. 25,00,000 per monitoring for 4 monitoring studies.	1,00,00,000
Other costs		
Other costs of GVRP and VPG Trainings and monitoring by Project teams (internal audits by GVRPs, Cluster and district teams).	To be integrated into the project implementation costs.	
Software development for Green rating tools and traceability mechanism, purchase of tablets etc.	To be integrated under ICT component.	
Costs on the infrastructure (energy, solar photovoltaic pumps and water efficient equipment for processing)	To be integrated into value chain costs or PG fund.	
Total		**11,74,30,000**
Contingency		**25,00,000**
Total		**11,99,30,000**

Rounding off to Rs. 12,00,00,000 (Twelve crore)

Annexure 1- <u>Pesticides mentioned in the WHO list that are commonly used in the agricultural subprojects along with their trade names:</u>

***Table 16**: Pesticides falling under class I-a: Extremely hazardous, <u>not permitted for use in the project</u>*

Pesticide	**Trade name**
Aldicarb	Temik
Parathion	Folidol, Ekatox, Thiophos
Parathion methyl	Metacid
Phorate	Thimmet
Phosphamidon	Dimecron

***Table 17**: Pesticides falling under class I-b: Highly hazardous, <u>not permitted for use in the project</u>*

Pesticide	**Trade name**
Carbofuran	Furadan, Thimmet
Dichlorovas	Nuvan
Monocrotophos	Nuvacron
Warfarin	-
Zinc phosphide	-

***Table 18**: Pesticides falling under class II: Hazardous, <u>not permitted for use in the project</u>*

Pesticide	**Trade name**
Cypermethrin	Cymbush
Alpha cypermethrin	-
Endosulfan	Thiodon
Fenithrothion	-
Fenvalerate	Sumicidin
Carbaryl	Sevin
Gamma HCH	BHC
Imidacloprid	-
Permethrin	Ambush
Chlorpyrifos	Dursban
Quinalphos	Ekalux

***Table 19**: Pesticides falling under class III: <u>Permitted for use in the project along with Integrated Pest Management Practices</u>*

Pesticide	**Trade name**
Acephate	Orthene, Dimethoate, Rogar
Allethrin	Pynamin
Isoproturon	
Malathion	
Sulphur	

Annexure 2: Indicative Format for Environment Appraisal

S. No.	Intervention Proposed	Sub Activity	Potential Environment Impact	Mitigation Measures