Social & Environmental Assessment Framework for Entire Bundelkhand Area of Uttar Pradesh

IRG in association with Tt

Final Report

Submitted to:

Project Activity Core Team (PACT)
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Executive Summary

The Environmental and Social Management Framework (ESMF) presented in this document provides general policies, guidelines, codes of practice and procedures to be integrated into the implementation of the World Bank-supported Uttar Pradesh Water Sector Restructuring Project Phase II. The proposed project would invest in improving the irrigation service delivery in the state and the potential environmental and social impacts would largely center on these rehabilitation and modernization investments. No new irrigation systems will be built. The passage of the Participatory Irrigation Management (PIM) Act in 2009 was a major reform enacted under the previous Phase I operation and the Phase II project would further strengthen farmer participation in water management. A total of 0.74 Lakh Ha of Gross Command Area (GCA) in Bundelkhand region (Rohini, Jamni, and Sajnam reservoir systems) will be covered. The three dams of Rohini, Jamni and Sajnam will be rehabilitated and modernized in addition to the associated canal systems. Besides this, the project will also finance other canal systems in the state (see environment and social reports for the Lower Ganga Canal and the Haidergarh Branch), agriculture improvements and institutional capacity building. This project is a follow-up to the previous Uttar Pradesh Water Sector Restructuring Project (UPWSRP) Phase I operation and to be managed by the same Project Activities Coordination Team (PACT). This has reduced the overall environmental and social risk due to the familiarity of the implementers with the Bank's safeguard policies and increased the confidence for avoiding and/or mitigating any adverse impacts that may arise**.** ***In general, the scope of the project does not indicate any major negative environment and social impact from the project activities*****.**

Bundelkhand Environment and Social Context

The Bundelkhand region is characterized by a rocky physiography with elevations ranging from 600 m amsl to 150 m amsl. Most of the area is drained by the Jamni River and its tributaries which form its eastern boundry, separating it from Tikamgarh district in Madhya Pradesh. The Sajnam River is a tributary of the Jamni. The Rohini River originates in Mandwara block of Lalitpur district and merges with the Dhasan River in the same block. The region has rich biodiversity both in terms of flora and fauna. The drainage patterns in Bundelkhand make the area a rich source of natural resources (e.g. minerals, forests). Groundwater occurs in both consolidated and unconsolidated formations and its availability ranges between 10 m to 40 m below ground level. Major crops are limited typically to oilseeds, pulses, and wheat. Overall gross sown area increased in 2008-09 in comparison to 2000-01 in project area. Forest area has decreased, while land put to use other than agriculture has increased. The region experiences varying climatic conditions e.g. deficiency in rainfall which triggers meteorological, hydrological and agriculture drought like conditions. A severe continuous four-year cycle of drought during 2004-2008 (more than 25% deficit against the annual average) lead to reduced sown area, loss of productivity, failure of crops already grown, and non-availability of forage, grass, and fodder. Moreover of the available 2 BCM of storage capacity available, filling of these reservoirs during this period progresessively decreased to 17%. Also, various tanks, ponds, dug-wells dried and groundwater tables fell during this period.

Bundelkhand is the poorest region in the state. Demographic features in project area indicates increasing population with adverse female to male ratio, higher literacy with reduced gap in male to female literacy. Though literacy rate improved and gap in male to female literacy rate

reduced, it remained less than state's average. ST population is minimal though SC population is comparatively significant. The infrastructure base indicates increased metalled road network but erratic power supply for agriculture. Data also indicate growth of gross irrigated area but low irrigation intensity (100.3%). Dependence on canal irrigation decreased with increase in shift to tubewell irrigation. Consumption of fertilizers increased though with unbalanced NPK ratio. Further, there is increasing dependence on tubewell irrigation vis a vis canal irrigation. Bar block in project area has been ranked under semi critical status by Central Ground Water Board in terms of ground water utilization. Labor profile indicates shift in occupational pattern from agriculture to non agriculture. Animal husbandry is the next source of livelihood besides agriculture.

Proposed Project

A long-term program covering a 15-20 year horizon with measures for improving water management and irrigation productivity was identified in the State. The Uttar Pradesh Water Sector Restructuring Project (UPWSRP) Phase I was the first step in this program and took place over 2002-2011. UPWRSP Phase II plans to scale up and improve on lessons from Phase I. It will continue to work in the Phase I areas, and will expand to cover parts of the Lower Ganga Canal (LGC) system, several dam systems in Bundelkhand and an area in the Haidergarh Branch. The Project Development Objectives are to (i) strengthen the institutional and policy framework for integrated water resources management for the entire State; and (ii) enable farmers in targeted irrigated areas to increase their agricultural productivity and water use efficiency.

The proposed UPWSRP Phase II project would include the following components:

Component A - Strengthening of State-level Water Institutions

- Operationalizing the State Water Regulatory Commission
- Strengthening the knowledge base and analytical capacity for integrated water resources management
- Strengthening the Water and Land Management Institute (WALMI) - the primary training institute for Irrigation Department engineers

Component B - Modernization and Rehabilitation of Irrigation and Drainage Systems

- Expansion of irrigation and drainage investments, with rehabilitation and modernization of irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. A total of 27.98 Lakh Ha of Gross Command Area (GCA) in the Lower Ganga Canal (LGC) and Haidargarh 23 Down would be covered. Only existing irrigation infrastructure systems would be taken up and no new canals or drains are planned for construction under the project.
- Modernization of the regulation system in the Phase I areas (i.e. Jaunpur Branch)
- Groundwater management activities

Component C – Consolidation and Enhancement of Irrigation Institutional Reforms

- Uttar Pradesh Irrigation Department (UPID) modernization and capacity building

- Water Users Associations (WUAs) strengthening and implementing the Participatory Irrigation Management (PIM) Act

Component D – Enhancing Agriculture Productivity and On-farm Water Management

- This component focuses on Farmer Water Schools and other agriculture demonstrative investments

Component E – Feasibility Studies and Preparation Activities for the Next Phase

- This component is to prepare detailed surveys and designs for future Phase 3 areas

Component F – Project Coordination and Monitoring:

- Project Activities Coordination Team, with overall coordination and management of the project, including Monitoring and Evaluation
- Monitoring of crop performance using remote sensing imagery, implemented by UP State Remote Sensing Agency (RSAC)

The project is located in command area of Jamini, Sajnam and Rohini dams. The landscape is rocky sloping from South to North with mixed land use, dominated by agriculture farmlands. All canals considered under the project are gravity based and do not pass through protected area. Further, no major wetlands fall in the canal alignment.

Environmental and Social Analysis

The analysis involved developing an environmental and social baseline, wide stakeholder consultations including Focused Group Discussion, survey of physical and natural features, interactions with farmers and other potential beneficiaries, desk review of secondary information/data sources, primary household survey in the project areas, analysis of alternatives and identification of potential impacts of planned investments. Moreover, the socio-economic status of relevant stakeholders and a cross-sectional view of stakeholder views was undertaken to highlight key environmental and social challenges and issues.

The environmental and social analysis highlighted dissatisfaction with assured irrigation services, particularly in the tail ends of the canals (more than even in the LGC and Haidergarh systems). Higher dependence on groundwater is leading to over exploitation and lowering of its level. Erratic availability of electricity further compounds the problem. As a result, optimum agriculture production is not fully achieved due to loss of productivity. Moreover, due to general lack of water availability, typically only one major crop is possible (e.g. rabi crops). Poor extension services along with poor availability of quality seeds and lack of application of modern agriculture technology leads to unbalanced use of fertilizers and inhibits crop diversification. The awareness regarding safe use of pesticides is lacking in majority of farmers increasing their risk of exposure to toxics. Other social issues that emerged from stakeholder consultations include breaching of distributaries, minors and in some cases even canals at several points (at farmer's field) for irrigation. There is limited ownership of control structures amongst farmers and such structures were observed in poor condition. Stakeholders also complained about the poor upkeep of crossover structures/narrow bridges that are dangerous to cross.

The practice of Anna Pratha prevails in Bundelkhand region, particularly in rain fed and water deficit irrigated project areas. As per the practice, cattle are let loose in fields for grazing. This practice not only leads to damage to canal embankments but also water bodies (minor/ drain) as a recipient of animal excreta/ dung. This sometimes leads to localized eutrophication in canals/drains. Further, lack of maintenance has resulted in vegetation growth in minors. Surface water quality parameter analysis indicates that the water is suitable for irrigation and also drinking purpose after treatment.

Stakeholder Analysis

The primary project stakeholders include farmers, Water User Associations (WUAs), women SHGs, PRIs, NGOs and government line departments and agencies, besides the project implementing agencies, namely, Uttar Pradesh Irrigation Department (UPID), PACT, Departments of Groundwater and Agriculture. As part of environmental assessment, stakeholders' consultations were undertaken in the project areas with various stakeholder groups. These consultations were held at individual, household and village/community levels in the field and also with PRIs, in particular through focus group discussions and household surveys. The EA report highlights the key feedback that emerged from these consultations. The project's coordinating agency, PACT, has the benefit of having implemented the first phase of the project and, therefore, has a good understanding of the Bank's safeguards policies and the importance of compliance with these. This familiarity would be useful in implementing the various mitigation measures.

Stakeholder feedback confirmed interest and support for project interventions. Many stakeholders suggested that increased water availability in command area was needed to support agriculture and livelihoods and to create economic opportunities in the agricultural sector. Increased surface water availability would also lead to reduced dependence on groundwater irrigation; this in turn could help reduce groundwater level decrease as well as reduce load on electricity. At the same time, a small majority of stakeholders were favorable to the use of tubewells versus canal water, as canal water was currently generally seen as not providing adequate and timely water for irrigation, even if tubewell water was costly. Increased water availability in the reservoirs would support increased fish production. It might also reduce dependence on India Mark II for drinking water. There was a demand for improved agriculture and horticulture extension services, for pilot demonstration of livestock rearing, as an alternate to the practice of Anna Pratha, and for a program for improving irrigation efficiency and promoting water conservation. With regard to potential negative impacts, stakeholders noted that successful project implementation could result in increased usage of fertilizers and pesticides; however, the program could also raise awareness on bio-fertilizers and bio-pesticides.

Potential Project Impacts

In terms of preliminary observations, it should be noted that the potential environmental and social impacts would largely center on the investments in irrigation service delivery. Adverse environmental impacts may arise due to certain planned activities, like disposal of silt during rehabilitation of irrigation infrastructure, construction and installation of irrigation control structures, small bridges over canals, increased used of agro-chemicals for increasing crop productivity etc. Adverse impacts could also arise due to poor construction quality and unsafe

construction practices, but these would be addressed by Quality Supervision Protocols that would be followed by the PACT, in a combination with Quality Assurance Consultants and their own engineers. Other risks would be addressed through the application of the ESMF and EMPs. Their selective and collective use would ensure that the project would not result in any long-term and significant adverse impacts on the people and the environment. A summary of component wise planned investments, their likely impacts and proposed nature of mitigation is given below:

Component	Nature of planned investments	Potential adverse/positive impacts and intensity	Nature of mitigation
1. Strengthening of State-Level Water Institutions and Inter-Sector Coordination	Training, Exposure visit, IT Equipment, Research & Studies, HR contracting	Low & limited, health & safety Improved water resource management	Environment & Social awareness building
2. Modernization and Rehabilitation of Irrigation and Drainage Systems and Groundwater Management	Design & Survey, de-silting, canal lining, re-sectioning, control structures, bridges, weirs, sluice, measurement devices, office buildings upgrading, water storage structures (dams). Groundwater management (groundwater assessment and aquifer management plan).	Moderate to high, unsafe construction related, impacts on wetlands, local biodiversity, material handling and storage, labor camps, issues related to safety of dams etc Improved resource conservation	Negative list, screening, mitigation measures, EMP, biodiversity offsets, awareness, compensation, social best practices, labor laws, construction management, capacity building
3. Consolidation and Enhancement of Irrigation Institutional Reforms	Training & Capacity Building, equipment support (earth movers, IT etc.), awareness building, NGO contracting	Low & limited, Social cohesion, equity, transparency, participation, minor civil works Better resource ownership	Environment & Social awareness building, training, social safety nets, local governance improvement
4. Enhancing Agriculture Productivity and On-Farm Water Management	Farmer Water Schools, Training & Capacity Building, equipment purchase (laser levelers), land leveling, irrigation equipment, soil testing, IPNM, cropping etc	Moderate to high, pesticide handling & storage, agro-chemicals, health & safety related Improved food security, water resource management, reduced pollution load	Negative list, screening, mitigation measures, EMP, Pest Management Plan, IPM/INM, Environment & Social awareness building
5. Feasibility Studies and Preparation Activities for the Next Phase	Design & survey consultancy, Research & Studies	Low & limited	Environment & Social awareness building
6. Project Coordination and Monitoring	Consultancies, Remote sensing, office equipment	Low & limited	Environment & Social awareness building

The approaches to address adverse environmental and social impacts include screening, negative lists, mitigate, compensate, and offsets. Based on this exercise, and in context of project investments, the social and environmental assessment includes screening criteria that places proposed project investments into three categories based on the magnitude of potential adverse impacts. It also includes a *negative list* of activities that the project would not finance. Based on this assessment, an Environmental and Social Management Framework (ESMF) has been developed that provides for measures to avoid, minimize and mitigate adverse environmental and social impacts of planned investments, as well as include measures to

enhance and replicate positive impacts. A role and responsibility matrix is included in the ESMF for ensuring timely monitoring of mitigation actions. In addition, Environmental Management Plans (EMP) are developed to ensure that investment with potentially higher environmental risk are implemented in order to minimize potential adverse impacts. EMPs are developed for construction related and canal rehabilitation activities, including silt disposal, for handling, applying and storing pesticides (Pest Management Plan) etc. At the planning stage of each sub-activities, in case there are major environmental or social issues as described in Table 6.3, a site specific Environmental Assessment (EA) /EMP will be prepared.

With regard to information disclosure, the draft ESMF report and its subsequent revised versions were uploaded on the UPID website (http://irrigation.up.nic.in/project.htm) from October 2012 for inviting comments and suggestions from public and other stakeholders, as well as on the World Bank InfoShop website. Further, hard and soft copies of these reports were circulated to offices of concerned UPID Chief Engineer as well as Superintending Engineers to receive comments & suggestions from all the stakeholders. The final social and environmental assessment/EMP reports will be publicly disclosed through UPID website and World Bank InfoShop, including a translation of the executive summary in Hindi to meet World Bank's disclosure policy requirements.

Applicable World Bank Safeguard Policies

No potentially large scale, significant and/or irreversible environmental and social impacts are anticipated due to limited spatial and temporal nature of project impacts arising out of planned investments. One of the key findings of the assessment highlights that the geographical spread of adverse impacts is unlikely as the bulk of the investments are planned along linear infrastructure. In terms of social impacts, the approach to devolve management of irrigation delivery system through the PIM Act to the WUAs would be a game changer for participation and transparency at the local level of self-governance. There could be impacts (under specific project components) along the canal banks, which have been detailed in the environment and social analysis. While the project is designed to benefit farming communities through investments on rehabilitation of irrigation systems and allied agriculture activities, the implementation of proposed components of the Project may result in adverse impacts on people and land. The project is rated as Category A. It triggers **four safeguards policies, namely, Environmental Assessment (OP 4.01), Safety of Dams (OP 4.37), Involuntary Resettlement (OP 4.12), Pest Management (OP 4.09), and a legal policy, i.e. Projects on International Waterways (OP7.50).**

The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation. In the rare event this is necessitated, the provisions of the Bank OP 4.12 on Involuntary Resettlement shall be invoked in consonance with the UP State R&R policy. The tribal populations in the project area are negligible and do not represent indigenous population; therefore they do not warrant the triggering of the OP 4.10 on Indigenous People. The project shall keep track of the tribal families that do exist in the project area and use every opportunity to support their special livelihood and allied service support requirements should any interventions be taken up in the vicinity of where these families exist.

There is an opportunity to strengthen the technical and regulatory provisions for safety of dams. Currently all the three dams have been found to be structurally and hydraulically safe. Modernization & rehabilitation of these dams along with installation of instrumentation and preparation of emergency preparedness plan and disaster mitigation & management plan has been recommended. In addition to addressing the potential environmental impacts through the ESMF and EMPs, the provisions related to the safety of dams included in the project would be dealt through the Dam Safety Cell (DSC) operating under the Chief Engineer Design in UPID. DSC would be strengthened during project implementation to ensure that all requirements of ensuring safety of dams are addressed. The strengthening of DSC would be undertaken through the ongoing World Bank funded Dam Rehabilitation and Improvement Project (DRIP) in which State of Uttar Pradesh is aparticipating. This would include posting of adequate staff to provide oversight to the 146 dams in the state, appointing the hydrologist and the geologist for reviewing and recommending measures, if required, for ensuring dam safety. This would also cover, amongst other, monitoring the compliance of recommendations given on the basis of review of the dams, updating the existing or preparing a new O&M plan for each of the dams under the project and preparing an Emergency Preparedness Plan for the project supported dams.

Analyses of Alternatives to proposed project interventions were considered. Since this second phase is effectively an on-going modernization and rehabilitation of existing irrigation and drainage infrastructure in the State, there is limited scope for considering alternatives to achieve intended development objectives. One alternative considered, but rejected was to create new irrigation infrastructure in the targeted areas. Instead, learning from the first phase would be applied under the project to improve irrigation water service delivery using the existing irrigation infrastructure network. A No Project scenario was also considered but rejected because of the existing drought conditions, as there is a dire need to improve irrigation service delivery to meet the demands of a fast growing population especially in the context of projected vulnerabilities from climate change. Besides, lack of dam rehabilitation could result in safety issues. Another alternative considered and adopted is to also invest in groundwater management to pilot real time conjunctive use of the two irrigation approaches. Conjunctive use is a potential management option in areas where both surface water and groundwater are amply available. This will be piloted under the project. The proposed conjunctive use of irrigation sources would also result in increased environmental and resource sustainability, as well as allow for enhancing positive environmental impacts from project investments.

Environmental and Social Management Framework (ESMF)

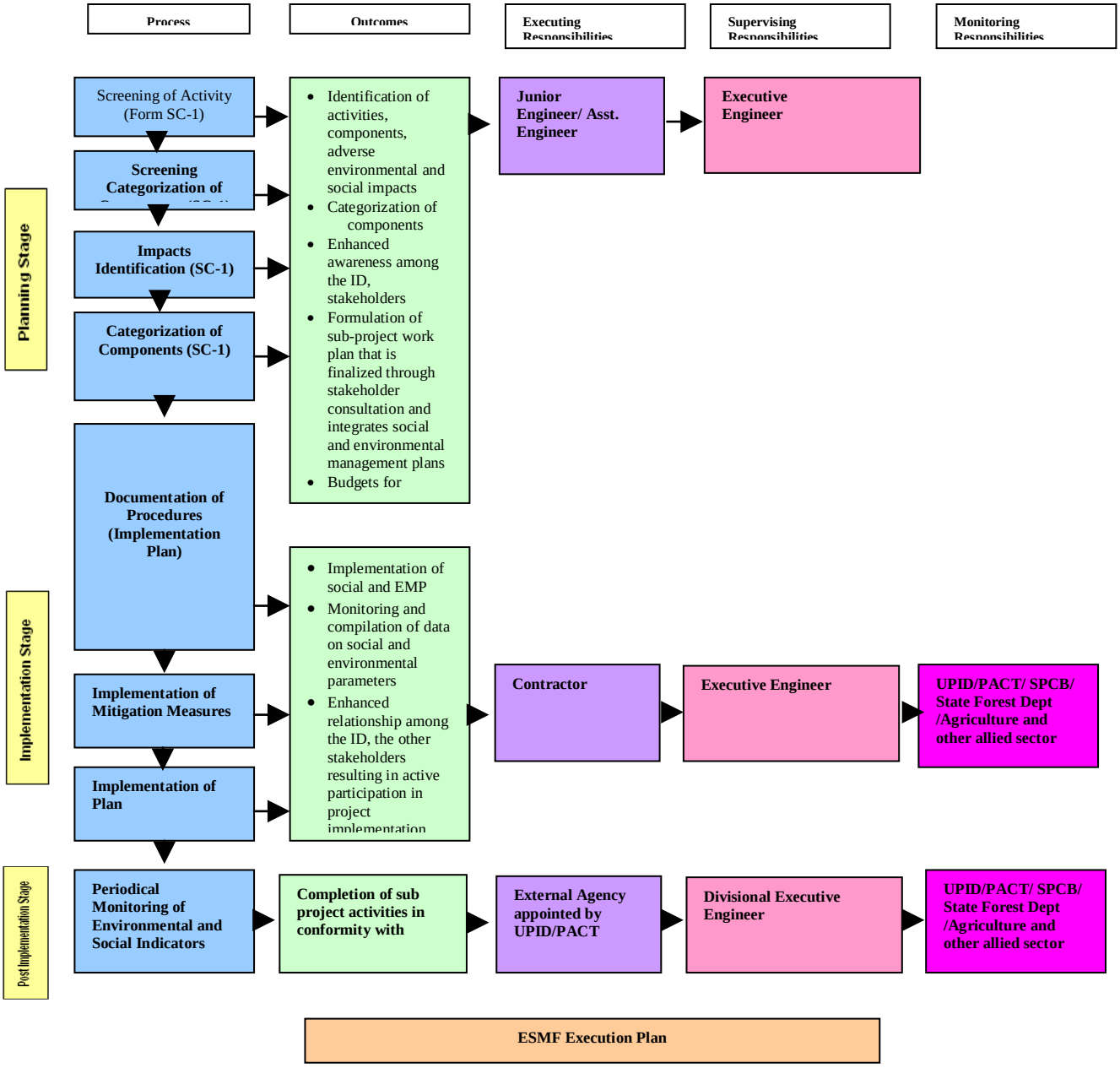
To ensure that the planned project activities do not lead to adverse environmental and social impacts, a social and environmental assessment has been undertaken in all the project areas proposed to be covered under Phase II. Moreover, since specific investments have yet to be identified, an environmental and social management framework (ESMF) has been designed to provide the project (in the Bundelkhand sub-project areas) with the overall guidelines and procedures to ensure compliance with environment and social standards during project implementation.

This environment and social analysis provides clear guidance on categorizing various project investments to identify and mitigate adverse impacts. Based on potential for generating adverse environmental and/or social impacts, project activities would be place under

any of the three categories: (i) **Category A** - activity/Components which have major environmental/social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. Wherever applicable, the EMP is to be incorporated in the bid document and contractor/implementing agencies has to follow this during construction as well as operation. Mitigation measures included as part of ESMF also applies; (ii) **Category B** - components which have moderate environmental and social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during construction as well as operation. Mitigation measures included as part of ESMF and specific management plans also applies during the project period. The final category is (iii) **Category C** - components which have negligible or nil environmental and social impacts and as such no mitigation measures have been proposed for these activities.

The analysis will guide project design and introduce innovative mitigation measures and strategies. One of the key observations from the analysis and stakeholder consultations feedback is the growing dependence and withdrawal of groundwater to meet irrigation needs, especially in absence of assured irrigation service delivery. In order to address the critical issue of groundwater depletion, quality and dependence, some of the environmental mitigation measures have been mainstreamed in the project design by inclusion of a sub-component (B3) on groundwater. The project may also introduce the use of biodiversity offsets as an innovative safeguards mechanism in the state.

The proposed mitigation/enhancement measures also include specific environment management plans (EMPs) – Annex 6.1. These include plans for construction camps, waste management, construction plants and equipment management, fertilizer and pesticide handling and storage, Integrated Pest Management, public worker's health and safety, cultural properties, tree plantation, silt disposal, biodiversity offset Annexure 6.2 lays out the Rehabilitation and Resettlement (R&R) Policy Framework. Further, Annexure 6.3 provides the organization structure for both the environmental and social cell in PACT and the dam safety cell in UPID, which will be complementing the ESMF execution mechanism shown below.



ESMF Executive Mechanism

Project implementation would require an enhanced degree of interdepartmental coordination. In terms of implementing departments, UPID will be responsible for implementing Components A, B1, B2, C, E, and F1. The Department of Agriculture is responsible for implementing Component D. To ensure close coordination between these departments (especially given the overlapping responsibilities vis-à-vis the water users association agenda), a senior (Joint Director-level) agriculture officer will be posted in the PACT. The Groundwater Department is responsible for implementing Component B3. However, implementation of identified civil works (e.g. recharge structures) will not be executed by the Groundwater Department. The Remote Sensing Applications Center will receive resources directly to carry out crop analysis and monitoring of project areas using satellite imageries. The State Institute of Rural Development will also be contracted by the

UPID to undertake the primary activities related to education campaigns and capacity building of water users associations.

Implementation of the ESMF would result in increased awareness, capacities, skills in environment and social issues and better conflict resolution in the irrigation sector. As part of ESMF, an information education and communication strategy, capacity building and training plan, and M&E schedule have been developed. This will help to convey to stakeholders the project specific envionrment and social messages. Suggested strategy and framework for IEC has been defined in terms of thematic area, target audience, content and form of knowledge material has been suggested. Communication tools that cover stakeholder groups, communication needs, messages and preferred tools have been provided. The M&E framework includes social and environmental impacts monitoring indicators. Further, the ESMF developed for UPWSRP Phase II can be implemented effectively by integrating it with UPWSRP Project Management Systems and Procedures. As part of the social and environmental assessment, an attempt has been made for assessing the type of risks and the existing conflict resolution systems. Conflicts and existing resolution system has been described.

There is some confidence in ensuring that adverse environmental and social impacts would be addressed adequately, as the institutional and implementation arrangements of the project are more or less similar to the ones followed in Phase I, bringing in good institutional familiarity with Bank processes and procedures. The primary multi-disciplinary coordination unit managing UPWSRP Phase II is the Project Activity Core Team (PACT) that is headed by a Chairman (Senior IAS officer) and supported by various technical and administrative experts. After several years of engagement working closely with the Bank team, the PACT has built significant capacity and knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. The specific functions of the PACT would include coordination of implementation (across various departments), M&E, procurement and financial management, Environmental and Social Safeguards management and processing all the necessary sanctions from various Steering and Executive Committees and line agencies. As in the Phase I operation, the PACT will be staffed with experts covering a range of subjects including, but not limited to, PIM, procurement, financial management, monitoring and evaluation, survey and design, rehabilitation, training, management information systems (MIS), agriculture, environment, social, and groundwater. These officers will provide support to the various line departments who will be responsible for the implementation of component activities. An estimated budget of $6.85M (over the 7 year project period inclusive of the LGC and Haidergarh Branch project areas) is envisioned for the implementation of the ESMF and includes costs for staff, training, and special studies (if required).

बुन्देलखण्ड सारांश

पर्यावरण और सामाजिक प्रबंधन फ्रेमवर्क (ESMF) इस रिपोर्ट में प्रस्तुत सामान्य नीतियों एवं दिशा निर्देशों तथा अभ्यास का कोड और विश्व बैंक समर्थित उत्तर प्रदेश जल क्षेत्र पुनर्गठन परियोजना चरण–2 के कार्यान्वयन में एकीकृत प्रक्रियाओं को प्रस्तुत करता है। प्रस्तावित परियोजना राज्य में सिंचाई सेवा वितरण में सुधार लाने और संभावित पर्यावरणीय एवं सामाजिक प्रभावों, पुनर्वास और आधुनिकीकरण के निवेश पर काफी हद तक केंद्रित है। इस परियोजना में कोई नई सिंचाई प्रणाली का निर्माण नहीं किया जाएगा। सहभागितापूर्ण सिंचाई प्रबंधन (पीआईएम) अधिनियम–2009 के अन्तर्गत प्रथम चरण–1 में प्रस्तावित प्रमुख सुधार चरण–2 से परियोजनाओं तथा जल प्रबंधन में किसानों की भागीदारी मजबूत होगी। यह परियोजना निचली गंगा नहर एवं हैदरगढ़ शाखा (23 डाउन के सकल कमान क्षेत्र के 27.98 लाख हेक्टेयर क्षेत्र में कियान्वित करी जाएगी। इसके अलावा इस परियोजना के अन्तर्गत वित्तीय कृषि सुधार और संस्थागत क्षमता का भी विकास किया जायेगा। यह परियोजना उत्तर प्रदेश जल क्षेत्र पुर्नगठन चरण–1 की की (PACT) के द्वारा प्रबंधित होगा। यह (ESMF) द्वितीय चरण में प्रस्तावित परियोजना से होने वाले समग्र पर्यावरणीय और सामाजिक प्रभावों (Risk) को विश्वबैंक की रक्षा नीतियों, राष्ट्रीय एवं राज्य की पर्यावरणीय एवं सामाजिक नीतियों के अन्तर्गत तैयार किया गया है (PACT) द्वारा चरण – 1 में इस प्रकार के कार्यान्वयन व्यवसायिक अनुभव पर आधारित होने के कारण किसी भी प्रतिकूल प्रभावों को कम करने के लिए विश्वास बढ़ाता है। सामान्यतः इस परियोजना के दायरे में किसी भी बड़े नकारात्मक गतिविधियों से पर्यावरण और सामाजिक प्रभाव का संकेत नहीं है।

बुन्देलखण्ड क्षेत्र के सामाजिक पर्यावरणीय और सामाजिक स्थिति के संदर्भ में

बुन्देलखण्ड क्षेत्र पथरीली प्रकृति से चिन्हित किया गया है, जिसका अधिकांश 600 मी0 से 150 मी0 ए0एम0एस0एल0 है। अधिकांश क्षेत्र पूर्वी सीमा जामिनी नदी और उसकी सहायक नदियों से सिंचित होता है, और यह मध्य प्रदेश के टीकम गढ़ जिले से अलग होता है। सजनम नदी जामिनी की एक सहायक नदी है। रोहिणी नदी ललितपूर जिले के मांडवारा ब्लाक से निकलती है और ढासन नदी में मिलती है। यह क्षेत्र वनस्पतियों और जैव विविधता से भरा हुआ है। बुन्देलखण्ड में जल निकासी ड्रेनेज पैटर्न क्षेत्र को प्राकृतिक संसाधनों (खनिज, वन) से परिपूर्ण करता है। भूजल दोनों समेकित और असमेकित पाया जाता है, जिसका जल स्तर 10 मी0 से 40 मी0 जमीन से नीचे पाया गया है। मुख्य फसल तिलहन, दलहन और गेहूँ है। कुल बुआई क्षेत्र 2000–01 की तुलना में 2008–09 में बढ़ा है। वन क्षेत्र में गिरावट पायी गई है, और कृषि क्षेत्र से गैर कृषि भूमि का उपयोग बढ़ा है। यह क्षेत्र वर्षा की कमी, सतही जल में कमी, भूजल के स्तर में कमी और सूखे से ग्रसित पाया गया है। 2004–08 के दौरान एक गम्भीर लगातार चार साल सूखा चक्र (वार्षिक औसत से अधिक 25 प्रतिशत की कमी) की वजह से बुआई क्षेत्र में गिरावट, उत्पादकता में गिरावट, घास की अनुपलब्धता पाई गई है। इस के अलावा जलाशयों को भरने की 2 बी0सी0एम उपलब्धता 17 प्रतिशत की कमी पायी गई है, विभिन्न टैंक, तालाबों, कुओं और भूजल के स्तर में इस अवधि के दौरान गिरावट पायी गयी है।

बुन्देलखण्ड क्षेत्र राज्य का सबसे पिछड़ा क्षेत्र है, परियोजना क्षेत्र में जनसांख्यिकीय सुविधाओं के साथ जनसंख्या पुरूष एवं महिला अनुपात, साक्षरता में कम अन्तर के साथ साक्षरता बढ़ने के संकेत मिलते हैं। अनुसूचित जनजाति की जनसंख्या कम है, हालांकि अनुसूचित जाति की आबादी अपेक्षाकृत पायी गई है। बुनियादी ढाँचे के आधार पर कृषि के लिए अनियमित बिजली की आपूर्ति ढाँचे को इंगित करता है। आँकड़ों से, कुल सिंचित क्षेत्र, सिंचाई की तीव्रता में बढ़ोत्तरी पायी गई

है। इसके अलावा नलकूप के द्वारा सिंचाई में बढ़ोत्तरी और नहरों द्वारा सिंचाई में कमी देखी गई है। परियोजना क्षेत्र के बार ब्लाक को गम्भीर क्षेत्र की केन्द्रीय भूमिजल आयोग द्वारा घोषित किया गया है। व्यावसायिक आँकड़ों से कृषि से गैर कृषि के लिए बदलाव के संकेत मिलते है। पशुपालन, कृषि के अलावा आजीविका का अगला स्रोत है।

प्रस्तावित परियोजना

उपरोक्त संदर्भ के अन्तरगत, उत्तर प्रदेश सरकार द्वारा एक लंबी अवधि के जल प्रबन्धन में सुधार और सिंचाई उत्पादकता को बढ़ाने के लिए राज्य में 15–20 वर्ष के लिए उपायों के साथ, एक क्षितिज कार्यक्रम को तैयार किया गया था। उत्तर प्रदेश जल क्षेत्र पुनर्गठन (UPWSRP)–परियोजना चरण–1 (2002–2011) इस कार्यक्रम का पहला कदम था। प्रथम चरण के अनुभव के अनुसार द्वितीय चरण में सुधार प्रस्तावित है। यह कार्य प्रथम चरण के कार्य क्षेत्र, निचली गंगा नहर (LGC), बुन्देलखण्ड में कई बांध और हैदरगढ़ शाखा में भी करने के लिए प्रस्तावित हैं। परियोजना विकास के उद्देश्य (i) संस्थागत और पूरे राज्य के लिए एकीकृत जल संसाधन प्रबंधन के लिए नीतिगत ढांचे का सुदृढ़ीकरण, और (ii) लक्षित सिंचित क्षेत्रों में किसानो को उनकी कृषि उत्पादकता और पानी का उपयोग क्षमता बढ़ाने के लिए प्रस्तावित है।

प्रस्तावित UPWSRP चरण–2 परियोजना निम्नलिखित घटकों में शामिल होगा

घटक–ए राज्य स्तरीय जल संस्थानों का सुदृढ़ीकरण

- राज्य जल नियामक आयोग को क्रियाशील बनाना।
- ज्ञान और एकीकृत जल संसाधन प्रबंधन के लिए विश्लेषणात्मक क्षमता को मजबूत बनाना।
- सिंचाई विभाग के इंजीनियरों के लिए प्राथमिक प्रशिक्षण संस्थान– जल और भूमि प्रबंधन संस्थान (WALMI) को मजबूत बनाना।

घटक बी– सिंचाई और ड्रेनेज सिस्टम के आधुनिकीकरण और पुनर्वास

शारदा सहायक के कुछ हिस्सों, (23 किमी0 और नीचे से हैदरगढ़ शाखा), बुंदेलखंड में तीन जलाशय (रोहिणी, जामिनी, सजनम बांधों), और निचली गंगा नहर प्रणाली और (समानांतर निचली गंगा नहर) में सिंचाई और जल निकासी के बुनियादी ढांचे के विस्तार, पुनर्वास और आधुनिकीकरण का प्रस्ताव। ये पहले निचली गंगा नहर एवं हैदरगढ़ शाखा (23 डाउन) के सकल कमान क्षेत्र 27.99 लाख हेक्टेयर और बुन्देलखण्ड के 0.74 हेक्टेयर क्षेत्र में प्रस्तावित है। इस परियोजना के तहत केवल मौजूदा सिंचाई संरचना सिस्टम को ही लिया जाएगा तथा अन्य कोई नई परियोजना कार्यान्वयन प्रस्तावित नहीं है।

- चरण–1 में नियमन व्यवस्था के आधुनिकीकरण (जौनपुर शाखा)
- भूजल प्रबंधन गतिविधियां

घटक–सी एकीकरण और सिंचाई संस्थागत सुधारों में संवर्धन

- उत्तर प्रदेश सिंचाई विभाग (UPID) का आधुनिकीकरण और क्षमता का निर्माण

- जल उपयोगकर्ता संघों (WUAs) को मजबूत बनाने और सहभागितापूर्ण सिंचाई प्रबंधन (पीआईएम) अधिनियम को लागू करना।

घटक–डी कृषि उत्पादकता बढ़ाने और कृषि जल प्रबंधन

- कृषक जल स्कूलों और अन्य कृषि मानदर्शक निवेश पर केन्द्रित निवेश

घटक–ई व्यवहार्यता अध्ययन और अगले चरण के लिए क्रियाएं

- भविष्य के लिए चरण–3 क्षेत्रों में विस्तृत सर्वेक्षण और रूपांकन तैयार करने के लिए है।

घटक एफ – परियोजना समन्वय और निगरानी

- समग्र समन्वय और परियोजना के प्रबंधन, निगरानी और मूल्यांकन सहित परियोजना की गतिविधियों के साथ समन्वय टीम की क्षमता का विकास
- यूपी स्टेट रिमोट सेंसिंग एजेंसी (RSAC) द्वारा क्रियान्वित
- रिमोट सेंसिंग के द्वारा फसल उत्पादकता की निगरानी

यह परियोजना (निचली गंगा नहर में और ढैहरगढ़ शाखा) गंगा नदी बेसिन में स्थित है। भूमि उपयोग के आँकड़े, सिंचित भूमि उपयोग और कृषि भूमि क्षेत्र को दर्शाता है। हाल ही में, बेहतर सड़क सुविधाओं की वजह से छोटे शहर नगरीय क्षेत्र में बदल चुके हैं। सभी परियोजना किसी भी संरक्षित क्षेत्रों के अन्दर प्रस्तावित नहीं है। कोई बड़ी वेटलैंड नहर एलाईनमेन्ट में नहीं आती है।

पर्यावरणीय और सामाजिक विश्लेषण

इस परियोजना के विश्लेषण एवं पर्यावरण और सामाजिक विकास के आधारभूत शामिल है, परियोजना क्षेत्र में ध्यान केंद्रित समूह चर्चा, मौतिक और प्राकृतिक सुविधाओं के सर्वेक्षण तथा किसानों और अन्य प्राथमिक घरेलू सर्वेक्षण किये गये। इसके अलावा सामाजिक–आर्थिक और हितधारकों की स्थिति विचारों तथा पर्यावरण और सामाजिक चुनौतियों और मुद्दों को उजागर किया गया है।

पर्यावरण और सामाजिक विश्लेषण खराब सिंचाई व्यवस्था को दिखाता है, विशेष रूप से नहर के आखिरी छोर तथा भूजल पर निर्भरता से अधिक भूजल दोहन और इसके जल स्तर में कमी करता है। बिजली की कमी भी एक समस्या पाई गयी है, नतीजतन ज्यादा कृषि उत्पादन नहीं हो पा रहा है। इसके अलावा जल की कमी के कारण केवल एक फसल (रबी) ही सम्भव है। बीजों की अनुपलब्धता और आधुनिक कृषि प्रौद्योगिकी की कमी असंतुलित उर्वरकों का उपयोग और खराब फसल विविधीकरण को बढ़ाता है। किसानो में कीटनाशकों के सुरक्षित उपयोग में जागरूकता की कमी से विषाक्तता का जोखिम बढ़ा है। अन्य सामाजिक मुद्दे हितधारकों से विचार–विमर्श करने से आये हैं। सीमित नियंत्रण और संरचनाओं की वजह से नहरों को रास्तों के रूप में प्रयोग किया जा रहा है। हितधारकों ने खराब रखरखाव के बारे में शिकायत भी की है।

क्षेत्र में अन्ना प्रथा एक गम्भीर समस्या पायी गई है, विशेष रूप से वर्षा से सिंचित क्षेत्र में ज्यादातार पशुओं को खेतों में चरने के लिए छोड़ दिया जाता है। इस समस्या से केवल पशु मल–मूत्र/गोबर के अलावा नहरों के तटों का भी नुकसान देखा गया है। कभी–कभी यह छोटे नालों और तालाबों

में वनस्पति उत्पन्न करता है, साथही जल की गुणवत्ता सिंचाई और उपचार के बाद पीने योग्य पाई गई है।

हितधारक विश्लेषण (Stakeholder Analysis)

प्राथमिक परियोजना के हितधारकों में उत्तर प्रदेश सिंचाई विभाग, पैवट, भूजल विभाग और कृषि विभाग के अतिरिक्त किसानों, जल उपयोक्ता संघों, महिला स्वयं सहायता समूहों, पंचायती राज संस्थाओं गैर सरकारी संगठनों को भी शामिल किया गया है। पर्यावरणीय मूल्यांकन के भाग के रूप में व्यापक हितधारकों के साथ विचार–विमर्श किया गया, यह विचार विमर्श व्यक्तिगत, घरों /गाँवों तथा समुदाय के स्तर पर पंचायती राज संस्थाओं के साथ किये गये। यह पर्यावरणीय मूल्यांकन रिर्पोट विभिन्न विचार विमर्श से महत्वपूर्ण रायों पर प्रकाश डालता है। परियोजना समन्वय संस्था, घाघरा–गोमती बेसिन में इस परियोजना के प्रथम चरण को लागू होने और विश्व बैंक के सुरक्षा उपायों की नीतियों और उनके अनुपालन के महत्व को प्रदर्शित करता है। यह विचार विमर्श विभिन्न महत्वपूर्ण उपायों को लागू करने में उपयोगी होगा।

हितधारकों की प्रतिक्रिया प्रोजेक्ट इंटरवेन्शन के समर्थन की पुष्टि करती है। कई किसानों ने बेहतर जल उपलब्धता से कृषि और आजीविका का समर्थन और उससे कृषि क्षेत्र में आर्थिक अवसरों में बढ़ने की इच्छा जाहिर की है। साथही जल की उपलब्धता, भूजल के उपयोग में कमी, जल स्तर में बढ़ोत्तरी और बिजली पर निर्भरता पर कमी आने की बात कही है उसी समय कुछ किसानों ने भूजल का उपयोग करने को कहा क्योंकि नहरों में जल की कमी है। जलाशयों में पानी की उपलब्धता में बढ़ोत्तरी मछली उत्पादन में बढ़ोत्तरी का समर्थन करेगी और पीन के पानी के लिए इन्डिया मार्क 2 पर निर्भरता को कम कर सकती है। कुछ किसानों ने बेहतर कृषि और बागवानी सेवाओं में विस्तार की माँग की अन्ना प्रथा, सिंचाई क्षमता में सुधार और जल संरक्षण को बढ़ाने के लिए एक कार्यक्रम की आवश्यकता जतायी गई। सम्भावित नकारात्मक प्रभावों के सम्बन्ध में हितधारकों ने कहा कि सफल परियोजना के कार्यान्वन से उर्वरकों और कीटनाशकों का उपयोग बढ़ सकता है।

परियोजना के संभावित प्रभाव

यह ध्यान दिया जाना चाहिए की संभावित पर्यावरणीय एवं सामाजिक प्रभावों को बड़े पैमाने पर सिंचाई सेवा वितरण द्वारा होंगे। पर्यावरण पर प्रतिकूल प्रभाव हो सकते हैं जैसे गाद निपटारण, निर्माण एवं सिंचाई नियंत्रक संरचनाओं, नहरों पर छोटे पुलों की स्थापना, असंतुलित कृषि रसायन का उपयोग उत्पादकता बढ़ाने के लिए, खराब निर्माण एवं खराब गुणवत्ता और असुरक्षित निर्माण के कारण प्रतिकूल प्रभाव हो सकते हैं। लेकिन ये क्यालिटि एस्योरेन्स सुपरविजन प्रोटोकालस्स पैवट, क्यालिटि एस्योरेन्स कन्सल्टेन्ट और इनके इन्जीनियरों की मदद से दूर किए जायेंगे। उनकी सुनिंदा और सामूहिक उपयोग से परियोजना के लोगों और पर्यावरण पर कोई दीर्घकालीन प्रभाव नहीं होंगे। उनके संभावित प्रभावों को दूर का एक सारांश नीचे दिया गया है।

घटक	योजनान्तर्गत निवेश की प्रकृति	संभावित प्रतिकूल/ सकारात्मक प्रभाव डालता है और सीमा	शमन की प्रकृति
1. राज्य स्तरीय जल संस्थानों और इंटर सेक्टर समन्वय का सुदृढ़ीकरण	प्रशिक्षण, एक्सपोजन यात्रा, आईटी उपकरण, अनुसंधान और अध्ययन, मानव संसाधन करार	कम सीमित स्वास्थ्य और सुरक्षा बेहतर जल संसाधन प्रबंधन	पर्यावरण एवं सामाजिक जागरूकता का निर्माण
2. सिंचाई और ड्रेनेज	डिजाइन और सर्वेक्षण, गाद निकासी	उच्च, असुरक्षित संबंधित निर्माण	नकारात्मक सूची, स्क्रीनिंग

घटक	योजनान्तर्गत निवेश की प्रवृत्ति	संभावित प्रतिकूल/ सकारात्मक प्रभाव डालता है और तीव्रता	शमन की प्रवृत्ति
सिस्टम के आधुनिकीकरण और पुनर्वास	नहर अस्तर, तदोपरान्त् संवर्धनिंग नियंत्रण संरचनाओं, पुलों ग्रामरस, मोरी, माप उपकरणों, कार्यालय भवनों का उन्नयन, भूजल पुनर्भरण, जल भंडारण संरचनाओं (बांधों)	करने के लिए उधार, झीलों, स्थानीय जैव विविधता, सामग्री हैंडलिंग और भंडारण, श्रम शिविरों, बांधों आदि की सुरक्षा से संबंधित मुद्दों पर प्रभाव	शमन उपायों, पर्यावरण प्रबंधन योजना (ईएमपी), जैव विविधता, जागरूकता, मुआवजा, सामाजिक सर्वोत्तम प्रथाओं, श्रम कानूनों, निर्माण प्रबंधन क्षमता निर्माण
3. सर्वेक्षण और सिंचाई संस्थागत सुधारों के संवर्धन	प्रशिक्षण और क्षमता निर्माण, उपकरण समर्थन (अर्थ मूवर्स आदि सूचना प्रौद्योगिकी (आईटी)), जागरूकता निर्माण, गैर सरकारी संगठन करार	कम और सीमित, सामाजिक सामंजस्य, समानता, पारदर्शिता, भागीदारी, मामूली सिविल कार्य बेहतर संसाधन स्वामित्व	पर्यावरण एवं सामाजिक जागरूकता के निर्माण, प्रशिक्षण, सामाजिक सुरक्षा जाल, स्थानीय शासन सुधार
4. कृषि उत्पादकता और कृषि जल प्रबंधन बढ़ाना	किसान पानी के स्कूलों, प्रशिक्षण और क्षमता निर्माण, उपकरणों की खरीद (लेजर), भूमि समतलीकरण, सिंचाई उपकरण, मिट्टी परीक्षण, फसल आदि	उच्च, कीटनाशक हैंडलिंग और भण्डारण, भौंडरेट कृषि रसायन, स्वास्थ्य एवं सुरक्षा से संबंधित बेहतर खाद्य सुरक्षा, जल संसाधन प्रबंधन, कम प्रदूषण	नकारात्मक सूची, स्क्रीनिंग शमन उपायों, ईएमपी, कीट प्रबंधन योजना/ आईपीएम आईएनएम, पर्यावरण एवं सामाजिक जागरूकता का निर्माण
5. अगले चरण के लिए व्यवहार्यता अध्ययन तैयारी क्रियाएं	डिजाइन और सर्वेक्षण के परामर्श, अनुसंधान एवं अध्ययन	कम और सीमित	पर्यावरण एवं सामाजिक जागरूकता का निर्माण
6. परियोजना समन्वय एवं निगरानी	परामर्श, रिमोट सेंसिंग कार्यालय उपकरण	कम और सीमित	पर्यावरण एवं सामाजिक जागरूकता का निर्माण

वर्तमान मूल्यांकन के आधार पर तीनों बाँध सुरक्षित पाये गये हैं। इसके अतिरिक्त तीनों बाँधों का नवीनीकरण एवं सुदृढ़ीकरण पुर्नवास, उपकरण स्थापन और आपदा प्रबन्धन योजना की अनुसंशा की गई है।

प्रातकूल पयावरण आर सामाजक प्रभावा का पता करन क लिए द्दाष्टकाण स्क्रानिग, नकारात्मक सूचा का कम करन, क्षातपूात, और दूसरे प्रयास शामल ह. इस अभ्यास क आधार पर, आर पारयाजना निवश क सदभ म, सामाजक आर पयावरणाय मूल्याकन स्क्रानिग मानदड ह कि सभावत प्रातकूल प्रभावा का भयावहता क आधार पर तीन श्रणया म प्रस्तावित पारयाजना निवश स्थाना म शामल ह. गातावाधया जो कि नकारात्मक सूचा म शामल ह. उनको किसी प्रकार का वित्त उपलब्ध नहीं कराया जायगा। पयावरण आर सामाजक प्रबधन फ्रमवक (ESMF) इस आधार पर विकासत किया गया ह कि नियाजित निवश का कम से कम प्रातकूल पयावरण आर सामाजक प्रभावा आर अधिक से अधिक सकारात्मक पड़े। एक भूमका आर जिम्मदारा मादृक्स शमन काया क समय पर निगरानी सुनाश्चत करन क लिए ESMF म शामल ह. इसके अलावा, पयावरण प्रबधन योजना (ईएमपी) सभावत उच्च पयावरण जाखम क साथ कि निवश सुनाश्चत करन क लिए विकासत किये गये हैं। EMPs निमाण स सबाधत ह आर नहर, गाद निपटान, साहत पुनवास गातावाधया के लिए विकासत किये गये हैं।

जानकारी प्रकटीकरण के संबंध के साथ, मसौदा ESMF रिपोर्ट और इसके बाद संशोधित संस्करण अक्टूबर 2012 से UPID (http://irrigation.up.nic.in/project.htm) सार्वजनिक और अन्य हितधारकों से आमंत्रित टिप्पणियों और सुझाव के लिए वेबसाइट पर अपलोड किए गए। इसके अतिरिक्त यह रिपोर्ट विश्व बैंक के सूचना केन्द्र की वेबसाइट पर भी उपलब्ध है। इसके अलावा, इन रिपोर्टों का हार्ड और सॉफ्ट प्रतियां संबंधित UPID चीफ कार्यालय एवं अधीक्षण अभियंता कार्यालय में भी सभी हितधारकों से टिप्पणियों और सुझाव प्राप्त करने के लिए सभी इंजीनियरस के कार्यालयों में भी वितरित करायी गई है। अंतिम सामाजिक और पर्यावरणीय EMP / / मूल्यांकन रिपोर्ट सार्वजनिक UPID वेबसाइट और विश्व बैंक के सूचना केन्द्र के माध्यम से खुलासा की जायेगी। कार्यकारी सारांश अंग्रेजी में अनुवाद करने के लिए बैंक प्रकटीकरण नीति संबंधी आवश्यकताओं को पूरा करना जायेगा।

प्रतिकूल पर्यावरण और सामाजिक प्रभावों के लिए दृष्टिकोण

इस आकलन के आधार पर और परियोजना निवेश के संदर्भ में, पर्यावरण और सामाजिक विश्लेषण स्क्रीनिंग मानदण्ड के संभावित प्रतिकूल प्रभावों की भयावहता के आधार पर प्रस्तावित परियोजना को तीन श्रेणियों में विभाजित किया गया है। इसके अलावा एक ऋणात्मक सूची भी तैयार की गई है जिसके तहत कोई भी इस प्रकार का कार्यकलाप प्रतिबन्धित है। एक पर्यावरण और सामाजिक प्रबंधन फ्रेमवर्क भी बनाया गया है जो प्रतिकूल प्रभावों, को कम करने में सहायक होगा और परियोजना के सकारात्मक प्रभावों के उपायों को प्रदान करता है। भूमिका और जिम्मेदारी और कार्यों पर समय से निगरानी सुनिश्चित करने के लिए ई0एस0एम0एफ0 में एक मैट्रिक्स बनाया गया है। इसके अतिरिक्त, पर्यावरणीय और सामाजिक प्रभावों को रोकने के लिए पर्यावरण प्रबंधन योजना भी तैयार की गई है। निर्माण कार्य, नहर पुर्नवास, गाद निपटारीकरण, कीटनाशकों के भण्डारण (वेस्ट प्रबंधन योजना) के लिए ई0एम0पी0 बनाये गए हैं। पर्यावरणीय एवं सामाजिक मूल्यांकन / ई0एस0एम0एफ0 / ई0एम0पी0 रिपोर्ट पर टिप्पणी के लिए हिन्दी और अंग्रेजी में सार्वजनिक किया गया है। जो कि विश्व बैंक के प्रकटीकरण नीति संबंधी आवश्यकताओं को पूरा करती है।

विश्व बैंक की लागू होने वाली रक्षा नीतियाँ

कोई भी बड़े पैमाने पर महत्वपूर्ण और अपरिवर्तनीय पर्यावरण और सामाजिक प्रभाव परियोजना से संभावित नहीं है। मूल्यांकन के प्रमुख बिन्दुओं से पता लगता है कि प्रतिकूल प्रभावों के भौगोलिक प्रसार की संभावना नहीं है। सामाजिक प्रभावों के संदर्भ में सिम एक्ट के माध्यम से वाटर यूजर एसोसियेशन सिंचाई वितरण प्रणाली एवं प्रबंधन में परिवर्तन होगा। नहर किनारे (विशिष्ट परियोजना घटकों के तहत) प्रभाव हो सकते हैं जो कि ई0एस0एम0एफ0 में दिए गये हैं। जबकि परियोजना सिंचाई प्रणाली और कृषि गतिविधियों के पुनर्वास पर निवेश के माध्यम से खेती करने वाले समुदायों को लाभ पहुँचाने के लिए बनाया गया है। प्रस्तावित परियोजना से लोगों और भूमि पर प्रतिकूल प्रभाव हो सकते हैं। खासकर पुनर्वास और आधुनिकीकरण के लिए प्रस्तावित 100 कि0मी0 नहरों से। प्रस्तावित परियोजना श्रेणी ए में चिह्नित की गयी है। यह परियोजना विश्व बैंक

की चार नीतियों, अर्थात पर्यावरण आकलन (ओ0पी0 – 4.01), बाँधो की सुरक्षा (ओ0पी0 – 4.37), अनैच्छिक पुनर्वास (ओ0पी0 – 4.12), कीट प्रबंधन (ओ0पी0 – 4.09) और एक कानूनी नीति, अंतराष्ट्रीय जलमार्गों पर परियोजना (ओ0पी0 – 7.50) को सक्रिय करती है।

नहर और सम्बन्धित ढाँचों के पुनर्वास और आधुनिकीकरण के लिए भूमि अधिग्रहण या पुनर्वास एवं पुनर्वास के लिए किसी की जरूरत को शामिल करने की संभावना नहीं है। दुर्लभ घटना में इस नीती का सक्रिय होना जरूरी हो जाता है। इस पहलू पर ध्यान केन्द्रित करते हुए एक पुर्नवास ढाँचा भी तैयार किया गया है। इस ढाँचे के अन्तर्गत अनैच्छिक पुनर्वास पर बैंक ओपी 4.12 के प्रावधानों के अनुरूप यूपी स्टेट आर एण्ड आर नीति के साथ लागू किया जाएगा। परियोजना क्षेत्र में आदिवासी आबादी नगण्य है और इसलिए ओ0पी0 4.10 लागू नहीं होता है। इसके अतिरिक्त परियोजना क्षेत्र में कोई मौजूद, आदिवासी परिवारों का रिकार्ड रखने और उनको हर अवसर का उपयोग करने के लिए आसपास के क्षत्र में ले जाया जाएगा। बांधों की सुरक्षा (ओ0पी0 4.37 बुंदेलखण्ड क्षेत्र में तीन जलाशयों पर लागू होता है और इनकी अलग पर्यावरण सामाजिक रिपोर्ट बनायी गई है।

प्रस्तावित परियोजना क्रियाओं के लिए विकल्प के विश्लेषण पर विचार किया गया। इस दूसरे चरण में राज्य में मौजूदा जल निकासी, सिंचाई के बुनियादी ढाँचे, आधुनिकीकरण और पुर्नवास के सिमित विकल्प हैं। नई सिंचाई बुनियादी ढाँचा एक विकल्प माना गया है, लेकिन इस परियोजना में कोई नई सिंचाई बुनियादी ढाँचा नहीं बनाया जायेगा। इसके लिए प्रथम चरण की मौजूदा सिंचाई बुनियादी ढाँचे का उपयोग और सुधार प्रस्तावित है। यहाँ एक सख्त सिंचाई सेवा प्रदान करने और कृषि उत्पादकता का बढ़ना, खाद्य सुरक्षा, अच्छी जल संसाधन को सुनिश्चित करना और तेजी से बढ़ती हुई जनसंख्या के विशेष रूप से माँगों को पूरा करने की आवश्यकता है। दूसरा विकल्प, भूजल प्रबन्धन है। संयुक्त उपयोग क्षेत्रों में जहाँ दोनों सतह के पानी का उपयोग और प्रबन्धन एक संभावित विकल्प है। दोहरी रोस्टर सिंचाई जल संसाधन स्थिरता में सुधार करने के लिए एक प्रभावी विकल्प हो सकता है। सिंचाई श्रोतों के प्रस्तावित संयुक्त उपयोग भी पर्यावरण और संसाधन स्थिरता में अच्छे परिणाम के रूप में अच्छा माना गया है। यह परियोजना में सकारात्मक विनयेश की अनुमति देता है।

पर्यावरण और सामाजिक प्रबंधन फ्रेमवर्क

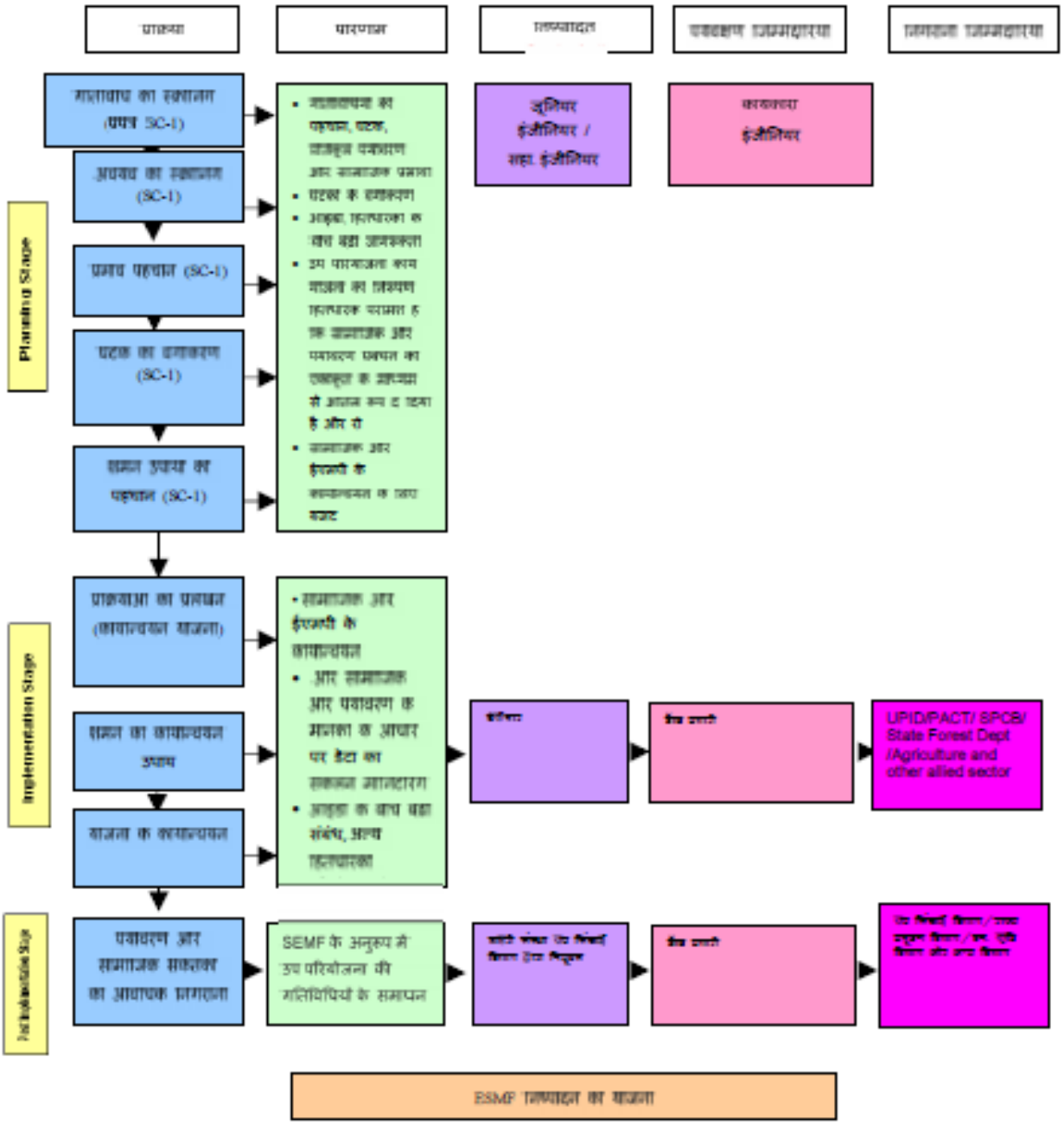
प्रस्तावित परियोजना की क्रियाओं के प्रभावों को कम करने के लिए, एक पर्यावरण और सामाजिक विश्लेषण सभी परियोजना चरण–2 के क्षेत्रों में किया गया है। पर्यावरण और सामाजिक ढाँचे (ई0एस0एम0एफ0) समग्र दिशा निर्देशों और प्रक्रियाओं के साथ (निचली गंगा नहर और हैदरगढ़ शाखा) प्रदान करने के लिए बनाया गया है।

पर्यावरण और सामाजिक विश्लेषण विभिन्न परियोजना निवेश पर स्पष्ट मार्ग दर्शन प्रदान करने और प्रतिकूल प्रभावों को कम करने के लिए, प्रस्तावित परियोजना से होने वाले प्रतिकूल प्रभावों को तीन श्रेणी में रखा गया है। 1– श्रेणी एः गतिविधि /अवयव जो प्रमुख पर्यावरण/सामाजिक प्रभाव डालेंगे और ई0एम0पी0 की आवश्यकता है, जहाँ भी ई0एम0पी0 लागू होता है वहाँ (Bid Document) और ठेकेदार द्वारा लागू किया जायेगा। 2– श्रेणी बीः इस श्रेणी का माध्यम पर्यावरण और सामाजिक प्रभावों को दूर करने और निर्माण के समय ठेकेदारों/संस्थाओं पर लागू होगा। ई0एस0एम0एफ0 और विशिष्ट प्रबन्धन के हिस्से के रूप में शामिल उपायों को भी इस परियोजना की अवधि के

दौरान लागू करने की योजना है। 3– श्रेणी सीः नगण्य या शून्य पर्यावरण और सामाजिक प्रभावों को इस श्रेणी में रखा गया है, और इन गतिविधियों के लिए कोई भी उपाय नहीं दिया गया है।

प्रारम्भिक पर्यावरण और सामाजिक विश्लेषण की डिजाइन कुंजी और प्रभावों को कम करने के उपायों और रणनीतियों का परिचय, विभिन्न विचार विमर्श से ज्ञात होता है कि परियोजना क्षेत्र में सिंचाई के लिए भूजल का अधिक मात्रा में उपयोग किया जा रहा है ज्यादातर वहीं सुनिश्चित सिंचाई सुविधाओं की कमी है। गिरते जल स्तर, गुणवत्ता और निर्भरता के महत्वपूर्ण मुद्दों को संबोधित करने के लिए कुछ पर्यावरण उपायों का उप–घटक बी3 का समावेश किया गया है। इस परियोजना से राज्य में कोई जैव विविधता का नुकसान नहीं है। कुछ महत्वपूर्ण प्रभाव नहर और झीलों में हो सकते है। परियोजना के रूप में अलग धनराशि निर्धारित कर सकते है।

प्रस्तावित परियोजना के प्रभावों को कम करने के उपायों का ई0एम0पी0 बनाये गये है। जो कि अनुलग्नकः 6.1 में दिए गये है। इनमें निर्माण शिविरों के लिए योजना, ठोस प्रबंधन, निर्माण और उपकरणों का प्रबंधन, उर्वरक एवं कीटनाशक से निपटने और भंडारण, समन्वित कीट प्रबंधन, सार्वजनिक स्वास्थ्य कार्यकर्ता, सुरक्षा वृक्षारोपण, गाद निपटारण जैव विविधता, शामिल है। पुनर्वास ढाँचा का अनुलग्नक 6.2 में विवरण दिया है।


Planning Stage
Implementation Stage
UPID/PACT/ SPCB/ State Forest Dept /Agriculture and other allied sector
ESMF कार्यान्वयन का योजना

प्रस्तावित परियोजना के कार्यान्वयन के लिए अंतर्विभागीय समन्वय की आवश्यकता है। कार्यान्वयन विभागों के संदर्भ में उत्तर प्रदेश सिंचाई विभाग घटक ए, बी1, बी2, सी, ई और एफ1 को लागू करने के लिए जिम्मेदार होगा। कृषि विभाग घटक डी को लागू करने के लिए जिम्मेदार होगा। एक अच्छे नागीदारी के लिए एक वरिष्ठ (संयुक्त निदेशक स्तर) का कृषि अधिकारी को पैक्ट में नियुक्ति किया जायेगा। भूजल विभाग घटक बी3 को लागू करने के लिए जिम्मेदार होगा, हालाँकि निर्माण कार्यों के लिए इसका प्रयोग नहीं किया जायेगा। रिमोट सेंसिंग केन्द्र फसल और उत्पादकता विश्लेषण, सेटे लाइट छाया चित्रों की निगरानी प्रदान करेगा। राज्य ग्रामीण विकास संस्थान नी उत्तर प्रदेश सिंचाई विभाग के साथ प्राथमिक शिक्षा अभियान और पानी के उपयोग कर्ताओं संघों की क्षमता का निर्माण करेगा।

ई0एस0एम0एफ0 का कार्यान्वयन, जागरूकता में बढ़ोतारी, वातावरण /सामाजिक मुद्दों और सिंचाई क्षेत्रों में समस्याओं को निपटाने का बेहतर उपाय होगा। इस ई0एस0एम0एफ0 में सूचना शिक्षा और संचार रणनीति, क्षमता निर्माण, प्रशिक्षण योजना और निगरानी एवं मूल्यांकन के लिए अनुसूची तैयार की गई है। सुझाव और सूचना शिक्षा संचार के लिए रणनीति ढाँचा बनाया गया है। निगरानी एवं जाँच तंत्र में पर्यावरण और सामाजिक प्रभावों को शामिल किया गया है। इसके अलावा, यू0पी0एस0आर0पी0 2 के लिए विकसित ई0एस0एम0एफ0 परियोजना प्रबंधन प्रणालियों और प्रक्रियाओं के साथ प्रभावी ढंग से लागू कर सकते हैं। पर्यावरण एवं सामाजिक मूल्यांकन ई0एस0ए0 जोखिम और मौजूदा चुनौतियों को कम करने के लिए इस परियोजना में बनाया गया है। इसमें मौजूदा प्रणाली का वर्णन किया गया है।

ई0एस0एम0एफ0 के प्रतिकूल पर्यावरण और सामाजिक प्रभावों को पर्याप्त रूप से संबोधित किया जाएगा, इसमें संस्थागत और कार्यान्वयन व्यवस्था प्रथम चरण और विश्व बैंक की प्रक्रियाओं के अनुसार होगा। प्राथमिक समन्वय बहु अनुशासनात्मक द्वितीय चरण पैक्ट के अध्यक्ष (भारतीय प्रशासनिक सेवा) के नेतृत्व में विभिन्न तकनीकी और प्रशासनिक विशेषज्ञों की निगरानी में होगा। कई सालों से विश्व बैंक की टीम के साथ, पैक्ट ने इस क्षेत्र में विश्व बैंक की प्रक्रियाओं (कार्यान्वयन जोखिम) और परियोजना स्तर पर महत्वपूर्ण क्षमता का विकास किया है। पैक्ट का कार्य परियोजना का कार्यान्वयन, वित्तीय प्रबंधन, पर्यावरण एवं सामाजिक सुरक्षा नीतियों का संचालन है। प्रथम चरण में पैक्ट में विषय विशेषज्ञों की नियुक्ति प्रस्तावित थी, लेकिन यह पिम, वित्तीय प्रबंधन, निगरानी और मूल्यांकन के लिए सर्वेक्षण और डिजाइन, पुनर्वास, प्रशिक्षण, सूचना प्रबंधन प्रणाली, कृषि, पर्यावरण, सामाजिक और भूजल तक सीमित नहीं थी। ये अधिकारी विभिन्न विभागों की मदद करने के लिए भी जिम्मेदार होंगे। लगभग $6.85 m (7 वर्षों की अवधि के लिए) बजट ई0एस0एम0एफ0 के कार्यान्वयन के लिए कल्पना की गई है, जो कि कर्मचारियों, प्रशिक्षण और विशेष अध्ययन (यदि आवश्यक हो) को भी शामिल किया गया है।

इसके अतिरिक्त, अनुलग्नक 6.3 में पैक्ट में पर्यावरण सेल की स्थापना और सिंचाई विभाग की बाँध सुरक्षा सेल के साथ उनके कार्यकारी सम्बन्ध के बारे में चर्चा एवं सुझाव प्रस्तुत किये हैं।

Chapter 1: Introduction

1.0 Water Resource Development in Uttar Pradesh

A large network of perennial rivers, mostly flowing from the Himalayas, contributes to Uttar Pradesh vast water resources potential and provides drainage to the state. Major rivers include Ganga, Yamuna, Ghaghra, Gomti, Gandak, Sone and Sarda, as shown in **Figure 1.1**. A deep alluvial aquifer underlies the vast plains, recharged annually by almost 1000 mm monsoon rainfall. Salient features of the State are given in Box 1.1.

Box 1.1 Uttar Pradesh at a Glance

The state of Uttar Pradesh (UP), having a geographical area of 24 MHa and a population of 166 million inhabitants accounting for 9% of India's total land area, and 17% of its population, is endowed with rich natural resource potential, lies in the fertile Indo-Gangetic plain with high natural soil fertility, abundant rainfall, and surface and groundwater resources. Five major rivers, the Ganga, Yamuna, Ramganga, Gomti and Ghagra flow through the state. All the rivers are part of Ganga Basin and ultimately drain into the Bay of Bengal.

Physio-graphically, the state is broadly divided into two regions, the southern hills, plateau, and the vast alluvial Gangetic Plains. The state has four major regions viz. Southern UP (Bundelkhand), Western UP, Central UP, Eastern UP. Administratively there are 75 districts in the state.

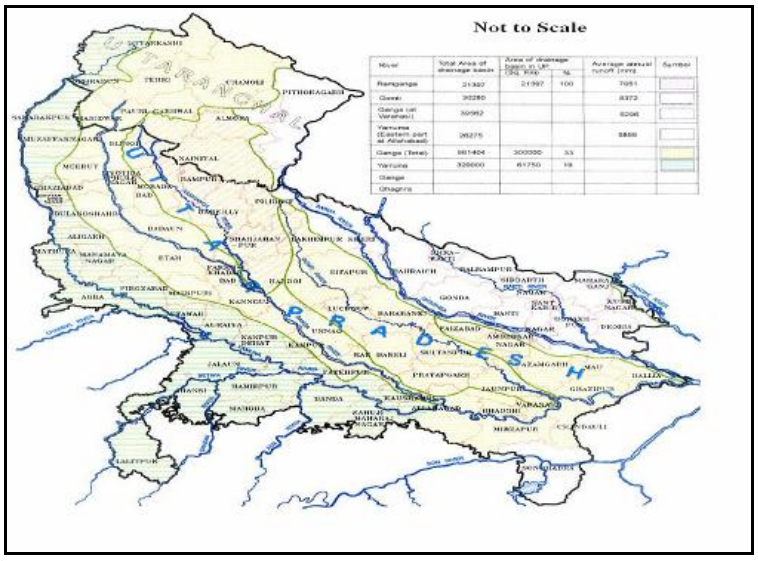
The economy of UP is predominantly dependent on agriculture, which accounts for 40% of state's GDP, and 75% of employment. The total arable land in the state is about 19.3 MHa out of which 92% is used for agriculture. Approximately 70% of total agricultural land in UP is dependent on irrigation using surface water sources with an average gross cropping intensity of about 100%.

The major rivers in the state provide water for canal irrigation. Over the past century, one of the world's largest canal systems has been constructed in the State, which supports a predominantly rice-wheat cropping system. The total length of the canal system in the state is about 71780 km, which consists of 4261 km of major canals and 7107 km of branch canals. The major canal systems in the state include Upper Ganga Canal, Eastern Yamuna Canal, Agra Canal, Lower Ganga Canal, Sarda Canal and Sarda Sahayak Canal System, Gandak Canal, Ken Canal and Betwa Canal systems. About 43.8 BCM of surface water is utilized for irrigation out of a total of about 161.70 BCM of surface water in the state. As per MoWR data, the total irrigation potential created at the end of ninth plan in the state is about 29.5 MHa (31% of the total national potential), out of which 80% has been utilized. Most of irrigation headworks are run-of-river systems, supplemented by some small reservoirs at some places particularly in the Shivalik foothills of the Himalayas and in Bundelkhand region.

MoWR, GoI data indicates that the annual replenishable ground water resource in the state is about 76.35 BCM per year with net annual ground water availability of about 70.18 BCM per year, out of which 48.78 BCM per year is the total draft. The stage of ground water development in the state has been estimated to be 70%.

The recent statistics on human development shows that the socio-economic and human development in UP has fallen behind India's better performing states. Agriculture sector performance has lagged behind while the rate of poverty is increasing (with an estimated 35% living below the poverty line) every year. The existing huge gap between the present farm productivity and its potential is increasing gradually. Sustainability of agriculture is threatened by water-logging and consequent soil salinity-sodicity in canal command areas, whereas groundwater depletion is also occurring in some other areas, resulting in reduced productivity.

Further, during monsoon period, the rivers cause flooding of large areas, particularly in Eastern UP, resulting into considerable loss of crops, life and property. Overall scenario indicates that due to changes in cropping pattern, competition from increasing demands for agriculture, domestic usage, power, industrial, environmental and other uses, allocation of water to different stakeholders in appropriate quantity and quality has become increasingly difficult while considerable losses occur due to natural disasters like flooding and droughts. **In the above context, a long term program Uttar Pradesh Water Sector Restructuring Project was initiated to address the issues related to water and related sectors in the state.**



Source: ID, GoUP

Figure 1.1: Major rivers & drainage basins of Uttar Pradesh

UPWSRP – Phase I

UPWSRP Phase – 1 took place over 2002-2011 with financial loan assistance of US$ 150 million from World Bank (WB) and with the following development objectives: (i) setting up enabling institutional and policy frame work for water sector reform in the state for integrated water resources management (IWRM); and (ii) initiating irrigation, agriculture and drainage sub-sector reforms in the state to increase and sustain water and agricultural productivity. Under the Phase I operation, key institutions for water resources management at the State level were set up. Integrated water resources management activities were carried out in the Ghaghra-Gomti basin. In particular, a basin plan was prepared for the basin and the Jaunpur Branch Sub-basin Development and Management Board was put in place. Irrigation and drainage systems covering about 300,000 ha were rehabilitated and modernized in Jaunpur Branch basin using modern surveys and designs. More than 800 WUAs (at the minor levels) were established and the Uttar Pradesh Participatory Irrigation Management Act was passed in 2009.

A Basin Social and Environmental Assessment study was carried out for Ghaghra Gomti Basin (GG-BSEA). This study was prepared based on the basin planning activities, and a social and environmental baseline was established. Social and environmental and institutional issues were then identified and mitigation options were proposed. Training and capacity building needs were assessed and a training program was developed. A basin level social, environmental and institutional and monitoring framework was prepared for implementation during Phase II.

Some of the gaps in the BSEA which have been observed while implementing the environmental and social framework study are given below.

- The study area did not include Bundelkhand and Lower Ganga Canal System, which have different environmental and social features.
- Institutional structures for mainstreaming environmental and social safeguards recommended in BSEA have not been implemented.
- Training and capacity building of UPID and other stakeholders recommended under BSEA have been partly implemented only.
- Environmental and social safeguard indicator / parameter monitoring framework / system which were recommended in BSEA is yet to be implemented.

The social and environmental knowledge base and infrastructure (GIS) developed by both PACT and SWaRA while implementing BSEA during Phase I can be utilized for implementing social and environmental interventions during Phase II.

UPWSRP - Phase II

UPWSRP was initiated with a long term perspective of 12-15 years to cover entire State and therefore, GoUP has decided to continue the efforts already initiated under Phase –I for funding from WB under Phase-II. Prior to 15th March 2012, it was planned in principle to focus on Bundelkhand region to study and implement IWRM in order to reform the water and agriculture sector with emphasis to mitigate droughts and to rehabilitate this region. A major shift in Phase II project area was then decided. Lower Ganga Canal System (LGC) has been included in the Phase II, while only a selected portion of Bundelkhand and the Sharda Sahayak Canal System (Haidergarh Branch) have been retained.

1.1 Project Area & Project Activities

The project area includes Lalitpur district of Bundelkhand region, three districts, namely Amethi, Barabanki & Rae Bareli under Sharda Sahayak Command Area, and twelve districts, namely Kasganj, Etah, Firozabad, Manipuri, Farrukhabad, Etawah, Kannauj, Auraiya, Kanpur Dehat, Kanpur Nagar, Fatehpur & Kaushambi under Lower Ganga Canal system. Basin-wise area covered under the project is given in **Table 1.1** and shown in **Figure 1.3**.

Table 1.1: Basin wise study area

Sl. No.	Basin/Project Name	GCA (Lakh ha)
1.0	***Bundelkhand Region***	
1.1	Portion of Betwa canal command consisting of Jamini Dam, Sajnam Dam and Rohini Dam	0.87
Sub Total		**0.87**
2.0	***Sharda Sahayak Command***	
2.1	Haidergarh branch of Sarda Sahayak	0.98
3.0	***Lower Ganga Canal (LGC)***	
3.1	LGC Canal Command Area	27
Sub Total		**27.98**
Grand Total (1.0+2.0+3.0)		**28.85**

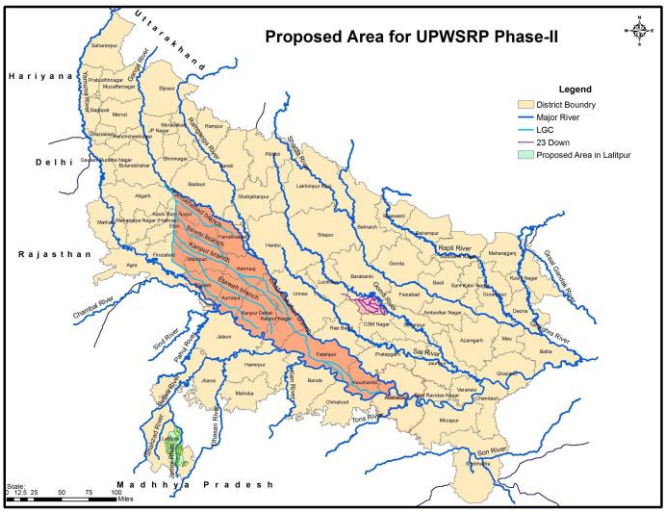


Figure 1.3: Study Area

Source: UPID, GoUP

The project has six components with a total outlay of about US$ 515 million, including about US$ 165 million contributed by the State as its share. These components are listed below.

- Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination.
- Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems.
- Component C: Consolidation and Enhancement of Irrigation Institutional Reforms
- Component D: Enhancing Agriculture Productivity and On-Farm Water Management.
- Component E: Feasibility Studies and Preparation Activities for the Next Phase
- Component F: Project Coordination and Monitoring.

1.2 Need for the Environmental and Social Management Framework

The implementation of UPWSRP Phase II components will have social and environmental impacts. Therefore, the Project Activity Core Team (PACT), on behalf of UPWSRP, Government of Uttar Pradesh (GoUP), is carrying out an environment and social assessment of the study area. The environmental and social analysis will lead to the development of the Environmental and Social Management Framework (ESMF) in order to mainstream social and environmental safeguards during Phase II planning and implementation.

1.3 Objectives of the study

The objectives are:

- to identify environmental, social and socio-economic issues in the Bundelkhand project areas
- to identify potential impacts (both positive and negative) of the proposed investments under Phase II
- to provide relevant mitigation measures to contain/minimize/reverse the potential negative impacts of the project investments as well as replicate/upscale/intensify the potential positive impacts

- to prepare an Environmental and Social Management Framework (ESMF) that will guide implementers at various levels to mainstream environmental and social issues
- to develop appropriate recommendations for sustainable utilization of water resources by integrating environmental and social concerns in water sector planning and management

1.4 Scope of Work

The scope of work is the following, as per the ToR for the study:

- Identifying key environmental and social issues in the geographical areas covered by the project and assessing the potential impacts arising from proposed project investments.
- Undertake a detailed review of legal, policy and regulatory environment as well as of the institutional framework in place for management of the water sector and irrigation service delivery.
- Develop Environmental Management Plans (EMPs) for investments that are known and prepare an Environmental and Social Management Framework (ESMF) for new project investments.
- Prepare a detailed social and environmental mitigation plan for the identified issues and potential adverse impacts.
- Prepare a Monitoring and Evaluation (M&E) strategy and plan including a list of key environmental and social indicators for monitoring at various levels.
- Prepare a training and capacity building plan on social and environmental issues, given the intended stakeholders and institutions.
- Develop a communications and consultation strategy to guide project investments during the implementation phase.

1.5 Approach & Methodology

A comprehensive approach and methodology, with a step-wise approach, has been adopted to develop the Environmental and Social Management Framework for Bundelkhand area.

Step 1: Gap analysis has been carried out based on data available from earlier GGB BSEA study and requirements of the current assignment.

Step 2: A comprehensive policy & regulatory review at national & state level has been carried out by summarizing the applicable policies and regulations. Applicable Safeguard policies of the World Bank have also been reviewed & summarized.

Step 3: Secondary and primary data collection and analysis. All the relevant data from secondary sources has been presented geographically & in database format. Identification of hotspots with different attributes have been further confirmed through stakeholder consultations and selected ground truthing. This leads to identification of issues, causes and broad level impacts.

Step 4: Extent and level of impacts has been assessed by using trend analysis, outputs from the earlier studies.

Step 5: Based on the impact analysis of adaptive and mitigative activities has been formulated.

Step 6: A monitoring and evaluation (M&E) strategy and plan including a list of key environmental and social indicators for monitoring at various levels has been prepared. The objective is both to monitor impacts identified in step 4 and outputs of activities identified in step 5.

Step 7: Development of ESMF and EMP. An institutional assessment has been carried out and outputs of steps 4, 5 and 6 have been mapped with respective institutions so that 'roles' and "responsibilities" for implementation are assigned during implementation.

Step 8: Training needs assessment has been carried out by using the outputs from Steps 1 to 7 and existing training modules have been strengthened. This will lead to develop a training and capacity building plan on social and environmental issues during implementation.

Step 9: Consultation and communication needs assessment has been carried out through different stakeholders consultations identified in step 1 and assessed through step 3 and step 7. This has lead to development of consultation and communication plan.

Step 10: Presentation of outputs through stakeholders' consultations by conducting two workshops, after submitting final report.

Secondary data has been collected from the various State and national level agencies such as Ministry of Environment and Forest, Central Water Commission, National River Conservation Directorate, The Energy Research Institute, Central Pollution Control Board, State Pollution Control Board, Department of Environment (GoUP), Ground Water Board (State And Central), Irrigation Department, Agriculture Department, Project Activity Core Team, State Water Resource Agency, UP Planning Commission, Department of Rural Development, Department of Health And Family Welfare, Department of Revenue And Land Record, Uttar Pradesh Diversified Agriculture Support Project, UP Bhumi Sudhar Nigam and all other relevant agencies. This data is in the form of reports, quantitative figures in excel format, table, graphs, bar charts and text. Primary data has been collected using KAP & PRA, focus group meetings / discussions, semi-structured interviews, workshops and scientific environmental tests.

Participatory Focus Group Meetings: Participatory focus group meetings provide a useful forum for a range of stakeholders to share their opinions and concerns regarding specific topics. A focus group discussion (FGD) guide was prepared and submitted to PACT in February 2012, which has been finalized and used for conducting FGD. This was modified for carrying out FGDs in the study area.

Other related tools such as Trend analysis; Social mapping; information and document review; quantitative household and community interviews; Semi-structured interviews and stakeholder workshops had been employed as part of PRAs to capture information on specific topics of interest.

1.6 Structure of the Report

This report is being submitted in two volumes. Volume I comprises of the following:

Chapter 1 - Introduction: Brief description of the context and objectives of the ESMF
Chapter 2 - Social/Socio-economic & Environmental policy, legal and guidelines: Brief review of policies and legislative acts both at the Central/State Government and safeguard requirements of the World Bank
Chapter 3 - Project Description: Description of project components and sub components and their potential social and environmental impacts
Chapter 4 - Socio-economic and Environmental Profile: Review of baseline data & social and environmental profile of the study area.
Chapter 5 - Stakeholders Consultation
Chapter 6 - Environmental and Social Impacts and their Management & Mitigation: Provision of adequate safeguards and measures to improve the mainstreaming of social and environmental issues in water resources management
Chapter 7 - IEC strategy, Capacity-Building & Training, Monitoring & Evaluation
Annexure 6.1: EMPs
Annexure 6.2: Resettlement Policy Framework

Volume 2 consists of Annexures & data.
Annexure 2.1 - Policies and Regulatory Framework
Annexure 4.1 - Secondary Data Tables
Annexure 4.2- Primary Data Tables
Annexure 4.3 - Rainfall Profile in Lalitpur
Annexure 4.4 - Performance of Irrigation Projects, Performance of Canal Systems & Performance of Canal Tails
Annexure 4.5 - Year wise ground water quality status
Annexure 4.6 - District wise Wetland Atlas
Annexure 6.2 A – A summary of various Government Policies and Ordres related to land acquisition and resettlement and rehabilitation

Use of this report

The report has been prepared with the expressed understanding that the consultant will provide support and assistance to the client in meeting the disclosure requirement of the project, which, at the minimum, shall meet the World Bank policy on public disclosure and requirements under the Right to Information Act of the Government.

Chapter 2: Legislative, Regulatory and Policy Framework

2.0 Introduction

The effective mainstreaming of environmental and social concerns for sustainable water resource development means their integration within the legal, policy and institutional regimes at different levels of administration in the country and state. Therefore, a review of the existing policy, regulatory and institutional framework related to safeguards to water resources, environment and natural resources, and social sector has been carried out, and findings are summarized in the following sections. Further, the safeguard requirements of the World Bank have also been reviewed & summarized below.

2.1 Policy and regulatory framework to deal with water management, social and environmental safeguards

Policy and regulatory frameworks at national and state level have been formulated to provide for social and environmental safeguards in the last two decades. The policy framework includes in particular water sectorrelated policies and policies related to environmental safeguards, both at the national and state level. Sector policies include Constitutional Provisions, National Water Policy, UP State Water Policy & UP Agriculture Policy. Environmental & Social Safeguard related policies include National Environment Policy, National Forest Policy, State's Forest Policy & National Policy on Resettlement & Rehabilitation. **These policies are presented in Annexure 2.1.** The EIA notification of 2006 forms the basis of environmental & social assessment of water resources project in U.P. The key water act, rules and notification of Government of Uttar Pradesh as it relates to the project is Northern India Canal & Drainage Act (1873). Other relevant regulations which may be applicable are presened in **Annexure 2.1**.

2.2 Applicable Policy, Rules & Regulation to project interventions / activities

2.2.1 EIA Notification

This is the Indian Government's Guidelines for environmental impact assessment governing all development interventions that take place within the boundaries of India. EIA notification was first issued by Ministry of Environment and Forests (MoEF) in 1994 and later amended in 2002 and 2006. Under the latest EIA Notification, 14th September 2006, all projects listed in Schedule -1 of the Notification require prior environmental clearance. The objective of the notification is to formulate a transparent, decentralized and efficient regulatory mechanism to:

- Incorporate necessary environmental safeguards at planning stage
- Involve stakeholders in the public consultation process

- Identify developmental projects based on impact potential instead of the investment criteria

As per new notification, item 1(C) on river valley, projects having more than 10,000 ha of Culturable Command Area (CCA) fall in category A projects, while projects having less than 10,000 ha of CCA fall under category B projects. Category A projects require submission of EIA report as per issued ToR by national environmental appraisal committee and public consultation before getting environmental clearance from Central Government. Category B projects require clearance from State's Environmental Appraisal Committee. Since the activities currently contemplated under phase II fall under the rehabilitation & modernization project without any change in CCA, this notification appears not to be applicable. ***However, environmental and social due diligence needs to be carried out, while preparing detailed project report for rehabilitation and modernization sub components.***

2.2.2 Other national and State acts

At the state level, the Department of Environment (DE) in UP has its own guidelines for carrying out environmental assessments, including the list of types of projects that require EIAs and instructions on how they should be carried out. The guidelines include "Irrigation Systems" in the list and provide an index of environmental considerations that should be addressed when carrying out an EIA.

No EA procedure exists in the UPID's operating and management rules. In guidelines for "studies and reporting" produced by the previous Ministry of Irrigation (now the Ministry of Water Resources) at central level, the environment was designated as "requiring attention". These guidelines set down a methodology for carrying out environmental studies associated with I&D works. Similar guidelines were also prepared by the Central Board of Irrigation and Power. However, UPID has initiated environmental assessment, which becomes a part of DPR for I&D works. This has been found by referring ToR for topographical and cadastral survey for the project area of Haidargarh branch canal system.

In between 1986 and 2011, a number of acts were enacted. Some of these enactments, which are applicable in the context of this project, are given in **Table 2.1.**

Table 2.1: Applicable Environmental Laws and Regulations

Rules & Regulation	Major Provisions	Remarks
The Environmental Protection Act, 1986	Chapter 1, Item 2 Chapter II, Item 3 (1), (2) Chapter III, Items 7, 8, 9, 11, 15, 17 Environment (Protection) Rules 1986, Item 3	Application is restricted for mainstreaming and not required for clearance from Competent Authority.
The Water (Prevention and Control of Pollution) Act, 1974	Chapter 1, Item 2, Chapter V, Item 24, 25, 26, 28, 31, 32, 33, Chapter VII, Item 42, 43, 44, 45, 46, 48, 49 Water (Prevention & Control of Pollution) Rules 1975, Schedule IV	Application is restricted for mainstreaming and not required for clearance from Competent Authority.
Forest Conservation Act 1980, and 1988 amendment	Item 2, 3 (A), 3(B) Forest Conservation Rules, Item 2, 6, 7, 8, 9	Applicable only if forest land involved; unlikely as only existing canals are part of project, which do not pass through any forest areas

Rules & Regulation	Major Provisions	Remarks
Wildlife Protection Act (1972) (as amended up to 1993)	Item (24), (14), (15), (16), (17), (23), (24), (25), (26), (27), (28), (36), (37), Chapter 3, Chapter 4, (Part I, Part II, Part III, Schedule I, Part IV), Schedule II (Part I, Part II), Schedule III, (Part IV, Part V & Part VI)	Not Applicable; No protected area is close to present activity.
The Air (Prevention and Control of Pollution) Act, 1981	Chapter I, Item 2, Chapter IV, Item 19, 20, 21, 26, 28, 29 National Ambient Air Quality Standards Schedule VII of EPA Act	Application is restricted to mainstream and not for required clearance from competent Authority. However, it will be applicable during the construction phase e.g. operation of batching plant if required.
EIA notification dated September 14, 2006	Rule 2, Rule 3, Rule 4, Rule 5, Rule 7, Schedule 1 (c)	Applicable only, if GCA is increased.
The Municipal Solid Wastes (Management and Handling) Rules, 2000	Item 3, 5, 7, 9, Schedule 2, Schedule 3, Schedule 4	It will be applicable during the construction phase e.g. from Labor Camp.
Wetland, 2010 Rules	Chapter I, item 2 (a), 2 (b), 2 (c) Rules 2 (a), (b), (c), (e), (g). Rules 3 (i), (ii), (iii), (iv), (v), (vi), Rules 4(1): (i), (iii), (iv), (v), (vi), (vii) Rules (2): (i), (iv), (v), (vi), (vii), (viii), (x), (xi), 4 (4), Rule 6 (2), Rule 8	It will be applicable and permission shall be required from the State Authority under item 2 of Rule 4.
Contract Labour (Regulation & Abolotion) Act, 1970	All Sections	Shall be applicable during construction period
Child Labour (Prohibition & Regulation) Act, 1986	All Sections	Shall be applicable during construction period
The Building and other construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 and the Cess Act of 1996	All Sections	Shall be applicable during construction period
Uttar Pradesh Maternity Benefit Act, 1951	All Sections	Shall be applicable in case of women labour
Uttar Pradesh Participatory Irrigation Management Act, 2009.	Chapter I – Item 2 (a) to (aac) Chapter II – Item 4 (v), item 5, 2 (a), (b), (c), (d) – Item 9 Chapter IV – Item 33 (1)	Shall be applicable throughtout the project/after the project
Uttar Pradesh UP WaMReC Act/Rules	Chapter I, Item 1, Item 2, Chapter III, Item 12 (f), (k),(l), (m), Item 13, Item 14, Item 16, Item 20, Item 21	Shall be applicable throughtout the project/after the project

2. 3 World Bank safeguard requirements

The operational guidelines under which WB projects are appraised based on EAs in the "project cycle" are detailed and specific. As a consequence the WB's EA source book, directives, policies, drafts terms of reference and technical updates have guided the preparation of this EA. All central and state EA regulations and conventions referenced have been cross checked with the WB procedures to ensure that all the points raised have been identified and satisfactorily dealt with. The WB classify Category "A" projects as those "likely to have significant environmental impacts that are diverse and unprecedented". On the other hand Category "B" projects are those whose "potential adverse environmental impacts on human populations or environmentally important areas-including wetlands, forests, grasslands, and

other natural habitats are less adverse than those of Category A projects[1]. The applications of World Bank Safeguard Policies in project are summarized in the **Table 2.2.**

Table 2.2: Application of Bank Safeguard Policies

WB Safeguard Policy	Triggered (Yes/No)	Summary	Application to the Project and Compliance Mechanisms
Environmental Assessment (OP/BP 4.01)	Yes	This is an umbrella process to ensure compliance with all other Bank safeguard policies. It provides a framework for analyzing the present conditions and predicting the likely impacts of the development projects. The environmental consequences of the project are taken in to consideration during the project cycle and are taken into account in selection, siting, planning and designing of projects. It emphasizes upon the mitigative measures so as to reduce the adverse environmental consequences.	➢ This project belongs to category A hence the Operational Policy (OP) is applicable to the project. ➢ The proposed investments could have adverse but geographically limited environmental impacts. Physical/civil works are of a rehabilitation nature on existing canal system and are unlikely to cause any significant adverse environmental or social impacts. Most impacts are likely to be limited to the rehabilitation phase of the infrstructure and no long-term adverse impacts are expected. ➢ The social and environmental assessment has been carried out and a range of preventive and mitigation measures are proposed as part of the Environmental and Social Management Framework (ESMF). Wherever required, Environmental Management Plans (EMP) are also prepared.
Natural habitats (OP 4.04, BP 4.04)	No	This policy emphasizes upon the conservation of the natural habitats like land, water, etc. It focuses upon the natural resource management so as to ensure environmentally sustainable development. It aims to support the protection maintenance and rehabilitation of the natural habitats and critical and semi-critical ecosystems.	➢ This OP is not applicable to the project. The project investments would not convert any critical or non-critical natural habitats. Any identified adverse impact is limited in nature and scope, both spatially and temporally. Further, any unlikely adverse impact on natural habitats would be addressed through the screening criteria included in the ESMF and an EMP has been prepared to deal with such possibilities. Finally, support for management of wetland and waterlogged areas will be enhanced in the project.
Forestry (OP 4.36, BP 4.36)	No	This policy emphasizes upon the management, conservation, and sustainable development of forest ecosystems and their associated resources.	➢ No forestry activities or activities on forest land are envisaged. Additionally, there are no forests in the irrigation areas. This OP is not applicable to the project
Pest Management (OP 4.09)	Yes	This is a policy to support biological or environmental control methods in managing pests that affect either agriculture or public health and reduce use of chemical pesticides.	➢ Although the project does not plan to finance any pesticides, there is a possibility of induced impact of greater pesticide use due to increased agricultural intensification and diversification. This OP is applicable to the project. ➢ Integrated pest management should be enhanced. A Pest Management Plan (PMP) is developed and would be applied as part of the project's EMP, in particular through Farmer Water Schools. Banned pesticides and those included in the WHO Scheduled Lists would not be financed.
Cultural Property (OP 4.11)	No	The policy aims to assist and prevention of cultural property and to avoid its elimination.	➢ No archaeological or other cultural sites of significance are impacted by the proposed project; since the project is on existing canals where no new digging (other than removal of silt on the original canal bed) is proposed, chance find procedures are not required. This OP is not applicable to the project.
Indigenous Peoples (OP 4.10, BP 4.10)	No	This policy asserts that the adverse impacts of the development projects on the indigineous people	➢ A detailed spatial census analysis does not indicate any tribal population in the proposed project area. therefore, no impact (adverse or

1. World Bank Operational Policy, 4.01, Environmental Assessment, January 1999

WB Safeguard Policy	Triggered (Yes/No)	Summary	Application to the Project and Compliance Mechanisms
		should be mitigated or avoided and the benefits of the project should be accrued to them.	positive) is expected by project on tribals This OP is not applicable to the project.
International Water ways (OP / BP 7.50)	Yes	This policy applies any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states.	➢ The Ganga is an international river and water abstractions from the river for irrigation would impact flows in lean periods. This OP is applicable to the project.
Involuntary Resettlement (OD 4.12)	Yes	This policy aims at avoiding, if not minimizing adverse impacts on the local population due to project and where unavoidable it ensures that those affected improve or at least restore their livelihood.	➢ The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). In the rare event that this is needed, the provisions of Bank OP4.12 shall be invoked in consonance with the UP State R&R Policy. A Resettlement Policy Framework has been prepared under this project (see Annex 6.1). This OP is applicable to the project.
Safety of Dams (OP 4.37, BP 4.37)	Yes	This policy is concerned with the safety of new and existing dams on which Bank financed projects are directly dependent. The policy distinguishes between construction of new dams and existing dams / dams under construction.	➢ No significant impacts are anticipated due to inclusion of the command areas of three dams in Bundelkhand under the project. An independent safety assessment of the three dams was completed and the findings reveal that there are minimal risks in relation to dam safety. Specific recommendations were made to improve the management and operation and maintenance of the dams as summarized in Chapter 6. These dams would be supported, as required to address any safety issues under the World Bank financed Dam Rehabilitation and Improvement Project (DRIP) under implementation in parallel. The Dam Safety Cell in the State of Uttar Pradesh would be suitably strengthened under DRIP to ensure issues of dam safety are addressed. Also, an independent Dam Safety Review Panel would be set up, emergency preparedness plans, disaster management / mitigation plans would be prepared and the dams would be instrumented.
Projects in Disputed Areas (OP 7.60, BP 7.60)	No	This policy is concerned with the disputed area in project	➢ The project is not in a disputed area and the OP is not applicable to the project.

Both the ESMF and EMPs have been designed to not only ensure compliance with World Bank safeguard policies but also to adopt good practices to maximize the environmental benefits that are possible in this type of project.

2.4 Institutional Analysis

The legal and institutional framework with respect to the environment is shown in Figure 2.1. The UP Department of Environment (DoE), in Lucknow, is primarily responsible for protecting and preserving environmental quality in the state. The Uttar Pradesh State Pollution Control Board (UPSPCB) is responsible for enforcing the regulations, and has a wider role in environmental governance than any other government body in the state and reports both to the Central Pollution Control Board (CPCB) in Delhi and the DoE. In addition to monitoring and enforcing industrial environmental standards, the UPSPCB also monitors other environmental issues, such as municipal solid waste, and biomedical waste. The supervisory powers exercised

by MoEF are not vested with the DoE as per the regulatory framework but instead lie with UPSPCB. DoE is dependant on the state government for resources, where as, UPSPCB raises most of its financial resources through consent fee and water cess.

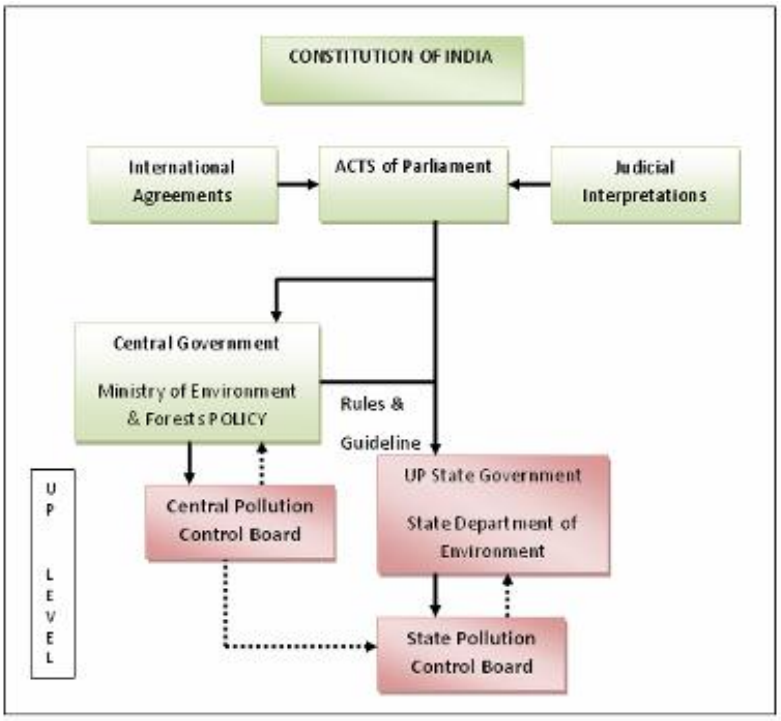


Figure 2.1: Legal and institutional framework for environmental safeguards

The analysis of the above policy, legal and regulatory framework indicates that a number of acts, regulations and agencies are involved at national, state and district level. All the agencies are functioning as per their mandate while there appears to be lack of integrating mechanism for overall development of the water sector in the state. For example, the agencies have worked on their objectives related to food sufficiency, irrigation and drinking water availability and control of pollution, but lack of integrated planning in the sector over the years has resulted in water logging, salinity, sodicity, siltation, reduced water delivery efficiency, resulting in turn in stagnation of agriculture production, deterioration of soil quality, higher resource consumption and higher non point source of pollution.

With regard to planning and implementation of UPWSRP phase II, PACT, UPID, and other line departments will be the main agencies involved. Whilst PACT appears to have sufficient capacity for implementation of the safeguard policies, UPID capacity should be strengthened and a training and capacity program has been developed in this regard (see 7.6).

2.4.1 PACT

After several years of engagement and working closely with the Bank team under Phase I project, PACT has gathered significant knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. An environmental and social cell is expected to be put in place shortly in PACT and will be responsible for screening the activities under the project, evaluating the level of environmental and social risks, ensuring overall supervision of implementation of the ESMF and conducting additional studies as needed (see

Annexure 6.3 for details on the environmental and social cell). The environmental and social specialists will be further assisted in this regard by the Monitoring and Evaluation Consultant and by the Third party quality supervision Consultant.

2.4.1 Uttar Pradesh Irrigation Department

In order to streamline social and environmental issues in planning and implementation of project based on stakeholders' needs, the institutional capacity of Uttar Pradesh Irrigation Department has been assessed with the view of preparing a training and capacity building program and implementation of ESMF.

Organization Structure of UPID

Organizational Structure of UPID - Present organization structure of Uttar Pradesh Irrigation Department (UPID) is depicted in **Figure 2.2**. The organization structure of UPID broadly indicates three functional areas, which are surface water irrigation, irrigation through tube wells and planning and design. All the three functional areas are organized at three levels of hierarchy as given below.

Level 1 – Top levels organized at headquarter and scheme level (En-in-Chief/Chief Engineer (Level-1) and Chief Engineer (Level-2),
Level 2 – Middle level management at Circle and Division level (Superintending Engineer, Executive Engineer and Assistant Engineer), and
Level 3 – Lower management level under each circle/ division (Junior Engineers and other field staff).

Assessment of functions of UPID

An assessment of existing functions of UPID in the context of social and environmental issues related to water resources has been carried out in terms of the knowledge base related to subject areas and the existing expertise. The different subject areas included GIS/ AutoCAD, water resources, basin planning, environment and socio–economics and agriculture. It is observed that the knowledge base exists with respect to all the subject areas in UPID except for social areas at L1 level. The expertise in respect of other areas is notable which is given in **Table 2.3**.

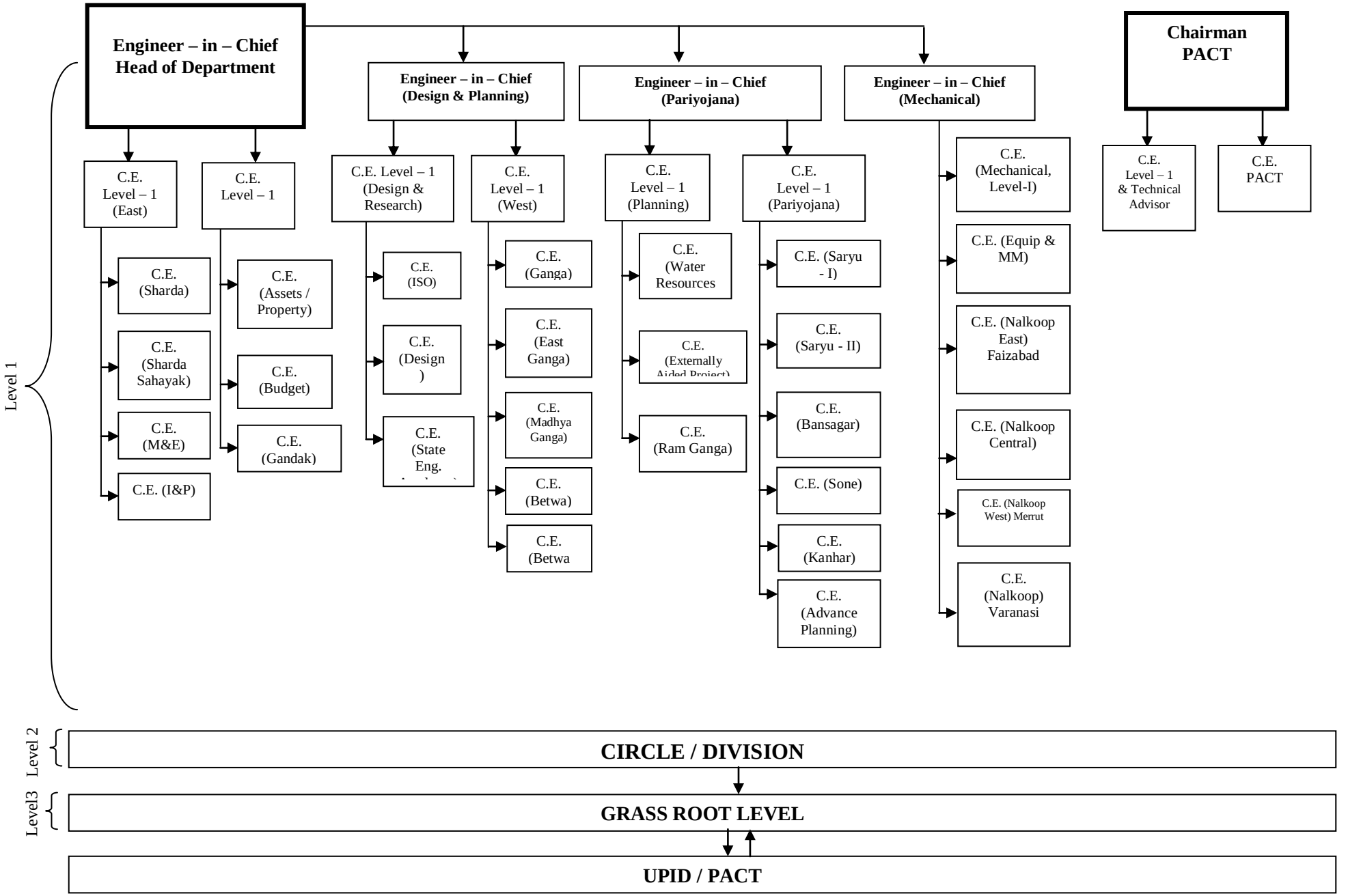


Figure 2.2: Organization Structure of UPID

Table 2.3: Existing Status of Functional Knowledge

Subject	GIS/ AUTOCAD			Water Resources			Basin Planning			Environment			Social			Agriculture		
Level	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
UPID	√	Limited	Very Limited	√	√	√	√	√	Insignificant	√	Limited	Limited	Limited	Insignificant	Insignificant	√	√	Limited

Source: Compiled by IRG, BSEA, UPWSRP Phase I

In UPID outside of PACT, there is no specific staff to address environmental and social issues by implementing ESMF described in Chapter 6. A limited knowledge base exists with respect to environment and GIS/ Auto CAD at L2 level. However, it is insignificant with respect to social issues at L2 level. At L3 level in UPID, the level of knowledgebase varies from limited to insignificant with respect to all the subject areas except water resources.

There is a need for strengthening of UPID to mitigate various social and environmental issues. Different types of training programs have been designed in terms of target group, frequency of conducting training programs, duration of training programs and format of training programs. These training programs are described in **Chapter-7**.

2.4.2 Other line agencies involved

Table **2.4** shows the relevant departments and agencies and their roles and responsibilities.

Table 2.4: Line Departments and their Key Roles and Responsibilities

Department	Key Activities
Forest Department	The main function of the Forest Department is to protect, conserve and manage the forest. In the recent years, it has been noticed that the forest reserves have been decreasing. Henceforth, Joint Forest Management has been initiated so as to ensure protection of forest against encroachers, grazing and also to increase the vegetation cover. In addition to this, it has also pioneered research and development for improving the quality of seedlings. Green belt can be developed in the waste lands so as to increase vegetation cover. Further, plants which are of ecological and economic importance can be encouraged on the waste lands. Cooperation with the Forest Department should be encouraged in relation to natural habitats.
Department of Agriculture	The Department of Agriculture supplies seeds, fertilizers and other agriculture implements. It also implements policies to achieve agriculture growth through optimum utilization of resources. Under the project, the Department of Agriculture will be responsible for implementation of agricultural related activities. The main activity will be the Farmer Water Schools (FWS) program. This will be implemented with technical assistance from the FAO and through hiring of contractual staff for program supervision and of master trainers and FWS facilitators. A monitoring consultancy and an impact evaluation consultancy will also support close oversight of the program.
Fisheries Department	The main function of this department is to increase inland fish production, development of tourism thereby increasing employment. The Fisheried Department is involved in fish production in water bodies in the project area.

Department	Key Activities
Social Welfare Department	The main objective of this department is to bring the target groups into the main stream of development by making them self-reliant. Various laws and policies are being implemented for the upliftment of the SCs/STs under protective discrimination basis.
Uttar Pradesh Pollution Control Board	The main function of UPPCB is to prevent, control or abate pollution. It advises the State Government on the matters concerning the prevention, control and abatement of pollution. Further, it disseminates information relating to pollution
Water and Land Management Institute (WALMI)	The training and capacity building to the irrigation department is provided by the Water and Land Management Institute (WALMI). Under the project, WALMI capacity will be increased and staff will be hired to provide training on modern approaches to irrigation.
Groundwater Department	The Groundwater Department is responsible for management of groundwater resources in the State. Under the project, the Groundwater Department will improve groundwater assessment and will prepare a detailed aquifer management plan.

In general, there is little available expertise/ functional position in the agencies with respect to environment, social and agriculture sector to address various social and environmental issues. However, activities under the project will support greater attention to environmental and social issues. With regard to agricultural activities, technical assistance by FAO and the monitoring and evaluation consultancies shall ensure appropriate implementation of the ESMF.

Chapter 3: Project Description

3.0 Introduction

UPWSRP-Phase II project targets improvements in irrigation service delivery and efficiency and would invest in building the technical capacity in the State institutions for enhanced water resources planning and management, undertake rehabilitation and modernization of critical irrigation and drainage infrastructure in identified priority areas, and extend the agricultural intensification and on-farm water management activities in Phase I and 2 areas. Only existing irrigation infrastructure systems would be taken up and no new canals or drains are planned for construction. The project seeks to mainstream the provisions of the PIM Act in managing irrigation resources at the community level, and thus presents an opportunity to improve water use efficiency and promote practice of climate smart agriculture at the farm level. The project comprises of six components with a total outlay of about US$ 515 million, including about US$ 165 million contributed by the State as its share. The components are described below. Their potential social and environmental impacts are described in Chapter 6.

Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination

This component aims to provide support to the institutions in the state responsible for overall integrated water resources management and implementation of the State Water Policy.

(a) **Component A1: Operationalizing the State Water Regulatory Commission.** The Uttar Pradesh Water Management and Regulatory Commission (UPWAMREC) has been created under an Act (2008) passed by the legislative assembly. Functions of this 'Regulator' include, inter alia, approving the Integrated State Water Basin Plans, determining the allocation and distribution of entitlements for various uses of water (e.g. urban, agriculture, energy) as defined by the State Water Policy, reviewing and providing clearances to new water resources project, establishing a system of enforcement, monitoring, and measurement of entitlements, promoting better water management techniques and setting water supply standards, fixing and regulating a water tariff system, and to aid and advise the State Government on any matter referred to the Commission. This sub-component will build the capacity of the UPWAMREC to implement the power, functions, and duties of the Commission. This will include primarily training, a panel of experts, staffing, and various workshops and study tours. To the extent possible, given the political nature of this entity, specific activities will be piloted (e.g. review of new project proposals) to demonstrate the independent, impartial role that the Commission may play.

(b) **Component A2: Strengthening the Knowledge Base and Analytical Capacity for Integrated Water Resources Management.** The State Water Resources Agency (SWARA) and the Data and Analysis Center (DAC) have been created and are

functional. These two entities should eventually be merged into one body. These two agencies currently support the UPWAMREC. The function of SWARA is to develop and provide State-level inter-sectoral analysis on water allocation, planning, and management for the optimal use of surface and groundwater uses. The function of DAC is to collect, verify validate, analyze, and store data related to water resources management for each river sub-basin in the State. This component will improve the knowledge base and analytical capacity of these two institutions. This will include, amongst other things (1) a proposal to develop an integrated water information system (IWIS) for the entire state (much like what is done under the Hydrology 2 Project), (2) the preparation of basin plans for critical basins in the State including the development of decision support systems and hydrologic modeling tools, (3) the commissioning of a study to examine inter-sector water allocation issues, (4) an assessment of the impact of climate change on the overall water resources in the state, and (5) the development of a Flood Management Information System (FMIS) for the entire State, including flood forecasting tools for identified critical basins (e.g. Rapti Basin). The flood management activities will be coordinated with various disaster risk management communities in the state to operationalize the knowledge being generated.

(c) **Component A3: Strengthening the Water and Land Management Institute.** This sub-component aims to strengthen the existing Water and Land Management Institute such that it provides targeted, practical and effective training and capacity building services to UPID and water users. Activities envisioned to transform this training institute include: the hiring of additional long-term faculty from multiple disciplines (engineering, agriculture, social sciences, and extension services) to improve the quality and scope of training for UPID engineers and upgradation of facilities including the development of a learning laboratory (including equipment to demonstrate new irrigation techniques, modern sensors, an open channel hydraulics lab). WALMI will also be supported to provide training to engineers (and awareness building) to support the Irrigation Department's role implementation of the Participatory Irrigation Management (PIM) Act.

Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems.

The inefficient performance and poor condition of canal and drainage infrastructure in the State is a major contributor to the poor water service delivery. This component represents the major infrastructure and civil works component of the project (almost 60% of the total project costs) and will restore the system to its original design discharges.

(a) **Component B1: Expansion of Irrigation and Drainage Investments.** This sub-component will rehabilitate and modernize irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. For parts of the system,

rehabilitation and modernization will be taken up to the outlet level. For other parts of the system, only branches will be taken up (see below).

S.N.	System	Main Canal / Branches Length	Distributaries Length	Minors Length	Total Length in Km.	CCA (in Ha)
Sarda Sahayak System						
1	Haidergarh Branch 23 dn.	8.000	271.340	406.230	685.570	73432
Total		**8.000**	**271.340**	**406.230**	**685.570**	**73432**
Bundelkhand Region						
2	Rohini Dam Canal System	8.640	0.000	11.450	20.090	3302
3	Jamini Dam Canal System	67.400	67.830	110.08	245.31	55114
4	Sajnam Dam Canal System	40.30	4.400	52.155	96.855	10210
Total Bundelkhand		**116.34**	**72.23**	**173.685**	**362.255**	**68626**
Lower Ganga Canal System						
5	Main Lower Ganga Canal	99.360			99.360	6171
6	Parallel Lower Ganga Canal	89.140			89.140	0
7	Farrukhabad Branch	98.050	Branch only		98.050	76599
8	Bewar Branch	92.613	Branch only		92.613	76068
9	Kanpur Branch	211.350	Branch only		211.350	143981
10	West Allahabad Branch	230.020	Branch only		230.020	235184
11	Fatehpur Branch + Feeder	167.800	Branch only		167.800	137454
12	Etawah Branch System	196.509	Branch only		2083.127	275029
13	Bhognipur Branch System	171.400	Branch only		1043.833	157566
Total Lower Ganga Canal System		**1356.242**			**4115.293**	**1,108,052**
Grand Total (Project)		**1480.582**	**1803.051**	**1879.485**	**5163.118**	**1,250,110**

The total cultivable command area to be attributed to the project interventions will be about 465,000 ha (assuming 45% of the CCA is attributed to the branch-only areas). The overall aim with these interventions in the 465,000 ha will be to improve the capacity and operation of the systems to ensure timely, assured, controlled, and measured water delivery and distribution. This will include updating topographic and cadastral surveys, updating hydrologic assessments, installing improved operation and discharge measurement devices (e.g. flow meters), rehabilitation of canals, drains, and pucca structures, introducing silt traps where technically advantageous, rationalization and modernization of outlets, modernization of head and cross regulators, duckbill weirs, village road bridges, vertical drainage, and canal lining in critical areas. The primary outcome of this rehabilitation and modernization work is to bring these systems back to their original design performance (i.e. enhance discharge and drainage) and improve operability of the system (i.e. meeting agreed rosters with local water users associations). This component will build upon the design features prepared in UPWSRP Phase I and build on the lessons learned during implementation.

(b) .**Component B2: Modernization of Regulation System and Service Delivery in Phase I Areas.** This sub-component will introduce additional methods of control and operation in the UPWSRP Phase I areas where modernization was not completed. This includes the installation of controllable and measurable inlets to the minors (with

close participation of WUAs), proportional, non-adjustable water dividers, modern measurement devices, and SCADA and telemetry systems (as required).

(c) **Component B3: Groundwater Management Activities.** This sub-component aims to strengthen the groundwater assessment in the state, upgrade groundwater level monitoring network and demonstrate implementation of groundwater management interventions following preparation of aquifer management plans for an over exploited watershed/catchment in the project area. This activity, which will be implemented directly by the Groundwater and Minor Irrigation Department, will encourage greater integration between this department and the Irrigation Department (i.e. conjunctive use). The groundwater assessment will be improved through the integration of knowledge developed by various stakeholders, use of advance hydro-geological models, remote sensing applications and up-gradation of water level monitoring systems. Initially, the development of aquifer management plans will focus on an over exploited watershed in the Phase II project areas (e.g. Araon block in Firozabad) where the majority of information will be made available through Component B1 (Irrigation Department). The development of an aquifer management plan shall be based on an understanding of the groundwater dynamics through geo-physical measurements, modeling micro-level hydro-geologic site investigations, and aquifer parameters tests..

Component C: Consolidation and Enhancement of Irrigation Institutional Reforms

This component will enhance the efficiency of the Uttar Pradesh Irrigation Department (UPID) and strengthen the Participatory Irrigation Management (PIM) approach both in the department as well as in the community. Investments would provide advanced IT based tools, performance-based systems for staff evaluation, modern survey and design techniques as well the overall management of the department through administrative and managerial skills enhancements and tools (e.g. management information systems).

(a) **Component C1: UPID Modernization and Capacity Building.** This sub-component aims to provide the training and tools such that UPID may re-orient itself towards a more professional and responsive irrigation service delivery agency that is accountable to its farmer clients. As part of UPWSRP Phase I, a substantial training program was delivered involving over 4500 UPID participants covering topics ranging from the technical (e.g. AutoCAD, GIS, Canal-Mod, MASSCOT) to the managerial. Almost 2000 officers were given basic computer training as the Department was computerized and an extensive management information system (MIS) for business processing put in place. This sub-component will continue capacity building efforts including among other things intensive and extensive training on advanced surveying techniques, GIS, modern control and measurement approaches, computers and IT systems, participatory irrigation management (through primarily WALMI), project management, and financial management. The Indian Institute of Management identified the training needs of the department and the program is tailored to different functions within the UPID. The IT section of UPID, the Information System Organization (ISO), will also be further modernized

including strengthening of staff, creating a centralized IT help desk, and strengthening the LAN and WAN systems across the divisional offices. A dedicated irrigation control center (connected to real-time water level sensors in the field) has also been created and will be equipped with modern facilities. Some equipment will also be provided to enhance the maintenance capacity of the Department (e.g. weed cutters, small dredgers, and customized earth moving machines). Finally, special focus and effort will be given to re-orienting field engineers towards a more performance based institution vis-à-vis "client" (i.e. water user association) satisfaction and field-level delivery metrics, in particular actual measured deliveries against the agreed roster at the beginning of the irrigation season and information provided to WUAs on changes in the roster. Special contractual relationships (between the Department and the water users association) may also be explored on a pilot basis for selected minors in the system.

(b) **Component C2: Water Users Associations (WUAs) Strengthening and Implementing Participatory Irrigation Management.** This sub-component will support the strengthening and development of water users associations and provide a framework for training and mainstreaming PIM throughout the State. The vision of the participatory irrigation management approach to irrigation water delivery (as defined in the 2009 Act on Participatory Irrigation Management - PIM is to build the capacity of these local associations (WUAs)to monitor the current status of the irrigation system under their control, participate actively in discussions on system design and implement rehabilitation of minors with the UPID, carry out on farm development (OFD) works where required, manage themselves the local water distribution, assess water charges, manage finances, operate and maintain local infrastructure, resolve conflicts, encourage conjunctive use of surface and ground water for intensified and diversified agriculture production system and promote greater efficient water use. Equally important is enhancing the ability of the UPID Engineers to work more in partnership with farmers as clients to help them manage the system at local level and substantially improve water use efficiency and productivity. Since the 2009 Act, 8858 WUAs at the outlet levels, 805 WUAs at the minor levels, and 28 WUAs at the distributary level have been formed in the Phase I areas. The key project activities will be to scale this up in the Phase II areas and make existing and proposed WUAs functional. This will be done by focusing on three key areas (a) mobilization of communities, (b) generation of awareness amongst communities of the PIM Act, and (c) capacity building and training of WUAs. Mobilization of communities will be focused on the Phase II project areas and will be implemented by NGOs. The generation of awareness on PIM will be through the use of a variety of media (e.g. pamphlets, community radio and TV, workshops, paintings and leaflets, etc) and will be for the entire State. This awareness generation is to be implemented by the State Institute of Rural Development (SIRD). For the capacity building and training of WUAs, emphasis will be placed on governance (e.g. WUA roles and responsibilities, organizing meetings, liaison with users), technical matters (e.g. maintenance inspections, preparation of estimates, measurement of works), financial management (e.g. maintaining financial records, preparation of annual budgets) and water management (e.g. recording of irrigated area, preparation and

implementation of warbandi). This will be delivered in the Phase I and 2 areas through the SIRD. WALMI Lucknow will be the key training agency to reorient UPID Engineers towards PIM (Component A3). Finally, special contractual relationships with the UPID and participation in a performance system for field engineers (as "clients") will be used to enhance accountability and feedback for irrigation deliveries.

Component D: Enhancing Agriculture Productivity and On-Farm Water Management

This component (to be implemented directly by the Department of Agriculture) aims to improve the overall agriculture productivity and water-use efficiency at the field level. This component will focus on both Phase I and II outlet command areas where improvements in irrigation water availability and timely support to water users associations will be integrated with improved agriculture production and on-farm water management practices. The component will use a specifically developed Farmer Water School (FWS) approach (see box), targeted at the area below the outlet as a mechanism to introduce improved agronomic and water management practices, and also to develop the institutional capacity of the WUAs for water management and operation and maintenance. The FWS will be a group of 20 – 30 farmers serving about 15 – 20 ha of a single outlet. The concept of FWS will borrow heavily from the FAO Farmer Field School models implemented successfully in over 90 countries worldwide. Some of the types of activities that may be part of the FWS curriculum (to be decided and agreed upon by the participant farmers themselves) include: (i) season-long farmer field studies on a range of crop approaches e.g. ridge and furrow irrigation, border irrigation, raised and sunken beds, etc, (ii) crop and water budgeting sessions, (iii) community interactions and consultations, (iv) field days for identified crops, and (v) soil testing for integrated plant nutrient management. A network of trainers will be developed under the project to support the FWS. FWS to FWS interactions will also be facilitated. In addition to the emphasis on FWS, this component will also support (i) a limited number of demonstrations/adaptive research trails, (ii) field level physical works related to improved water use efficiency (laser leveling, sub-plots, border check, raised beds, etc), (iii) field days (block level), (iv) exposure visits, (v) staff capacity development, and (vi) purchase of equipment (such as tensiometers and leaf color charts).

Component E: Feasibility Studies and Preparation Activities for the Next Phase

This component is to prepare detailed surveys and designs for future Phase III areas. These new areas will be identified by the Government of Uttar Pradesh and will make use of similar design principles (and the lessons learned) adopted under this Phase II operation.

Component F: Project Coordination and Monitoring

(a) **Component F1: Project Activities Coordination Team (PACT):** The existing multi-disciplinary PACT (established under Phase I) will continue to provide overall

coordination and project management. This component is designed to assist the PACT with its role in facilitating and guiding the implementation and monitoring of all project activities, ensuring synergy and coordination amongst activities and Departments (Agriculture, Groundwater, Remote Sensing Agency, State Institute for Rural Development), and in preparing consolidated reports and facilitating training and study tours. Key activities include managing critical support consultancies such as the Monitoring and Evaluation consultancy and a consultancy to provide third-party construction quality support. Monitoring and evaluation will guide project implementation by conducting input and output monitoring, process monitoring, impact assessment, and by providing feedback to PACT on recommended adjustments. It will also provide feedback on client satisfaction with UPID performance. Monitoring and evaluation will make use of state-of-the-art information and communication technologies for field data collection, in particular mobile-based technologies with GPS systems. The PACT will also play a fiduciary role in the overall project, including providing support on procurement.

(b) **Component F2: Monitoring of Crop Performance using Remote Sensing Imagery.** This component will will support the services of the UP Remote Sensing Applications Center (RSAC) in monitoring of the project area using satellite imageries. RSAC has independently been monitoring crop acreage and production numbers since 1988 for the major agricultural crops in UP (e.g. wheat, paddy, sugarcane, and mustard crops). Under this component, RSAC will throughout the life of the project prepare annual reports for the project areas tracking a wide range of parameters including cropping intensity, cropping calendar, acreage and productivity, irrigated areas (under the canal command and groundwater), and land use at the cadastral levels. Some ground truth data will also be collected from the field during key times during the three cropping seasons in all the study districts.

3.1 Negative list of activities

The project will not finance the following activities:

1. Any activity that convert or lead to conversion and/or degradation of significant areas of critical natural habitats (areas officially protected or proposed to be protected) and/or other natural habitats (including wetlands of significance)
2. Construction of any new irrigation reservoir dam
3. Realignment of any existing canal, branch canal and offtake
4. Realignment of any existing drain
5. Construction of new canals, branch and offtake
6. Construction of any new drain
7. Any activity that violates the provisions of applicable National and State laws
8. Any activity that is against the provisions of the PIM Act
9. Procurement of banned pesticides (Class I and Class IIA & IIB of the WHO list)

3.2 Social Perspective on Supporting Water Users Associations

Improving Irrigation service delivery and effective implementation of PIM: The focus of Components B and C of the Project is on enhancing the capacity of the UP Irrigation Department to be able to deliver irrigation services in accordance with the needs of farmers. Key areas for attention include

- The inability of the UPID to ensure irrigation service delivery as per irrigation rosters that it announces in advance.
- The tendency of head-reach farmers to over irrigate their fields and extract water from the system far in excess of their entitlements.
- The lack of awareness amongst farmers about what their water entitlement from the irrigation system is and the need therefore to undertake crop planning accordingly.
- The need for enhancing the ability of farmers at crop water budgeting and improved and efficient water management and inculcating the discipline to follow agreed norms rigorously.

The UP PIM Act and the formation of Water User Associations (WUAs) at the outlet, minor, distributary and Project levels is intended to address the need for mobilizing and organizing farmers for improved water management and operations and maintenance of the irrigation system. NGOs for assisting with community mobilization, the Department of Agriculture (DoA) supported Farmer Water Schools (FWS) as an approach to improving farmer level crop water budgeting in line with farmer water entitlements, the State Institute of Rural Development (SIRD) for creating awareness and basic capacity amongst farmers about the UP PIM Act, Participatory Irrigation Management and its key tenets, WALMI Lucknow as the agency organizing exposure visits and related capacity building and the PIM Cells at division, circle, Chief Engineer and Engineer in Chief levels as the overall coordinators of this entire effort constitute the institutional structure for the Water User Associations as depicted in the following diagram.

Effective coordination between all these entities and wholehearted involvement in coordination on the part of the UPID PIM Cells would be critical to the success of this support structure in achieving the overall objectives of Participatory Irrigation Management (PIM). UPWSRP Phase I has demonstrated how the lack of coordination amongst these entities can jeopardize the achievement of the ultimate objective of PIM.

Focus on those without land in the command area: As in Phase I of the project, there would be several households in the village who either do not own land in the command area or are even landless. It is important that the project focusses attention on involving these households in agriculture and allied service related activities such as input supply, provision of agricultural implements on hire and other related activities that while providing required support to the farmer members of WUAs also serves to address livelihood requirements of those not benefitting directly from the irrigation scheme improvements. Women would be organized into Self Help Groups (SHGs) that can similarly take on income generating activities that are catering to the agriculture and allied service support needs of WUAs and their farmer members.

The leadership and coordination role of UPID: Enhancing the ability of UPID Engineers to take leadership and at coordination and collaboration would be critical to achieve the aforesaid objectives. It is in this area that UPWSRP Phase I was unable to make adequate difference. By increasingly making UPID Engineers responsible for achieving desired outcomes and providing them the flexibility, technical, training, institutional and financial support, the UPWSRP Phase II aims to enable UPID Engineers to successfully achieve the project development outcomes.

Chapter 4: Socio-economic & Environnemental Profile

4.0 Introduction

The project interventions are in Bundelkhand and focus on Lalitpur District. The District lies between Latitude 24º11′ N - 25º17′12″ N and Longitude 78º11′ E - 79º00′ E. The area of the district is 5039 km^2 with total population of 835,790. Socio-economic & environmental profile of Lalitpur district and of the project area is summarized in following sections.

4.1 Socio-Economic Baseline Status of Blocks under Project (based on secondary data)

The command areas of Jamini, Sajnam and Rohini dams fall in four blocks namely Bar, Birdha, Mahrauni and Mandawara of Lalitpur district. Blockwise data is given in **Annexure-4.1.**

4.1.1 Demography

Lalitpur district covers an area of 5039 square Km. In 2001 (census data), it had a total population of 977734 persons, including 24.93% from Scheduled Castes (SC). The proportion of SC population was higher than the State's average (21.15 %). Decadal increase in population of the district remained higher in 1991-2001 (30.01%) and 2001-2011 (24.57%) against growth at the State level (25.85%) and 20.09% respectively. Density of population per Sq.Km. in Lalitpur remained very low as compared to the State's, i.e. 149 persons per Sq.Km. in 1991, 194 in 2001 and 242 in 2011 as against State's average of respectively 473, 690 and 828. The lower density is due to the District's topography. Sex Ratio, i.e. number of females per 1000 males improved in the district from 882 in 2001 to 905 in 2011 as against State's 898 and 908 respectively.

Literacy Rates in the district increased from 49.46% in 2001 to 64.96% in 2011. They remained behind the State's values however, i.e. 56.30% and 69.72% respectively. The gender gap in literacy decreased from 30.84% in 2001 to 24.15% in 2011.

The percentage of total workers, i.e. Main and Marginal, marginally increased from 42% in 1991 to 43% in 2001. The proportion of Main workers among total workers in 1991 was significantly higher, i.e. 78.2% which declined to 68.46% in 2001. Thus, the percentage of Marginal workers increased from 21.78% in 1991 to 31.54% in 2001. There was an increase in proportion of families below poverty level in all four blocks of the project area between 1998 and 2002, from 35% to 39%. The increase was significantly higher in block Mandwara, from about 36% in 1998 to 48% in 2002.

4.1.2 Infrastructure Facilities

The number of public primary schools per lac population slightly declined from 126.8 in 2000-01 to 125.1 in 2008-09, possibly because new schools were not opened

proportionate to the increase in population. The number of public senior primary schools per lac population significantly increased from 31.2 in 2000-01 to 55.1 in 2008-09 mainly because more new schools for girls were established. The number of public higher secondary schools per lac population declined from 3.2 in 2000-01 to 2.9 in 2008-09 as a large number of private schools has been started and the government did not feel pressure from public for opening higher secondary schools.

Length of metalled road per thousand square km in the district increased from 257.95 Km. in 2000-01 to 278.325 Sq. Km. in 20008-2009. About 20 Km of metalled roads were added in eight years. The proportion of electrified villages in the district increased from about 55% in 2000-01 to almost all of the villages (99.8%) in 2008-09. With regard to banks, in Lalitpur district, 23 branches each of nationalized and rural banks existed in 2000-01. Nationalized bank branches increased to 34 in 2009-10 while rural banks branches declined to 20. Safe Source of Drinking Water was available in all villages of the district since 2000-01 through India Mark-II handpumps.

With regard to health facilities, the number of hospitals per lac population declined in the district from 4.7 in 2000-01 to 3.8 in 2008-09. Similarly, the number of beds in Allopathic hospitals and PHCs per lac population declined from 30.5 in 2000-01 to 27.8 in 2008-09. This situation arose probably due to stagnation in number of hospitals and beds and increase in population over the years.

4.1.3 Agriculture and related socio-economic aspects

Agricultural production: The cropping intensity increased in the district from 134.1% in 2000-01 to 153.7% in 2008-09. Similarly, in the project area it increased from 128.5% (2000-01) to 149.6 %(2008-09) during the same period. A significantly higher increase was recorded in Bar and Birdha blocks. In terms of crops cultivated, pulses cover a large part of cultivated area in the district (about 62% in 2008-2009), followed by wheat (28%), oilseeds (9%), and rice (1%).

Area under different crops per block (2008-09)

Block Name	Total rice	Wheat	Total pulses	Total oilseeds
	Total	Total	Total	Total
Bar	871	20277	30746	9538
Birdha	285	19694	62033	2841
Mahrauni	290	15918	49403	3233
Mandawara	405	10838	37064	2726
Total	**1851**	**66727**	**179246**	**18338**
Total District	**3503**	**110609**	**235082**	**32730**

Over the past decade, oilseeds cultivated area has gradually increased (51% increase in the District and 65% in project area). Rice-cultivated area has decreased on the contrary (40% decrease in the District and 48% in project area). There are inter-annual variations for wheat and pulses cultivated areas and no clear historical trend emerges for these

crops. The productivity of total pulses in Lalitpur increased by 35% from 2000-01 (6.16 Qtl/Ha) to 2008-09 (8.32 Qtl/Ha). The productivity of total oilseeds increased by 10.4% from 5.86 Qtl/Ha in 2000-01 to 6.47 Qtl/Ha in 2008-09.

Landholdings size: The percentage of Marginal farmers having up to 1 Ha. Land increased from 37.75% in 1995-96 to 41.73% in 2000-01 in the district. The percentage of Small farmers with up to 2 Ha and Large farmers having landholdings of more than 2 Ha declined from 1995-96 to 2000-01. The same situation was observed in the project area. A significant increase in percentage of Marginal landholding and decline in proportion of Small landholdings was found in Blocks Mahrauni and Birdha.

Irrigation Intensity: Irrigation Intensity was 100.8% in the district in 2000-01 and remained same in 2008-09, much lower than State's average. In the project area, Irrigation Intensity was slightly lower at 100.4% in 2000-01 and 100.3% in 2008-09.

Source-wise Irrigation and Infrstructure: The length of irrigation canals in the district in 2009-10 was 825 Km. and in project area 579 Km. The district had only one Government Tubewell, and 26202 permanent wells, 4799 Rahat and 2970 pumpsets.The proportion of Canal irrigated land in district Lalitpur fluctuates from year to year. It was about 32% of the total irrigated land in 2000-01and reached 31% in 2009-10. Of the total irrigated land in project area of the district about 25% was irrigated through canal, 30% through Tubewell, 26% through wells, 15% through ponds and 4% through other sources. The total irrigated area in the district increased significantly from 184773 Ha in 2000-01 to 249224 Ha in 2009-10, which represents a 35% increase. The total irrigated area in the project part of the district increased from 123181 Ha to 174524 Ha, i.e. by 42% during the same period.

Livestock and Fisheries: In the project area the average number of livestock per family declined from 6 to 5 between 1997 and 2003. There were 3 departmental reservoirs in district Lalitpur in an area of 18250 Ha in 2000-01, producing 1411 quintal fish. In 2009-10 the number of departmental reservoir was reduced to only one, in an area of 126.47 Ha, producing only 80 quintal fish. Thus, the production of fish in last 10 years declined to almost insignificant level.

Labour Force: The proportion of farmers and agricultural labour, among Main workers declined seriously from 1991 to 2001, showing that due to decline in agricultural conditions more farmers and agricultural labour had shifted to other activities.

4.2 Socio-Economic Baseline Status of Lalitpur district (based on Household Survey)

The sample of households for primary survey consisted of 10 families in 10 villages for three Blocks, namely, Birdha, Mandwari and Talbehat in Lalitpur district. The data was analysed based on command and non-command area. A total of 110 families belong to the Command area and 190 to the non-command area, out of which farmers families were 98 and 168 respectively. Data tables of district Lalitpur are given in **Annexure-4.2**.

Caste-wise Distribution: A large proportion of the sample households in Command (53.6%) and non command (52.1%) areas belong to the Other Backward castes (OBC) followed by the Scheduled Castes (22.7% and 26.8%) respectively. SC Population in Lalitpur was 24.93% i.e. higher than at the State level. About one fifth of the families belong to the General Castes (20.9% and 20.5% respectively). Block Mandwari had a higher sample of OBC (60.0% and 55.7%) while Block Talbehat had higher proportion of SC (33.3% and 30.0%) households. Scheduled Tribe families are nominal i.e. 2.7% in Command and 0.5%, in non-command area.. Scheduled tribes families do not represent indigenous people as per OP 4.10:

- They have been mainstreamed into the local culture.
- They do not differ in nature considering social, culture, economic & political institution's perspectives from the dominant community.
- They do not have attachment to geographically distinct habitats or ancestral territory in the project intervention area.
- They do not have an indigenous language.

Landholding Size: The average landholding size in district Lalitpur was reportedly higher (1.73 Ha) than at the State level (0.83 Ha) in 2000-01. It is reflected in the sample of household as 34.5% in Command and 33.7% in non-command area were small farmers having 1-2 Ha; 28.2% in Command and 26.8% in non command were large farmers with more than 2.0 Ha; 26.4% in command and 27.9% in non command area were Marginal farmers having up to 1.0 Ha land. Landless constituted 10.9% in the Command and 11.6% in non command Area.

Composition of Families: Though a majority of families in the district were single in both Command (58.2%) and non-Command (63.2%) areas, the proportion of joint families was significant which reflect traditional system prevailing in the society. A large majority of household were Male headed in both the Command (94.6%) and non-Command (93.7%) area.

Literacy: The percentage of literates among families in Command was 77.8 and in non-Command 76.4. This was significantly higher than State average (69.7%) in Census 2011. In non-command area of Block Talbehat the proportion was, however, slightly lower (67.4%).

Living Condition: About 18 percent of houses in both command and non-command areas had pit toilet within their house. About 24 percent of houses in Block Birdha in command area and 27 percent in Block Mandwari and 22 percent in Birdha in non-command area had such facility. About two-third of Pacca houses in Block Birdha command area and Block Mandwari and 57 percent in Birdha in non-command area had this facility within their premises. About 62 percent of houses in Command and 64 percent in non-command area had electricity connection. A significantly larger proportion of houses in Block Birdha in both areas had this facility as compared to other Blocks.A large majority of families were using Cow dung cake/ firewood as fuel for cooking. A large majority of families in both Command (77.3%) and non-Command (80.0%) were getting drinking water through government handpumps. Most of the

respondents in Command (96.4%) and non-command (94.7%) area reported the quality of drinking water was clean.

Family Assets - Agricultural Implements: About 40 percent of families in Command and 45 percent in non-Command area had some agricultural implements. In command area, 27.3% of families had Pumpset and Ferrying Trolly; 20.5% owned Tractor; 31.8% had Harrow; 11.4% owned Thresher and 50.0% had wooden plow. In non-Command area, 40.0% of families owning implements had Pumpset; 23.5% had Ferrying Trolly; 10.6% had harrow; 8.2% each had Tractor and Thresher and 38.8% owned wooden plow. The proportion of families owning pumpset is large which indicates a dire need of irrigation. Further, the proportion of Pumpsets owners in Block Birdha was very high as against other two Blocks in both Command (46.2%) and non-Command (56.3%) area. It suggests serious surface water shortage in this Block.

Family Assets-Livestock: A large proportion of families in both Command and non-command area owned livestock, ranging from 84.0% of households in Block Birdha and 87.0% in Talbehat to 90.0% in Mandwari in the Command Area. In non-command area, 84.0% of families in Block Mandwari, 88.0% in Birdha and 93.0% in Talbehat owned livestock. Ownership of livestock by a large number of households indicates that animal husbandary is an important source of earning for the people in Lalitpur. The average number of livestock per family was significantly higher in the command area (6.6) of all three blocks as compared to non-command area (2.7). This situation may be due to easy availability of surface water in the command area.

Family Income: The average net annual income per family from various sources was found higher in command (Rs. 45179) as against the non-command (Rs. 36456) area. The same trend was found in all the three Blocks. The average per family annual net earnings from two major sources, i.e. agriculture and animal husbandry were lower in non command area as the cost of input were considerably higher in this area. Due to shortage of surface water farmers and owners of livestock were depending on costly ground water for irrigation of crops as well as for animal fodder.

Savings: As regards the number of families who were able to save some small amount of money and deposited it in the Bank, Post office or kept with themselves a slightly higher average annual savings was reported by respondents of Command (Rs. 1429/-) than of the non-command (Rs. 1257/-) area, may be due to the higher income they earned.

Indebtedness: Indebtedness seems to be a serious problem as about 40% of sample families in command and 29% in non-command area were indebted. Average loan per indebted family in command area was Rs. 98341/- while average current outstanding was Rs. 93295/- i.e. about 95% of the loan amount was yet to be repaid. In non-Command area, the average loan amount per indebted family was Rs. 102536/- while the average current outstanding amount was Rs. 81125/- i.e. about 79% of the loan amount was yet to be repaid. Thus, a higher proportion of amount was repaid in non-command than in command area. A higher average loan per indebted family was reported in Block Birdha followed by Mandwari and Talbehat in both Command and non-Command area. A significantly larger average amount of loan was obtained from banks rather than from

money lenders or relatives / friends in both Command and non-command area. A larger proportion of loan secured from Banks was repaid in non-command (21%) than in command area (about 5%). The entire loan amount taken from Moneylenders remained outstanding in both command and non-command area despite the fact that it carried a very high interest rate of even upto about 5% per month.

Issues related to Poverty: The respondents were asked to identify a critical situation that they faced due to poverty. About half of the sample in Command (52%) and non-command (51%) areas mentioned that they could not arrange medical treatment of family member; about 31% in command 37% in non command areas reported that they could not marry their daughter while about 17% in command and 13% in non command reported their children had to drop out of school due to non-payment of fee. Non availability of Medical treatment due to poverty was reported by more respondents in block Talbehat and Mandwari in both Command and non-Command areas as compared to block Birdha.

Migration Status: A total of 21 Male (19%) alongwith 4 female workers in command area migrated for employment. Among them 12 male and 3 female workers migrated out of their district but within the State while 9 male and 1 female worker migrated out of the state. Migration of 12 male and 4 female workers was seasonal. Thus, out of 21 male workers, 9 migrated permanently. In non-Command area, a lower proportion of families (8%) reported on migration of their members as 15 male and 1 female workers had migrated to other places.. Proportion of migrated workers was significantly higher in command area of block Talbehat (33%) and Mandwari (27%) than in Birdha (6%). A similar situation was found in non-command area, though not significantly.

Area affected by Waterlogging/Barren land/Drought: Out of 110 families in Command area, 12 having 12.6 Ha land and 28 families out of 190 in non command having 30.3 Ha land reportedly suffered from drought. The affected size of landholding suggests that most of them were Marginal farmers. Blocks concerned were Birdha (8 households), Mandwari (2) and Talbehat (2) for Command area and Birdha (11), Talbehat (10) and Mandwari (7) in non command area. Only two farmers in command and 5 in non command area had a total Barren land of 1.8 Ha and 9.6 Ha. One farmer each in command and non-command area complained about water logging.

Depth of Ground water and Preferred Source of Irrigation: The depth of ground water in all the 3 blocks in Command and non-command area was reported at more than 30 feet. When enquired about farmer's preferred source of irrigation in case ground water level was very deep, 58 farmers in command preferred Tubewell as compared to 52 farmers preferring Canal irrigation. In non-command area, the numbers were equivalent (93 each for Tubewell and canal). These answers indicate that, even though tubewell water is much more expensive than canal water, tubewell water was slightly preferred as a source of water. The reason for this might be that canal water supply is generally untimely/ inadequate. Block wise, a significantly large number of respondents in Talbehat both in command (22 respondents) and non-Command (51) area preferred irrigation through Tubewell as compared to those preferring Canal irrigation i.e. 8 and 17 respectively. This suggests that the condition of canal irrigation in Block Talbehat was not satisfactory. The respondents belonging to the three Blocks reported that the level of

canal water generally remain high during November-December while during March-June the Canal remains dry.

Crops affected by Drought in Last 10 years: About 88% of farmers in command area reported that their crops had been affected by drought between one and six times in the last 10 years. About 96% of farmers in Blocks Birdha and Mandwari were affected while in Talbehat about 65% of the farmers were affected. About 79% of farmers in non-command reported their crops were affected between one and 8 times in the last 10 years. About 96% of farmers in Birdha, 92% in Talbehat and 55% in Mandwari suffered from such occurrences. During the last 10 years, crops of a majority of farmers in Command (74%) and non-command (62%) area were affected for 3-4 times due to occurrences of drought, which is a considerably large number as one failure of crop affects the economic condition of farmers for more than two crop seasons.

Soil Fertility Testing: More farmers in non command (15%) than in command area (4%) reportedly get soil fertility of their farms tested in the last ten years, mostly once, and some twice or more. The proportion of such farmers was significant in Block Birdha non-command (38%). About 21% of farmers in non-command and 12% in Command area reported reduction in Soil fertility of their farms. Block-wise about 19% of farmers in Mandwari, 15% in Talbehat and 7% in Birdha in Command area reported reduction in soil fertility of their farms while in non-command area about 27% of farmers in Birdha, 19% in Mandwari and 18% in Talbehat reported a similar situation. It is therefore, a serious constraint for a significant proportion of farmers in both command and non-command area. Only 3 farmers in command and 7 in non-command reported about barrenness of some of their farm land.

Main Crops and Productivity: Major crops in terms of area covered in the district included Wheat, Jwar, pulses and Oilseed. Productivity i.e. Qtl/Ha of all crops was low in comparision to the State's average for the year 2008-09.

- Productivity of Wheat in the district was reportedly 24.9 Qtl/Ha in Command and 20.9 Qtl/Ha in non-command against State's average of 29.97 Qtl/Ha.
- For Jwar, the productivity was 6.8 Qtl/Ha in command and 6.9 Qtl/Ha in non-command against states average of 10.38 Qtl/Ha.
- For total pulses, the productivity was 6.7 Qtl./Ha in Command and 6.2 Qtl/Ha in non-command against State's 8.99 Qtl/Ha
- For Total oilseed, the productivity was 4.9 Qtl/Ha in Command and 4.4 Qtl/Ha in non command against State's 8.87 Qtl/Ha.

In terms of historical trends;

- Productivity of Wheat in Command area was reported at 24.9 Qtl/Ha at present, 20.7 Qtl/Ha 5 years back and 17.3 Qtl/Ha 10 years before. This was considerably higher than productivity in the non-command area, i.e. 20.9 Qtl/Ha, 18.5 Qtl/Ha and 16.5 Qtl/Ha during the three periods respectively.
- Productivity of other crops such as Jwar, Pulses and Oilseeds had mixed historical trends. The productivity of Jwar in Command at present was reportedly 6.8 Qtl/Ha, which is slightly lower than in non-command (6.9 Qtl/Ha) while it was slightly higher (7.6 Qtl/Ha) 5 years before but lower (6.4 Qtl/Ha) 10 years before

as against non-Command area (7.4 and 6.6 Qtl/Ha). The productivity of Pulses at present in Command area was higher (6.7 Qtl/Ha) than in non-command (6.2 Qtl/Ha) but its productivity was reported lower in Command 5 years and 10 years back (6.2 and 6.0 Qtl/Ha), as compared to 7.3 and 6.2 Qtl/Ha in non-command area. The productivity of oilseeds in Command area at present was 4.9 Qtl/Ha against 4.4 Qtl/ Ha in non-command while farmers in non-command had higher productivity 5 years back (5.5 Qtl/Ha) and 10 years back (6.6 Qtl/Ha) than in Command area i.e. 4.7 Qtl/Ha and 5.7 Qtl/Ha respectively. The reasons given for increase in productivity of crops at present included: Use of HYV Seeds, proper use of fertilizers and timely irrigation in both Command and non-command area. The reasons for decline in productivity of crops included: irrigation problem (untimely/insufficient), shortage of fertilizers and the menace of wild animals destroying the crops.

Proportion of Area Sown in Rabi and Kharif: A higher percentage of total sown area was covered during Rabi season in non-command (94.8%) than in command (91.9%) area of the district. During Kharif however, a larger area was sown in Command area (49.7%) than in non-command (43.2%). With regard to blockwise data, in command area of block Mandwari, about 96% of area was sown during Rabi followed by Talbehat (93%) and Birdha (90.0%). In non-command area also a higher proportion of sown area was covered in Rabi in Mandwari (98%) followed by Birdha (94%) and Talbehat (92%). During Kharif, a higher proportion of sown area (49.7%) was covered in command area of the district, highest in Block Mandwari (54%) followed by Birdha (50%) and Talbehat (41%) against 43%, 47% and 39% respectively in non-command areas. Overall, a higher proportion of sown area was covered in non-command (95%) during Rabi while in Kharif proportionately more area was covered in Command area (49.7%).

Irrigated Area and Sources of Irrigation. In the command area of Block Mandwara a larger proportion of sown area was reportedly irrigated (53%) followed by Talbehat (48%) and Birdha (36%); while in the non-command more area in Block Mandwara (57%) was reportedly irrigated followed by Birdha (48%) and Talbehat (45%). Investigations in the sources of irrigation show that farmers were using more than one source in both command and non-command area. In the command area, a large proportion of the irrigated area was supplied with canal water in the district (48.5%). The rate was highest in Block Talbehat (64.5%) followed by Birdha (54.5%) and only 30.2% in Mandwara. Despite a significantly large proportion of irrigated area getting canal water in Talbehat about 44% of the irrigated area was also irrigated through private Tubewells and 9% through Pond/Well. Similarly, in Birdha about 50% of the irrigated area was also irrigated through Pond/ Well and 20% through Private Tubewells. Since Canal irrigated area in Mandwara was lowest, about 58% of the irrigated area was covered through private Tubewell, 7% through Pond/ Well and about 4% through Reservoir/ Dam. There was also heavy dependence on Rainfall i.e. 43% in Talbehat, 40% in Birdha and 20% in Mandwari. This situation suggests inability of the current canal systems to provide sufficient water for irrigation.

In non-command area, since canal was reportedly not available about 53% of the irrigated area was covered through Private Tubewell, 40% through Pond/Well and 3% through

Reservoir/ Dam in the district. Almost the entire irrigated land in Birdha was covered by Pond/ Well (99.7%), followed by Private Tubewell (9%) and Reservoir/ Dam (9%); in Talbehat and Mandwari there was heavy dependence on Private Tubwell as respectively 79% and 71% of area was irrigated through this source. About 12% of irrigated area in Mandwari and 10% in Talbehat was covered through Pond/Well. Dependence on rainfall in non-command area was lower than in command area.

Willingness to pay higher water tariff: A small proportion of farmers in the command area of district (12.4%) expressed their readiness to pay higher water Tarrif if timely and adequate canal water supply is provided. It was also found that comparatively more small farmers than large farmers expressed their willingness to pay higher charges provided the timely and adequate water supply is assured.

Ability to provide required watering of crops: In command, area, only about 80% of the total number of required watering for wheat crop were reportedly given - about 52% were timely and 48% late. 95% of total required waterings for Jwar were given- 84% timely and 16% were late. About 88% of total required watering was given to Pulses crop and all were late watering. In non-command area about 88% of the total number of required waterings were given to wheat crop - 51% timely and 49% were late; Only 76% of the required number of watering for Pulses crop were given-74% timely and 26% were late.

Landholding Size wise Production of Crops, Cost and Income per Ha: The average productivity (Qtl/Ha) of Wheat, Jwar and Pulses in command area was lower in Marginal landholdings (<1 Ha) than in Small (1-2 Ha) and Large (> 2 Ha) landholdings. In the case of oilseeds, Marginal farmers recorded higher productivity than small and large farmers. It may be due to higher use of fertilizers and adequate irrigation by marginal farmers. The expenditure on these two items by Small and Large farmers was negligible/nil.

In non-command area, the average productivity of all four crops was lower in Marginal landholdings as compared to Small and Large landholdings.

In terms of net income per ha, averages in the study area were:

- 8200 rupees/ ha for pulses
- 9000 rupees/ha for wheat
- 8600 rupees/ ha for oilseeds
- 1500 rupees/ ha for jwar/ barja

Net income values are lowest for marginal farmers for pulses, oilseeds, and wheat. In the case of jwar/ barja, small farmers actually have the lowest net income.

The net income per Ha produce divided by gross income was higher in Command area with respect to Wheat (41.84%), Pulses (41.13%) and Oilseeds (61.64%) as compared to net income from Produce of Wheat (30.61%), Pulses (31.32%) and oilseeds (59.92%) in non-command. Net Income from Jwar produce per ha was higher in non-command (27.88%) than in Command (22.40%) area.

Problems in Marketing of Produce: Farmers were selling their produce at more than one place and at different times, depending on the quantity of produce and their need to get cash. A large proportion of farmers reportedly sold their produce in local market followed by Mandi, Wholesellers / Middleman / Moneylenders in both command and non-command area. Only a few sold their produce at the Procurement Centre. The major problems identified for marketing included: a) Low price in local market; b) Exploitation by Middlemen / Moneylender; c) Lack of procurement Centre at Convenient distance; c) Long distance of mandi; d) High cost of transportation to long distance procurement Centre and Mandi.

Use of Fertilizer and Pesticide per Hectare: The farmers were using chemical and Bio-fertilizers and Chemical Pesticides (Bio-Pesticide used only in Block Mandwari). The average quantity of Bio-fertilizer used per Ha was higher (339.9 Kg.) than the quantity of Chemical fertilizer (282.8 Kg) in command and non command (334.5 Kg and 264.7 Kg respectively) area. The quantity of chemical as well as Bio-fertilizer per ha was higher in command than in the non-command area. The average quantity of chemical Pesticide used in Command area was also higher (17.5 Kg/Litre) than in non-command area (7.0 Kg/Litre). The highest quantity of Bio fertilizer and Chemical Pesticide were used in Block Mandwari in both Command and non-Command area, Bio-fertilizer at 376.9 Kg in Command and 389.5 Kg in non-command and chemical Pesticide at 46.2 Kg/Litre in Command and 15.3 Kg/Litre in non-Command which were very high as compared to other Blocks.

Major Problems Related to Agriculture and Irrigation from the Farmers Perspective: The farmers identified about five problems that they were facing with regard to agriculture. Their problems as well as the probable reasons were common in both Command and non-command area and included:

Problems	Probable Reasons	% of Respondents	
		Command	Non-Command
1. Seed Quality	Shortage of HYV Seeds	90.8	94.6
2. Fertilizer Problem	Shortage	71.4	87.5
3. Stray Animals	Due to Anna Pratha	90.8	81.0
4. Loss of Animals	Wild Animals Close to forest Attack	74.5	80.4
5. Low Productivity	Loss of Soil Fertility	53.1	66.1

Although the cause of low productivity has been mentioned as loss of soil fertility, it is certainly due also to shortage of HYV seeds and fertilizer. Stray animals due to Anna Pratha destroy a considerable part of crops while there is no check on them to prevent the loss due to social practices as well as the influence of owners of such cattle. There was reportedly considerable loss of cattle due to their killing by wild animals around the forest area. As regards the major problems that farmers were facing in relation to irrigation, the common problems in both command and non-command area were:

Problems	Probable Reasons	% of Respondents	
		Command	Non-Command
1. Electricity	Regular Power failure	96.9	82.1
2. Water Level	Deep Ground Water Level	83.7	76.8

Problems	Probable Reasons	% of Respondents	
		Command	Non-Command
3. Water Supply	Untimely Supply	85.7	73.8
4. Irrigation Equipment	Lack of proper Equipment	79.6	71.4
5. High Cost of Irrigation	Due to heavy dependance on tubewell	76.5	64.3

Regular power failures causes not only hardship but increase dependence on Diesel run Tubewells, which enhances cost of irrigation. Untimely supply of canal water increases the dependence on tubewells. Addressing shortage of irrigation equipment would require financial investments which were not possible for the farmers, while cheap irrigation through wells was difficult due to ground water level being very deep.

Water Users Association/ Arrangement for Distribution of Canal Water: There was no Water Users Association in the district. In command area only two respondents reported that they discuss about sharing of canal water with fellow farmers. No farmer reported on any type of arrangement for distribution of canal water; there was no role of farmers in recording of irrigation through canal; and repair of canal was undertaken neither annually nor season-wise. Farmers had also no knowledge about the fine imposed on any one for unauthorised use of Canal water or any case filed on canal crime.

NGOs in the area: None of the respondents in Command area had any knowledge of the NGOs working in their area while 6 respondents in non-command (5 in Block Talbehat and 1 in Mandwari) knew some NGOs in their area. Among the 6 respondents 5 also reported their families had benefited from the activities of the NGOs. Thus, NGOs activities seem to be limited.

Self-Help Groups: A total of 9 respondents, 5 in Command and 4 in non-command reported the existence of Self-Help Groups in their area. These SHGs were working for improvement in Animal Husbandry and some were also helping their members for small business. None of the family members of the respondents were, however, associated with the SHGs. It suggests that their area of activities was limited.

Contact with Officials of Irrigation Department: When enquired whether the respondents maintain contact with any officials of the Irrigation Department only 2 in Command and 4 in non-command reported they maintain contacts with the Seenchpal, particularly when they do not get sufficient water for irrigation.

Environment-Disposal of Garbage: It seems people were not particular in dumping garbage at some specific place. They were, therefore, throwing it wherever they desired. Most of them were however, throwing it on dump site in the village (93% in Command and 89% in non-command), 31% in command and 17% in non-command were also throwing it near their home; 29% in command and 35% in non-command were throwing it in the field while 8% in command and 11% in non-command were dumping it in pond.

The above practice result in breeding of mosquitoes / flies (55% in command and non-command each), dirty environment (58% in command, 35% in non-command), foul smell (33% in command and 39% in non-command), and prevalence of Malaria (16% and 22%

respectively). A sizeable section of respondents reported that they also use garbage for preparing fertilizer (38% in Command and 36% in non-command). It seems only a part of Garbage was used for this purpose.

Health conditions: Average monthly expenses on medical treatment of all family members and exclusively on women show that a slightly higher proportion of expenses were incurred on treatment of women members in both command (50.3%) and non command (53.1%) area. Proportionately more women than men reported having been sick in the past two years. Out of those who suffered from certain diseases in Command area 24% men and 14% women suffered from Typhoid (significantly higher proportion of both in Block Mandwari); 7% of men and 12% of women were affected by Cholera/ Diarrhoea (significantly higher proportion of both in Mandwari); 20% of men and 33% of women suffered from Malaria (a very high proportion of both in Block Talbehat); 13% of men and 7% of women suffered from whoping cough (a higher proportion of both in Block Birdha) while 20% of men and 19% of women were affected by some skin disease (significantly higher proportion of both in Block Birdha and Talbehat). In non-Command area, of those who suffered from certain diseases 18% of men and 20% of women suffered from Typhoid (a higher proportion of both in Block Talbehat) ; 18% of men and 21% of women suffered from Malaria (a high proportion of both in Talbehat); 12% of men and 16% of women suffered from whoping cough (significantly higher proportion of both in Block Mandwari and Birdha; and 25% of men and 22% of women were affected by skin diseases (significantly higher proportion of both in Birdha). Thus, most common diseases which affected a significant proportion of men and women in both command and non-command area were Typhoid, Malaria, Whoping cough and some skin diseases which were related to quality of drinking water, sanitation/ environmental pollution.

Families Benefitting from Government Programmes: The respondents were asked about benefit their families received from the government programmes in the area of Agriculture, Irrigation and Poverty Alleviation. They had no knowledge of the Government programmes related to Agriculture and Irrigation. With regard to Poverty Alleviation, people mentioned only MNREGA. The proportion of beneficiary families was 73% in Command and 69% in non-command area. The proportion of beneficiary families in Block Talbehat was lowest in both Command (47%) and non-command (43%) area. Most of the respondents from beneficiary families expressed dissatisfaction from the benefits that they received under MNREGA. The reasons were that wages under MNREGA were lower than prevailing market rates and there were some problems in Management of the programme as they complained about irregular payment period.

Conditions of Women: Women's condition was investigated in detail. In general, women and girls situation in the project area was found to be unequal from men and boys situation.

- Out of 98 families of farmers in Command and 168 in non-command, family land was recorded in Khatauni in the name of women in 4 household of command and 3 in non-command. Thus, most of families had land ownership in the name of male members.
- There were 114 boys in age group of 7-14 years in Command and 177 in non-command area and all of them were reportedly attending school. Among a total of 94

girls in command 62 (66%) and out of 123 in non-command 88 (72%) were attending school. Thus a sizeable proportion of girls i.e. 34% in Command and 28% in non-command area were out of school.

- The average per child annual expenditure on education of boys in command area was significantly higher (Rs. 3211/-) as compared to expenses on girls (Rs. 2454).
- Families were asked about the problems that they face in continuing education of girls. A larger proportion of them in command and non-command (43% and 49% respectively) mentioned the problem of transport, suggesting that girls were to go out of the village; about 15% of respondents in Command and 19% in non-command mentioned lack of school in the village; 15% in command and 10% in non-command cited the problem of their poverty; early marriage as a constraint was mentioned about 18% in non-command while about 26% in command and 4% in non-command had no specific reason, indicating their lack of interest in the education of girls.
- Most of the women engaged in agricultural work were working for cultivation/weeding in Command (81%) and non-command (76%) area. A significant proportion of women were also involved in sowing (35% and 36% in command and non-command respectively); Crop-Storage (33% and 14% in command and non-command respectively); and Harvesting (15% and 9% respectively). Thus, they were engaged in multiple agricultural activities. Care of livestock in the families was reportedly joint responsibility of men and women in both command (95%) and non-command (91%).
- Average number of hours per day spent by women respondents in household activities were reported 8.33 in Command and 8.31 in non-command area. Their activities included cooking, care of livestock, fetching water, collecting fuel wood, unpaid work on own farm and other household activities. For fetching water about 0.55 hours was spent in command and 1.16 hour in non-command while for collecting fuel wood they were spending 1.00 hour in command 1.51 hour in non-command area. Care of Livestock was taking 1.00 hour in command and 0.58 hour in non-command area.
- Earning Women and their Average Annual Income: A total of 19 i.e. about 17% of the women interviewed in Command and 27 i.e. 14% in non-command area were earning members in their families, mostly working as labour. 14 women in command and 23 in non-command were earning through this source. The proportion of earning women was lowest in Block Talbehat, both in Command (10%) and non-command (6%). A total of 4 women in Command and 3 in non-command had an average annual income from Agriculture amounting to Rs. 35788/- and 36417/- respectively while 14 in command and 23 in non-command had average annual income of Rs. 8743/- and 9887/- respectively from labour. One women each in the command and non-command was earning through service with an annual income of Rs. 48000/- and Rs. 45000/- respectively.
- The workers, Men and women both were earning wages from agricultural and non-agricultural work. The average number of working days of Men was 151/ year in Command and 183/ year in non-command. Women were getting work in both agricultural and non-agricultural activities for 124 days / year in command 108 / year in non-command area. Average rate of daily wages of women workers in both agriculture (Rs. 94/-) and non-agriculture work (Rs. 116/-) against wages for men

(Rs. 106/- and Rs. 135/- respectively) in command were lower. Similarly in non-command, they were getting average daily wages of Rs. 80/- for agricultural and Rs. 115/- for non-agricultural work as against men getting an average daily wage of Rs.97/- and Rs. 132/- respectively.

- There were 19 (17.3%) women respondents in command and 27 (14.2%) in non-command who were earning members. Among them 12 in command had an average annual saving of Rs. 1063/- In non-command out of 27 earning women 10 reported by had average saving of Rs. 4943/- per year. The earning women members were reportedly sharing family expenses on Health, Food, clothes and Education of children. A significantly higher proportion of them were sharing family expenditure on Health and Education of children in both Command and non-command area.
- Only one woman respondent in Command area of Block Talbehat was member of Self Help Group (SHG) and benefitted by Rs. 1000/- per year. No women in non-command were associated with the SHG. Only 1 women respondent in Command area of Block Talbehat was associated with a voluntary agency for community service, engaged in Training of Sewing.
- With regard to women participation in local councils, none of the Women respondents in Command was members of village Panchayat. In non-Command area one respondent each in Block Mandwari and Talbehat were Panchayat member. The Panchayat member in Block Talbehat was getting reasonable importance in the meetings while the other one in Mandwari had a negative experience. A large majority of Women respondents reportedly voted in elections in both command (94.5%) and non-command (95.3%) area which indicate a higher degree of consciousness about the importance of elections
- With regard to social problems affecting women, a large majority of women respondents (92%) complained of low status of women in their family in both command and non command area. About 35% in non-command complained about alcoholic husband, 30% regarding violence against women, 28% about strict behaviour of In-laws, and 27% complained about insecure village environment. The proportion of women complaining about same was lower in Command i.e. 16.4%, 16.4%, 18.2% and 16.4% respectively.

4.3 Summary of findings from household surveys

In terms of demography, the proportion of Scheduled Castes families was 22.7% in Command area and 26.8% in non command area. Scheduled Tribe families were nominal i.e. 2.7% in Command and 0.5%, in non-command area, are mainstreamed with dominant population, and do not represent indigenous population. The average landholding size in district Lalitpur is reportedly higher (1.73 Ha in 2000-2001) than at the State level (0.83 Ha) and this was corroborated by household surveys. Literacy levels were higher than State's average, except for non command area of Talbehat Block (67.4%). Gender bias has been observed in women ownership of land, women education, meeting daily needs like fetching water, care of livestock, collection fuel wood and rate of wages paid to women. A large number of households own livestock, which indicates that animal husbandary is an important source of earning.

On the basis of 2008-2009 secondary data, the major crops grown in the district are pulses (about 62% of cultivated area), wheat (29%), oilseeds (8%) and rice (1%). In the area surveyed, crop productivity was significantly lower for all crops than State's averages. It was equal to 70% - 80% of State's averages from most crops, and reached only 50% for oilseeds. Besides, crop productivity was lower in non-command area than in command area.

Marginal landholders generally had lower productivity than Small and Large landholders for pulses, wheat, and jwar, but higher for oilseeds. They earned lower net income per ha for pulses, wheat, and oilseeds.

The average net annual income per family from various sources was found higher in command (Rs. 45179) as against the non-command (Rs. 36456) area. The average per family annual net earnings from two major sources, i.e. agriculture and animal husbandry were lower in non command area as the cost of input were considerably higher in this area. Due to shortage of surface water, farmers and owners of livestock were depending on costly ground water for irrigation of crops as well as for animal fodder.

Indebtedness is a serious problem as about 40% of sample families in command and 29% in non-command area were indebted. A higher average loan per indebted family was reported in Block Birdha in particular as compared to the two other Blocks.

With regard to source for irrigation, farmers were often using more than one source of irrigation in command area, certainly due to untimely/inadequate provision of canal water. In command area, 48.5% of the area was supplied with canal water. Besides, private tubewells and pond wells were also used to supply water. In Talbehat Block, about 44% of the irrigated area was also irrigated through private Tubewells and 9% through Pond/Well. In Birdha Block, about 50% of the irrigated area was also irrigated through Pond/ Well and 20% through Private Tubewells. In Mandwari Block, about 58% of the irrigated area was covered through private Tubewell, 7% through Pond/ Well and about 4% through Reservoir/ Dam.

In non-command area, about 53% of the irrigated area was covered through Private Tubewell, 40% through Pond/Well and 3% through Reservoir/ Dam. The proportion of families owning pumpset is large in both command (27.3%) and non-command (40%) area, which indicates a dire need of irrigation. Proportions were particularly high in Birdha block. With regard to farmers' preferences, even though tubewell water is much more expensive than canal water, tubewell water was slightly preferred as a source of water. There are currently no specific arrangements for canal water sharing or operation and maintenance of irrigation and drainage systems. Canal repair was not undertaken. Few farmers reported that they had had contact with UPID Seenchpal.

Farmers identified the major problems related to agriculture as the following:

- Seed quality
- Shortage of fertilizer
- Stray animals due to Anna Pratha practice

- Loss of animals because of forest wild animals attack
- Low productivity because of loss of soil fertility

Major problems related to irrigation were the following:
- Regular power failure for electricity
- Deep groundwater level
- Untimely supply of water
- Lack of proper equipment for irrigation
- High cost of irrigation, due to heavy dependence on tubewell

4.4 Regional Environmental Setting & Environmental Baseline

An analysis of environmental characteristics and issues has been carried out for Bundelkhand and more specificallyLalitpur district. The baseline environmental conditions are described in terms of Land Environment, Climate & Air Environment, Water Environment, Forest & Biodiversity and public health.

4.4.1 Land Environment

Physiography: Uttar Pradesh Bundelkhand area is bounded by Vindhyan plateau in the South, by river Yamuna in the North, river Ken in the East and rivers Betwa and Pahuj in the West. The region generally slopes from South to North. The area generally slopes from mild ravines to level plains near Yamuna. The elevations in the area range from 600 m above mean sea levels (amsl) in southern part in MP to 150 m (amsl) near the Yamuna. The total area of Bundelkhand is 29616.9 km^2 with a population of 6389336. Figure 4.1 shows the physiographic features of Bundelkhand region.

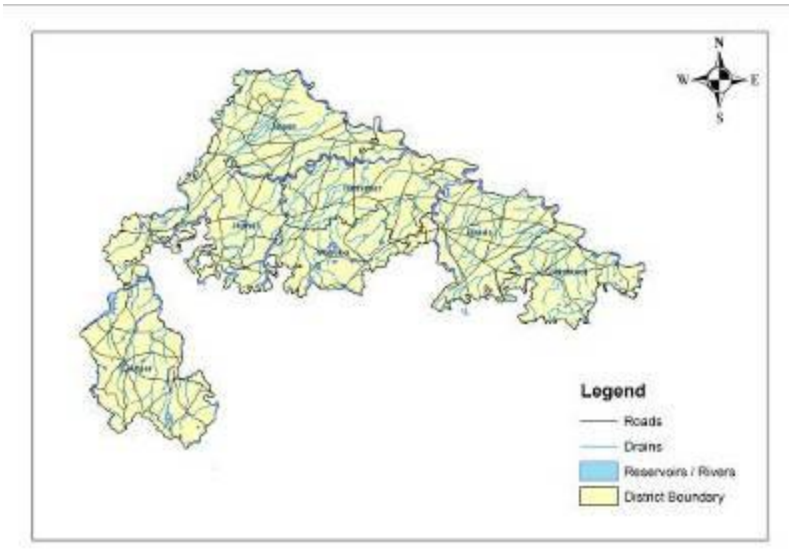


Figure 4.1: Physiographic features of Bundelkhand region

Lalitpur district area area is generally rocky. The highest ground is in the extreme south with scraps of the vindhyan plateau, running from the Betwa in south-easterly direction

and gradually breaking up into a confined mass of hills, parts of which approach a height of 650 m amsl. The north of the scrap, undulating plain of black soil interrupted with scattered hills and scoured by numerous drainage channals, stretches north beyond the town of Lalitpur and gradually becomes rockier. Low red hills of granitoid rock then appear with long ridges running from south- west to north- west direction.

Most of the area is being drained by river Jamni and its tributaries which form its eastern boundry, separating it from Tikamgarh district in Madhya Pradesh. River Betwa forms the western and northern boundry and drains the western part of the district. The south eastern part is partly drained by Dhasan River. In general, the slope is towards the north.

4.4.2 Physiography of Study Area

Undulating terrain due to Vindhyan rocks in the southern part (Lalitpur, Jhansi, Mahoba & Southern part of Banda & Chitrakoot**)** makes the sourthern part of the area a reservoir of natural resources, in particular minerals and forests. The drainage pattern towards north along with Yamuna plain is indicative of resources supporting agriculture. The main rivers, i.e. Sajnam, Jamini, and Rohini, are shown in **Figure 4.2.**

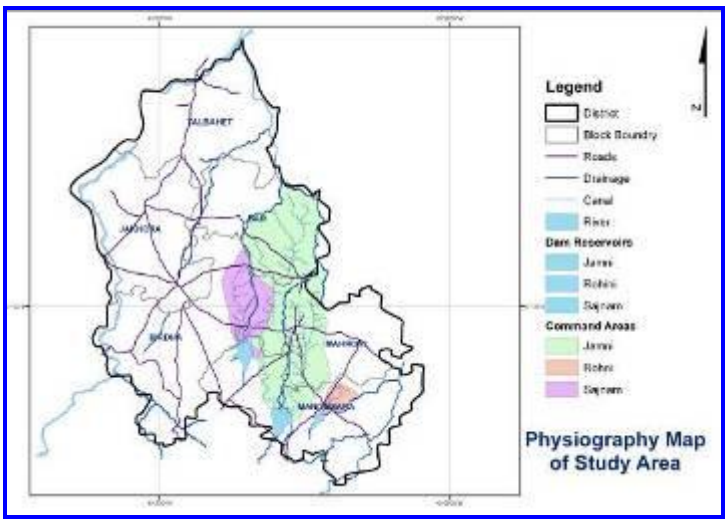


Figure 4.2: Physiography of Study Area

4.5 Geology & Minerals

In Lalitpur District, the Geological Setup consists of the area which is covered by Bundelkhand Granitic Massif overlain by Mahakoshal (Bijawar) and Vindhyans. Mineral investigation programmes in the area have found Gold in Girar area, Platinum group of elements in Ikauna-Dangli area and placer Gold in Berwar area. **Major minerals** include Pyrophyllite, Diaspore and Rock phosphate. **Minor minerals** include Granite, sandstone and Morrum. Sanctioned leases in the district include 4 Sand and Morrum, 53 for Granite dimensional stone, 8 for Diaspore – Pyrophyllite, 15 Building stone (Granite) and 30 for Building Stone (Sandstone). The Geology & mineral map of the study area is given in

Figure 4.3. Mineral Based industries include 8 Granite Stone cutting/polishing units, 2 Granite & Sandstone cutting / polishing units, 11 Stone grit units and 2 Handicraft units.

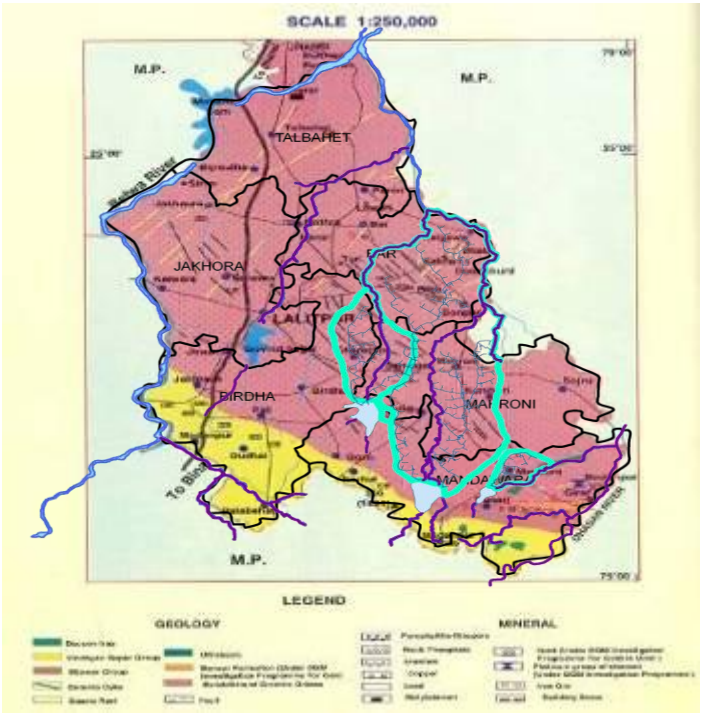


Figure 4.3: Geological & Mineral Map of District Lalitpur

4.5.1 Details of Sanctioned Leases-Major Minerals

There are 29 authorized mining locations which are located in 5 districts of Bundelkhand Area. As per the department of Geology and Mining, there is no unauthorized mining activity reported in the Uttar Pradesh Bundelkhand Area. The mining locations in the study area are given in **Table 4.1**. Weathering of rocks and upper layer is an ongoing natural phenomenon which suggests erosion and its drainage into river system depending on vegetation cover. Extraction of minerals based lease allotted in each district as well as operation of mineral based industries is suggestive of alteration of drainage system, erosion and siltation of river system and air and water pollution.

Table 4.1: Sanctioned lease record for mining in Bundelkhand

Sr. No.	Mineral	Lease Holder	Village	Area (ha)	Period
Lalitpur					
1.	Pyrophyllite/ Diaspore	Sri J.K. Minerals	Maillar, Shivpura, (Tehsil Lalitpur)	30.75	20 years from 30.10.72 Renewed from 29.10.92 for 20 yrs.
2.	- do -	- do -	Bijri, (Tehsil & District Lalitpur)	37.983	20 years from 01.09.83 Renewed
3.	- do -	Sri Om Prakash Kejriwal	Mailar (Tehsil Lalitpur)	2.10	10 years from 22.4.84 Applied for Renewal
4.	- do -	M/s. UP SMDC Ltd	Tori, Pulawan (Tehsil Mehrauni)	73.20	20 years from 23.9.83

Sr. No.	Mineral	Lease Holder	Village	Area (ha)	Period
5.	- do -	- do -	Seron, Lagoun (Tehsil Mandwara)	254	20 years from 23.9.83
6.	- do -	- do -	Bijri, (Tehsil Lalitpur), Dhankuan, (Tehsil Mehrauni)	447	20 years from 7.4.85
7.	Rock Phosphate	- do -	Sonrai, Tori (Tehsil Mehrauni)	874	20 years from 9.3.81
8.	Pyrophyllite Diaspore	M/s. Ishwar Industries Limited	Pura, Dhankuan (Tehsil Mehrauni)	47.42	20 years from 01.05.64
9.	- do -	M/s. Vini Minerals	Myaun	19.15 Acre	20 years from 22.12.94
10.	- do -	- do -	Bilata, (Tehsil Mehrauni)	5.90 Acre	20 years from 09.01.97
11.	- do -	Sri Salil Richharia	Mailar (Tehsil Lalitpur)	15.00 Acre	20 years from 10.11.98
12.	- do -	Sri Vishwa Nath Singh	Pura Dhan Kuan (Tehsil Mehrauni)	6.25 Acre	20 years from 16.9.96
13.	- do -	Sri Subhash, Chandra Om Hare	Mailar, (Tehsil Lalitpur)	8.77 Acre	20 years from 27.07.01

Source: Directorate of Geology & Mining, UP

4.5.2 Soils in Lalitpur District

Lalitpur district falls in Chromusterfs and Association, Ustalfs and Usterts soil classification. The soil group under this classification indicates mixed red and black soil and medium black soil. Soil pattern suggests that soils support agriculture in district.

Soil Fertility Status: The soils in Lalitpur district in general are fertile. Available nitrogen concentration in soils in general ranges from low to very low. Same trend has been observed for available Phosphate where most of the soils lie in low to very low category. The available potassium is high to medium in most of the areas. According to the soil testing data on Nitrogen (N) available phosphate (P) and potassium (K) of the project area is shown in **Figure 4.4**.

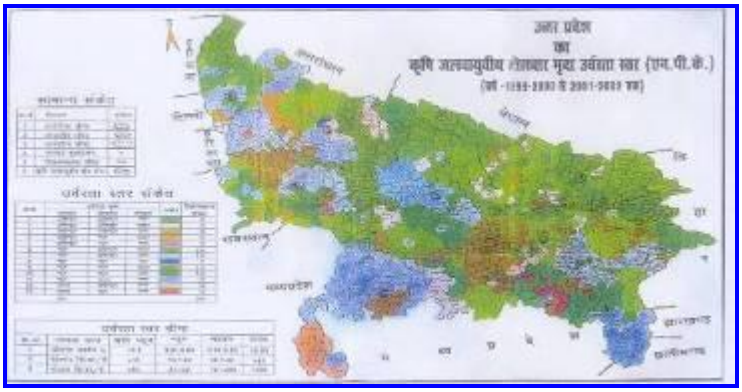


Figure 4.4: The Soil Fertility\Health Map of the Project Area

4.5.3 Soil Fertility Status in Study Area

The soils of the study area in general are fertile. Available nitrogen concentration in soils in general ranges between low to medium. The available phosphate was observed low to very low while potassium was found high. According to the soil testing data on Nitrogen (N) available phosphate (P) and potassium (K) of the project area is given in **Table 4.4**.

Table 4.4: Block wise Soil Fertility Status (2009-10)

District	Block	No. of Samples	Element Index			Fertility Level		
			N	P	K	N	P	K
	Bar	3121	2.51	1.48	3.88	Medium	Very Low	High
	Birdha	3334	2.40	1.47	3.90	Low	Very Low	High
	Mahrauni	3487	2.63	1.43	3.84	Medium	Very Low	High
	Madwara	2492	2.70	1.77	3.80	Medium	Low	High
						Medium	**Very Low**	**High**

Source: Department of Agriculture, UP

Macro-nutrient Status:

- Low nitrogen status has been reported in Birdha block of Sajnam Command Area while other blocks, Bar, Mahrauni & Mandwara falling in Jamini & Rohini belong to medium nitrogen status.
- Very low phosphate status has been reported in 3 blocks of Command Area while Madwara block was observed low phosphate level.
- Potassium status was found high in all blocks. Since Birdha block is deficient in both Nitrogen & Phosphate, any intervention related to higher usage of Nitrogenous or Phosphatic fertilizer by the farmers offers higher potential of water pollution from the agruiculture run off in the command area in the long term.

Micro-nutrients Status: Analysis of micronutrient deficiency for the command area has been analyzed and blocks reported deficient for different micro nutrients are given in **Table 4.5**.

Table 4.5: Micro-nutrients and precision element index, 2007-08

District	Block	No. of Samples	S		No. of Samples	Element Index				Fertility Level			
			Element Index	Fertility Level		Z	Cu	Fe	Mn	Z	Cu	Fe	Mn
	Bar	392	1.72	M	392	2.44	3.27	3.29	3.32	M	S	S	S
	Birdha	609	2.00	M	609	2.52	3.22	3.26	3.33	S	S	S	S
	Mahrauni	319	1.67	D	319	2.51	3.31	3.32	3.33	S	S	S	S
	Madwara	277	1.60	D	277	2.32	3.29	3.31	3.33	M	S	S	S
	Total	**3302**	**1.71**	**M**	**3302**	**2.45**	**3.27**	**3.30**	**3.33**	**M**	**S**	**S**	**S**

Source: Department of Agriculture, UP (M= Medium, D=Defficient, S=Sufficient)

Sulphur deficiency is reported in Mahrauni & Madwara blocks of Jamini command area while in other blocks it is found to be medium. Copper, Iron and Mengnese is found sufficient in all blocks.

4.6 Land Use

In Lalitpur district, in 2008-09, nearly 66.14% of the total area was used for the cultivation, while approximately 16.52% was under double cropping system. The breakup of land use pattern is shown in Figure 4.6. Block wise land use pattern in Lalitpur district is given in **Annexure 4.1**.

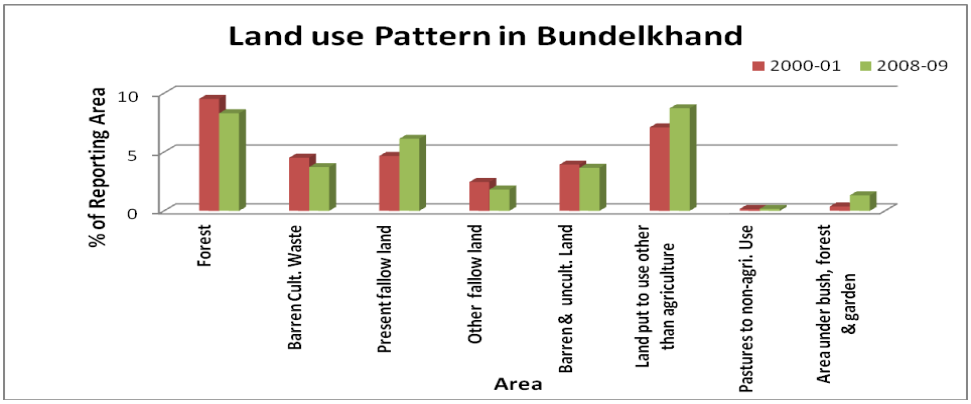


Figure 4.5: Change in Land use Pattern

In the study area in 2000-01, the total command area (4 blocks) was 336774 hectare. Land use of Command Area can be categorized as cultivable, and uncultivable. Uncultivable land includes forest, pasture, fallow, and barren land.

During 2008-09, nearly 59.83% of the total area was used for cultivation while in district it was 55.99%. Mehrauni (72.83%) block has highest net sown area followed by Bar (63.96%) and Birdha (55.30%) while Mandawara (50.74%) block was lowest. Area sown more than once of command area was 29.67% while in district it was 30.04%. Area sown more than once was highest in Bar (44.67%) block followed by Mehrauni (30.10%) and Birdha (27.48%) blocks. During the 2000-01, cropping intensity was 128.50% in 2008-09 it was 149.59. The breakup of land use pattern in command area in 2008-09 is given in **Table 4.7** & shown in **Figure 4.7**.

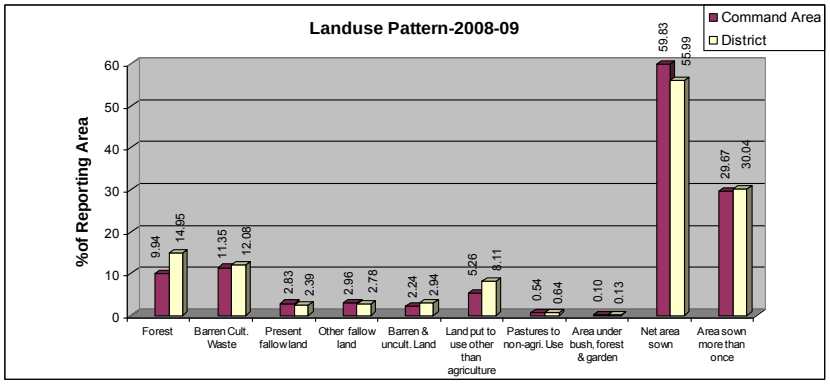


Figure 4.7: Land use Pattern in Command Area (2008-09)

Table 4.7: Land use Pattern of Command Area (% of reported Area)

Particular		2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Total Area		336774	336539	336539	333128	331782	329632	339576	330045	330860
Forest		15.04	15.05	15.05	9.94	9.94	9.94	9.94	9.94	9.94
Barren Cult. Waste		15.43	15.25	15.05	11.98	11.04	11.72	12.09	11.41	11.35
Present fallow land		4.08	4.05	7.88	5.80	4.46	6.92	6.24	8.85	2.83
Other fallow land		5.60	5.53	4.79	3.44	2.97	3.50	3.11	2.96	2.96
Barren and uncut Land		2.58	2.55	2.41	2.37	2.24	2.25	2.48	2.25	2.24
Land put to use other than agriculture		3.88	3.88	4.68	4.48	4.46	4.50	6.96	5.27	5.26
Pastures to non-agri. Use		0.66	0.66	0.66	0.66	0.54	0.54	0.52	0.54	0.54
Area under bush, forest & garden		0.35	0.31	0.27	0.28	0.12	0.12	0.10	0.10	0.10
Net area sown		52.38	52.72	49.21	55.79	58.90	55.51	54.00	53.71	59.83
Area sown more than once		14.93	15.98	23.96	23.11	23.44	16.36	18.29	17.01	29.67
Gross area sown	Total	339692.00	341544.00	318114.00	385426.00	401115.00	362209.00	377348.00	348214.00	438560.00
	Rabi	46.43	47.09	44.38	40.60	42.73	49.78	47.46	34.42	40.70
	Kharif	20.23	20.44	23.33	26.31	25.30	15.56	17.50	32.58	26.73
	Jayad	0.08	0.17	0.05	0.07	0.05	0.07	0.09	0.03	0.10
Net irrigated area		68.35	71.35	70.76	79.04	80.73	91.55	92.49	65.09	88.16

Recent changes in the Command Area land use pattern from 2000-01 to 2008-09 are shown in **Figure 4.8**.

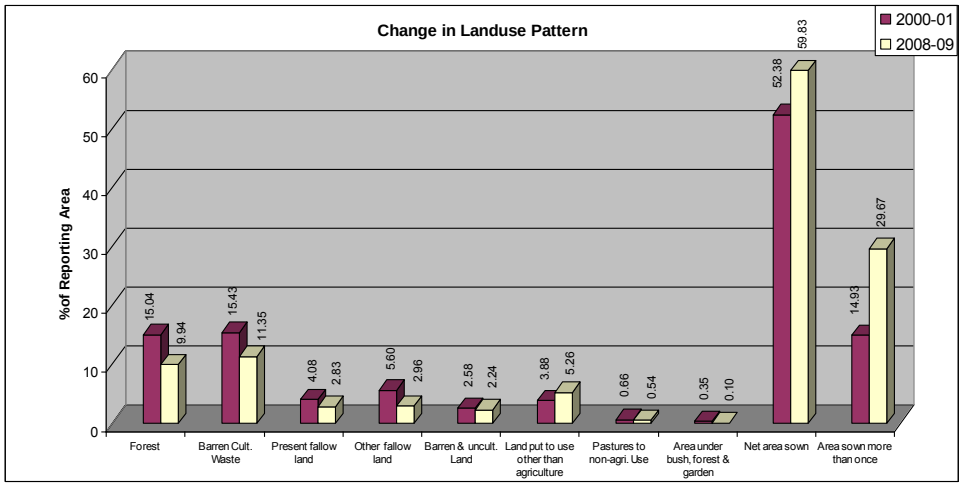


Figure 4.8: Change in Land use Pattern

Overall gross sown area increased in 2008-09 in comparison to 2000-01. This increase in 2008-09 is because of increase in gross sown area in all blocks of command area. Further, gross sown area showed an increasing trend during Kharif except during 2005-06 & 2006-07, which can be attributed to drought years. This indicates that availability of water can further increase the gross sown area in the command. Forest area has decreased, while land put to use other than agriculture has increased.

4.7 Climate

The climate of the project area is characterized by cold weather from November to February along with hot summer from March to June and the rainy season from July to October.

The temporal variation of rainfall as well as its spatial variation plays a significant role in the water resources planning of system. The rainfall pattern in Bundelkhand is typically monsoonic and the Bundelkhand region in Uttar Pradesh gets around 600 to 900 mm of rainfall annually. Normal rainfall Isohyetal map of Bundelkhand region is shown in **Figure 4.9**.

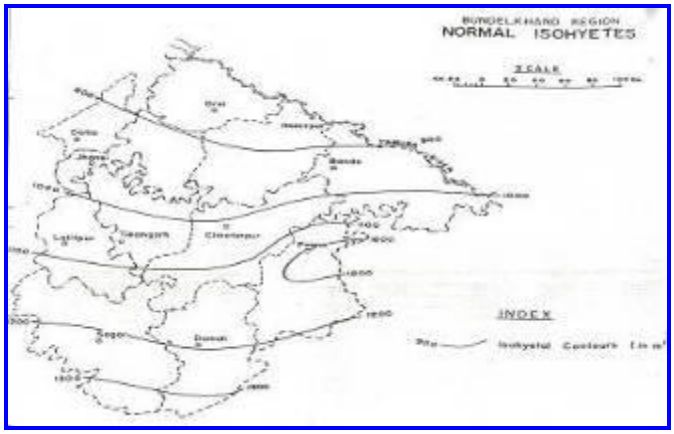


Figure 4.9: Normal rainfall Isohyets in Bundelkhand region

Rainfall profile in Lalitpur district from 1971 to 2009 is shown in **Annexure 4.3**. This profile indicates that rainfall deficiency is observed on average every seven to eight years. Besides, historical data show a declining trend in rainfall over the years. District's rainfall pattern from 2000 to 2009 is given in **Table 4.8** and shown in **Figure 4.10**.

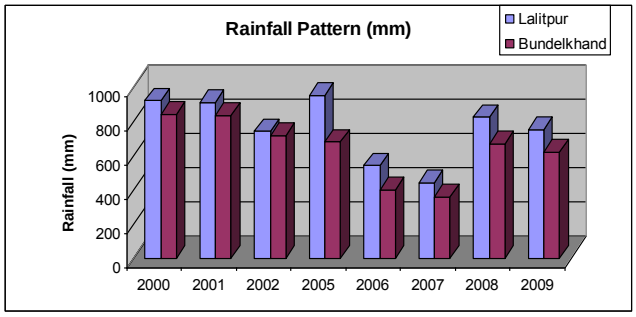


Figure 4.10: Rainfall Pattern from 2000 - 2009

Table 4.8: District rainfall Pattern in Lalipur (mm)

Districts	2000	2001	2002	2005	2006	2007	2008	2009
Lalitpur	920	911	742	952	542	443	824	752
Bundelkhand	**841**	**834**	**718**	**680**	**399**	**359**	**670**	**619**

Year 2006, 2007 and part of in 2008 indicate rainfall deficit years in Lalitpur[2], where rainfall dipped to as low as 49% of normal rainfall. This phenomenon prevailed continuously for three years and had impacts on water resources.

4.8 Jamini, Sajnam & Rohini dams

The reservoir systems for which interventions have been proposed are Jamini, Sajnam & Rohini reservoirs in Lalitpur district. Their location is shown in **Figure 4.11**. Their salient features are summarized below.

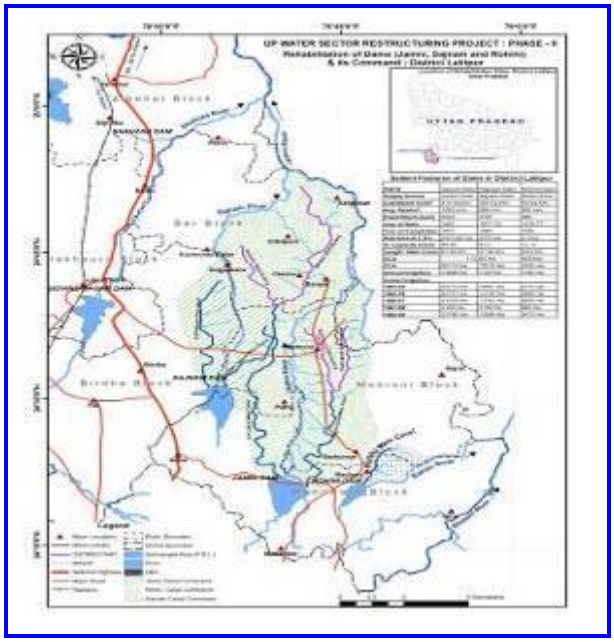


Figure 4.11: Location of the dams

Salient Features of the 3 Reservoirs under UPWSRP Phase II

Name	Jamini Dam	Rohini Dam	Sajnam Dam
Latitude & Longitude	24º20`N - 24º25`N 78º40`E – 78º45`E	24º20`N – 24º25`N 79º50`E – 79º55`E	24^0 -32' N 78^0-36 'E
Location	Village Devri of Mahroni Tehsil	Village Madawara of Mahroni Tehsil	Village Sindhwaha of Mehroni Tehsil
River	Jamini River	Rohini River	Sajnam River
Catchment area	414 Sq. Km (245.81 Sq.Km in UP and 168.19 Sq.Km in M.P)	44.03 Sq. KM	290 Sq.Km (258 Sq.Km in UP and 32 Sq.Km in MP)
Date of Construction	1962 to 1973	1976 to 1984	1977 to 1990
Type	Earthen dam	Earthen dam	Earthen dam
Dimensions	Length: 6.4 KM. Width: 6.1 M. Max. Height: 15.7M	Length: 1.647 KM Width: 6.08 M Max. Height: 15.5 M	Length: 4.374 KM Width: 6.7M Max. Height: 13.4 M
Capacity	Max.: 92.88 MCM Dead storage: 8.80 MCM	Max.: 12.11 MCM Dead storage: 3.82 MCM	Max.: 83.5 MCM Dead storage: 8.65 MCM

[2] Report on Drought Mitigation Strategy for Bundelkhand region of Uttar Pradesh and Madhya Pradesh by Inter Ministerial Team, National Rain Fed Area Authority (2008)

Name	Jamini Dam	Rohini Dam	Sajnam Dam
	FRL: 403.55 M HFL: 403.86 M	FRL: 396.39 M HFL: 397.10 M	FRL: 373.2 M Dead storage level: 367.20 M
Live Storage	84.023 MCM	8.29 MCM	74.85 MCM
Spillway	Ogee type with six vertical gates of 12.19 M X 6.09 M Length of spillway: 90 M Crest level: 397.72 M	Ogee type with vertical gates of 6.0 M X 3.60 M. Length of spillway: 24 M Crest level: 393 M	Ogee type with four vertical gates of 10 M x 6.50 M Length of spillway: 40 M Capacity: 2000 cumecs
Flood Discharge	Max.: 2520 cusecs	Max.: 380 cumecs	Max.: 131400 cusecs Design discharge revised by CWC: 4850 cumecs
Average Annual Rainfall	802 mm	956 mm	889mm
Years filled at full capacity	1990, 1993, 1996, 1999, 2003, and 2011	1987, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 2005, and 2008	1996, 1999, 2005, 2008, and 2011
Length of main canal	67.40 KM	8.64 KM	37.50 KM.
Distributaries	36 distribution systems 177.91 km	4 minors 11.220 km	Left Sajnam Canal: 20.30 km with design discharge of 97 cusecs. Right Sajnam Canal: 20 km with design discharge of 68 cusecs. 16 distribution systems with length of 48.05 KM.
Irrigable command area	55114 ha	3302 ha	10210 ha
Annual average irrigated area	13699 ha	1780 ha	7145 ha
No. of distribution system	36	4	16
Provision for drinking water supply by Dam	1.42 MCM	--	1.417MCM

4.9 Water Environment

Water environment is described in terms of surface & ground water resources in Bundelkhand region, district Lalitpur & study area. Surface & ground water availability, irrigation sources, drinking water supply, and water quality are reviewed in turn.

4.9.1 Hydrogeology & Ground Water Resources of the Bundelkhand Region in Uttar Pradesh

The nature and the extent of the aquifer bodies, their hydro-geological properties in relation to the ground water flow characteristics and their formations in Bundelkhand

region are classified as consolidated, Vindhyan formations and unconsolidated formations[3].

The Consolidated Formations: These broadly can be interpreted as composed of granite, gneisses and quartz reef etc. and are hard rocks and compact with negligible porosity resulting into poor aquifers. The porosity of these rocks varies from 0 to 0.3%, and, therefore, these formations are incapable of holding and transmitting water. However, along the planes of weakness and fractures, joints, and shear planes, the weathering and decomposition provides appreciable porosity. Generally, dug wells in these zones have a depth of 5 to 30 m with water levels between 3 to 15 m below ground level (bgl).

The Vindhyan formation: These formations on the other hand are composed of sand stones, shale and limestone. The sandstones and shale are hard and compact hence form poor aquifer. The ground water occurs in these formations under water table conditions in fine interstice of the weathered zones and joint planes. Deeper sandstone zones are compact and impervious and generally do not bear water and are thus unsuitable for ground water development. The cavernous zones and cavities in lime stones on the other hand are generally potential repositories of ground water and provide copious discharge when tapped. Wells in lime stones can yield up to 100 - 500 m^3/day. Unless tapped, both these formations leak water which flows fast towards the Yamuna.

The Unconsolidated Formations: These occur south of the Yamuna in Jalaun, Hamirpur, Banda and parts of Chitrakoot district in Uttar Pradesh. Unconsolidated formations are characterized by generally north-east sloping planes formed by the drainage system of Yamuna River. The sediments mainly comprise clay-kankar-silt with intercalation of sand and gravel lenses of varying thickness and inter-granular porosity. Thickness of these deposits is about 50-150 m. Ground water in these strata generally occurs in the upper zones of about 40 m. and under semi-unconfined conditions at deeper level below 40 m. Wells between 30 to 40 m of granular aquifer can yield 50-65 litres per second (lps) (4000 to 5000 m^3/day). Hydro-geology of the Bundelkhand region is shown in **Figure 4.12**.

[3] Hydrogeology of the Bundelkhand region, CGWB, 2001

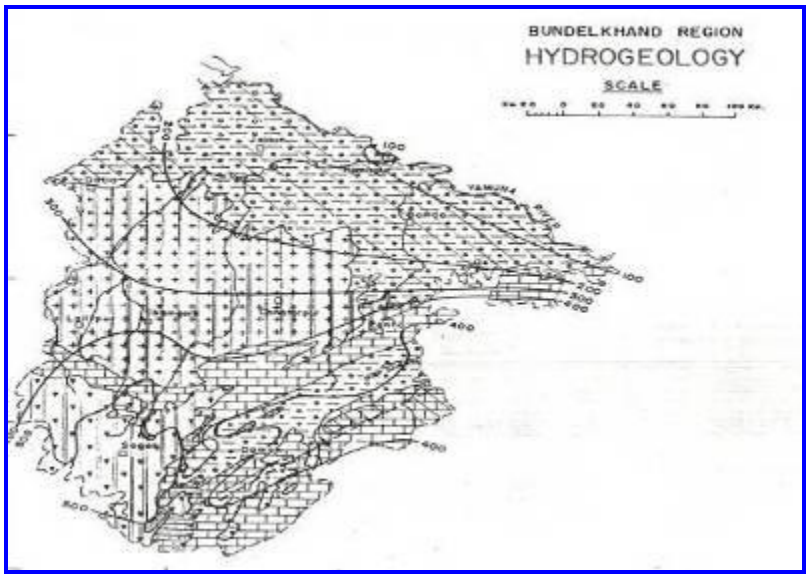


Figure 4.12: Hydrogeology of Bundelkhand region

Source: Hydrogeology of the Bundelkhand region, CGWB, 2001

4.9.2 Hydrogeology & Ground Water Resources of Lalitpur district & Study Area

The geological formation of Lalitpur may be grouped into three types: (a) Crystalline rocks – mainly granite, gneisses, schists, quartz reefs, mafic rocks, which occupy about 80% of the district where as 18% is occupied by (b) Sedimentary rocks viz. mainly sandstone, shales and carbonate rocks while the remaining 2% area is occupied by the (c) unconsolidated alluvial valley fills formations.

In the crystalline rocks, the occurrence of ground water largely depends on the topographical situations and intensity of weathering while the movement of ground water depends on the interconnections of fracture zones. Groundwater occurs in these crystalline rocks either in the sub-aerial weathered mantle or along the joints, fractures and other weak plains under the water table conditions. In southern peripheral part of the district, sedimentary rocks are exposed comprising mainly of sandstone and shale. Ground water in the sandstone shale sequence occurs mainly in the fine interstices of the weathered zones and along the joint planes, bedding planes in the unaltered rocks. In the carbonate rocks the ground water occurs either in the weathered mantle or along the cavities and cavernous formed as a result of carstification. The availability of ground water depends upon the number of such cavities and other saturated weak planes in these rocks. The ground water development in the study area is given in **Figure 4.13**.

Annual ground water recharge of the district is 67813 ha-m. The net annual ground water availability is 62274 ha-m. The existing gross ground water draft for all uses is 32195 h-am. The net ground water availability for future irrigation development is 28824 ha-m. The stage of ground water development is 51.70%. As per CGWB data, 4 blocks fall in safe category and the remaining 2 blocks Bar & Talbehat fall under semi-critical category.

The maximum stage of ground water development is in Bar block (82.28%) and minimum stage of ground water development is in Birdha block (31.38%). The southern part of the area i.e. Mandwara & Mahrauni blocks has good scope for further ground water development through tubewells.

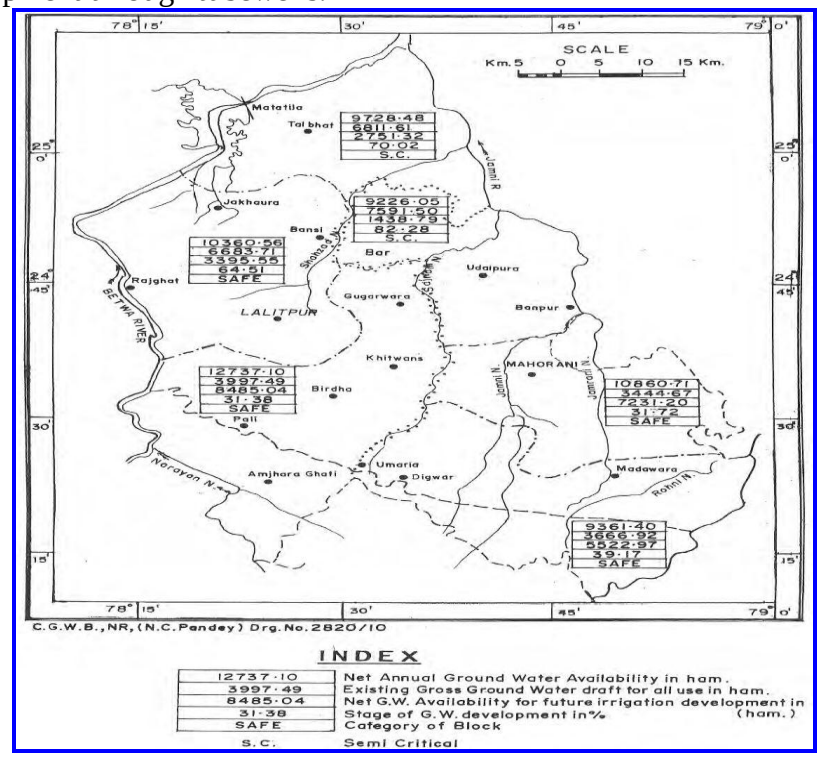


Figure 4.13: Map Showing Categorization of Blocks Lalitpur District, U.P.

Source: Ground Water Brochure of Lalitpur District, U.P. (A.A.P.: 2008-2009)

Depth to Water Level: Pre & Post Monsoon 2006, depth to water table of the district is given in **Figure 4.14** & **Figure 4.15**. Premonsoon water level varies from 0.77 (Talbehat) to 11.85 mbgl (Madawara). In postmonsoon period, depth to water level varies from 0.70 to 10.38 mbgl. Water level fluctuation varies from 0.07 m (Talbehat) to 2.60 m (Lalitpur). Shallow water level is observed in canal commands and the deeper water level is noticed at southeastern part of the district mainly in Madawara block. The shallow water level (0.00 – 3.00 mbgl) are occurring in the form of small pockets along the surface water bodies in Talbehat areas.

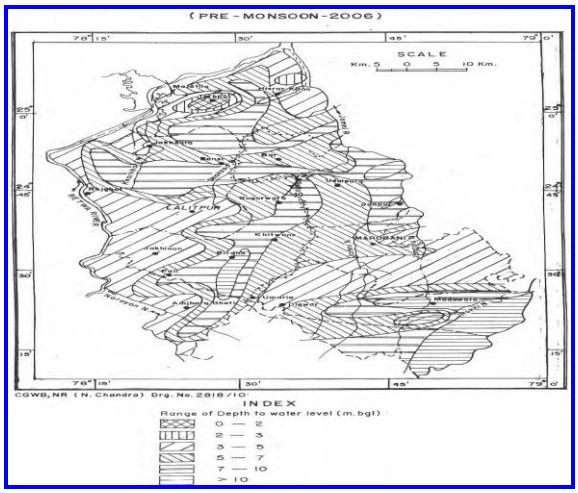


Figure 4.14: Depth of Water Level Map, Lalitpur District, U.P.

Source: Ground Water Brochure of Lalitpur District, U.P. (A.A.P.: 2008-2009)

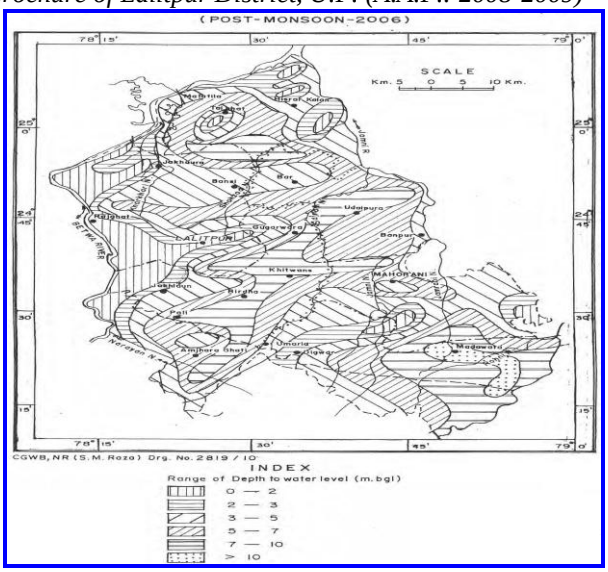


Figure 4.15: Depth of Water Level Map, Lalitpur District, U.P.

Source: Ground Water Brochure of Lalitpur District, U.P. (A.A.P.: 2008-2009)

4.9.3 Sources of Irrigation in Bundelkhand & Lalitpur District

The third census of minor irrigation schemes (2001) shows that nearly 14% of net sown area of about 19 lakh ha is irrigated by major and medium schemes, 13% by gravity water and 1% by other surface water resources. Kharif irrigation is about 5% and Rabi about 95%. Nearly 70% of the area continues to be rain dependant. **Table 4.9** given below shows irrigation from different sources.

Table 4.9: Irrigable Area and Area irrigated from different Source (Tha)[4]

District Name	Geogra-phical Area	Cultivable Area	Net Sown Area	System Canals	Minor Irrigation (MI) Area Under Different Source						Total Irrig-ation from all source
					Ground Water Wells /Tube wells			Surface Water		Total MI Irrigated Area	
					Dug	Shallow	Deep	Flow	Lift		
Lalitpur	386.52	324.76	299.66	27.45	11.34	45.75	59.66	1.38	2.43	120.54	147.99
Jhansi	313.29	219.27	199.86	13.62	9.61	15.75	1.62	4.68	3.90	35.55	49.16
Jalaun	401.40	324.21	303.86	37.92	10.90	34.52	37.74	2.00	3.46	88.60	126.52
Hamir pur	457.76	371.44	337.13	118.09	7.16	26.71	61.00	1.03	0.51	96.41	214.50
Mahoba	483.96	356.17	305.98	57.24	41.43	30.71	8.76	0.83	5.51	87.25	144.48
Banda	509.87	387.68	213.34	46.74	52.08	2.06	3.80	0.17	2.85	60.97	107.71
Chitrakoot	277.95	203.73	194.05	8.83	31.95	2.22	0.30	10.63	0.87	45.97	54.80
Total	**2830.74**	**2187.24**	**1853.87**	**309.89**	**164.46**	**157.71**	**172.88**	**20.71**	**19.51**	**535.27**	**845.16**
Percent of Net Sown Area				**16.7**	**8.9**	**8.5**	**9.3**	**1.1**	**1.1**	**28.9**	**45.6**

Source – Third Minor Irrigation Census (2000-01)

4.9.4 Sources of irrigation in Lalitpur district

Both Surface and ground water is used for irrigation in the district. Surface water is supplied through canals, ponds and rivers. Ground water is extracted from public and private tube-wells. At district level, the following table shows the sources of irrigation from 2000-01 to 2008-09.

Table 4.11: Source of Irrigation in Lalitpur (%)

District	Year	Canals	Tubewell		Wells	Ponds	Others
			Public	Private			
Lalitpur	2000-01	26.66	0.51	5.16	38.26	3.03	26.38
	2001-02	29.77	0.00	6.68	36.45	2.98	24.13
	2002-03	29.20	8.14	4.69	34.33	18.16	5.49
	2003-04	33.33	0.00	10.93	32.96	21.34	1.44
	2004-05	33.32	0.00	11.68	34.77	16.97	3.26
	2005-06	34.09	0.02	12.04	32.37	17.94	3.54
	2006-07	35.34	0.02	15.05	29.48	17.07	3.05
	2007-08	17.01	0.91	39.55	24.90	14.60	3.03
	2008-09	30.99	0.34	22.51	28.61	14.19	3.36

In Lalitpur district, canals are the (more than 35%) major source of irrigation followed by wells (25%). The two sources contribute more than 60% irrigation. Variation over eight years in the sources of irrigation indicate a significant increase in ground water irrigation from 2000-01 to 2008-09. The same trend has been observed throughout Bundelkhand region over the same period. The table shows heavy dependence on private tubewells & wells for irrigation in comparison to public tubewells. Significant decrease in canal irrigation has been observed in 2007-08 and is indicative of reduced water availability in

[4] Concept note on "IWRM for Rehabilitation of Bundelkhand Region of Uttar Pradesh, SWaRA for Phase - 2 of UPWSRP

the canal system due to drought condition. Focus Group Discussions in Lalitpur district confirmed increased development of groundwater irrigation.

4.9.5 Sources of Irrigation in Study Area

Both Surface and ground water is used for irrigation in the Command Area. Irrigated area of the command area covered under different sources as per the District Statistical Handbook is shown in **Figure 4.18**. Ground water (Tubewells +Wells) use covers 32.54% of the reported irrigated area in the year 2000-01 and 55.92% in 2009-10,which indicates approximately a 23.38% increase in ground water usage over 10 years. Surface water (Canal + Pond) use covers 41.78% in 2000-01 and 40.25% in 2009-10. Block wise area irrigated by different sources is given in **Table 4.12**.

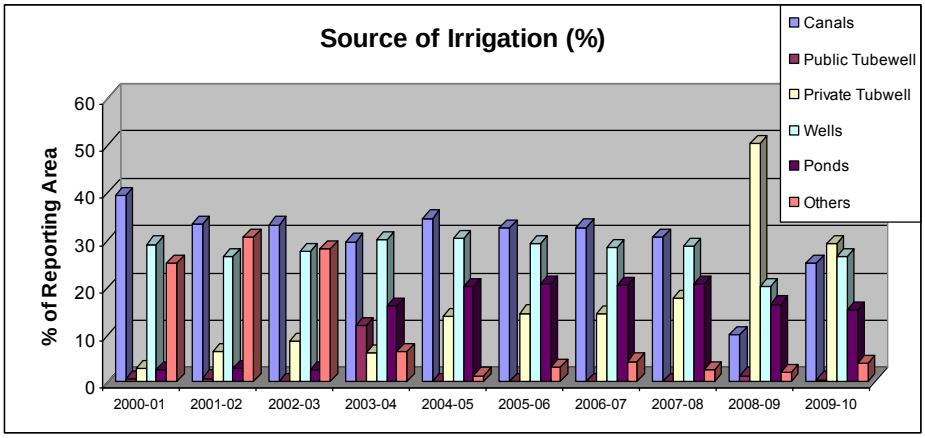


Figure 4.18: Temporal Source of Irrigation

Table 4.12: Source of Irrigation in Command Area (%)

Block Name	Year	Surface Water			Ground Water				Others	Total
		Canals	Pond	Total	Tubewell		Wells	Total		
					Public	Private				
Bar	2000-01	35.86	3.56	39.42	0	1.21	42.36	43.57	17.01	34699
	2001-02	24.96	2.72	27.68	0	0.80	51.24	52.04	20.28	27535
	2002-03	25.00	3.56	28.56	0	0.56	49.44	50.00	21.43	28725
	2003-04	28.09	22.39	50.48	0	0.61	48.24	48.85	0.67	25862
	2004-05	29.16	22.25	51.41	0	8.63	39.18	47.81	0.77	36064
	2005-06	21.66	22.45	44.11	0	0.65	52.99	53.63	2.26	36354
	2006-07	22.81	20.56	43.37	0	1.24	52.37	53.61	3.02	39660
	2007-08	19.00	20.82	39.82	0	0.41	57.24	57.66	2.52	36021
	2008-09	4.42	21.32	25.73	0	16.53	53.11	69.64	4.63	7065
	2009-10	13.57	20.12	33.69	0.50	1.54	61.00	63.04	3.27	39413
Birdha	2000-01	34.38	0.86	35.24	0	2.73	27.62	30.35	34.40	35112
	2001-02	26.25	2.40	28.65	0	15.25	23.13	38.38	32.98	34679
	2002-03	33.09	3.10	36.20	0	17.22	21.65	38.88	24.93	38012
	2003-04	46.36	11.24	57.60	0	12.63	23.08	35.71	6.69	37238
	2004-05	45.29	14.18	59.46	0	16.90	22.62	39.52	1.01	45306
	2005-06	31.16	11.44	42.60	0	26.36	23.21	49.57	7.84	49724
	2006-07	32.66	5.79	38.45	0	29.79	20.28	50.08	11.47	52632
	2007-08	31.34	12.64	43.98	0	31.74	17.97	49.71	6.32	56082
	2008-09	14.91	14.58	29.50	0.22	50.47	16.39	67.08	3.43	44907

Block Name	Year	Surface Water			Ground Water				Others	Total
		Canals	Pond	Total	Tubewell		Wells	Total		
					Public	Private				
	2009-10	29.06	10.65	39.71	0.40	36.06	16.97	53.43	6.86	55576
Mahrauni	2000-01	57.55	2.17	59.72	2.6	4.92	19.37	26.85	13.43	31555
	2001-02	52.78	1.29	54.07	2.22	4.41	13.67	20.30	25.64	34593
	2002-03	45.87	0.64	46.51	0	9.95	15.98	25.94	27.56	35322
	2003-04	21.07	13.56	34.63	45.87	6.63	6.15	58.65	6.72	30411
	2004-05	38.51	25.35	63.86	0	19.81	14.06	33.87	2.27	25084
	2005-06	72.04	15.39	87.43	0	14.06	20.60	34.66	0.00	42337
	2006-07	49.32	19.73	69.05	0.10	12.29	18.56	30.95	0.00	44616
	2007-08	45.95	14.07	60.02	0.01	17.90	22.07	39.98	0.00	45475
	2008-09	7.02	11.19	18.21	0.25	63.01	18.32	81.58	0.21	35854
	2009-10	34.84	11.05	45.89	0.00	42.15	10.55	52.70	1.41	45818
Mandawara	2000-01	29.55	3.63	33.18	0	2.74	23.99	26.73	40.08	21815
	2001-02	24.74	5.24	29.98	0.56	2.67	20.72	23.95	46.07	23771
	2002-03	24.42	3.60	28.02	0	2.11	28.12	30.22	41.75	24530
	2003-04	15.79	19.84	35.63	0	1.73	51.42	53.15	11.22	23664
	2004-05	22.09	21.91	44.00	0	10.64	43.71	54.35	1.65	31631
	2005-06	23.34	42.20	65.54	0	12.20	22.27	34.46	0.00	29358
	2006-07	20.73	45.72	66.45	0.00	8.10	25.46	33.55	0.00	30607
	2007-08	20.34	43.54	63.88	0.12	12.01	23.98	36.12	0.00	32011
	2008-09	7.16	24.94	32.11	4.70	41.82	19.70	66.22	1.67	27555
	2009-10	18.26	22.90	41.16	1.27	32.16	22.67	56.10	2.74	33717

Except for Mehrauni block, all the blocks showed increased dependence on ground water. Mehrauni block, located on the head of the canal system, gets the maximum advantage of canal irrigation. Bar block, which is located at the tail end area of canal system indicates maximum dependence (43% to 69%) on ground water for irrigation. This increased dependence on ground water in Bar has resulted in 82% of ground water development in the block, thereby ranking it into semi critical category as per CGWB. This limits the scope of further development of ground water resources in the block and calls for interventions to increase efficiency in Canal System on the upstream side in order to deliver water in the tail end. The table also shows the impact of the drought in 2007-2008 on sources of irrigation.

4.9.6 Performance of Surface Water Schemes

Performance of surface water irrigation system has been assessed based on performance of Jamni, Sajnam & Rohini reservoirs in terms of live storage from 2000-01 to 2010-11, performance of Jamni, Sajnam & Rohini canal system in terms of Kharif & Rabi irrigated area from 2001-02 to 2010-11 and year wise tail feeding from 2006-07 to 2011-12. The data related to these items is given in **Annexure 4.4**.

Performance of *Jamini* reservoir live storage indicates that it ranged between 17.3% in 2007-08 to 100% during 2003-04 & 2005-06. Out of eleven year period, live storage ranged between 60 - 80% during four years, one year between 80 - 90% and above 90% during five years. During one year, the live storage capacity was less than 20%. Live storage trend indicates steep decrease during the period 2005 to 2009 indicating

hydrological drought. Performance of *Sajnam* reservoir live storage indicates that it ranged between 17.9% during 2007-08 to 100% during 2005-06 & 2008-09. Over the eleven year period, it ranged between 60% - 80% during three years, while for one year, it ranged between 80 - 90%. During the remaining seven years, the live storage was below 60%. Live storage trend indicate steep decrease in capacity during the period 2005 to 2009 indicating hydrological drought. Further, near normal conditions are indicated during three years, when live storage capacity was above 90%. Live storage capacity of *Rohini* dam from 2000-01 to 2010-11 indicated that it ranged from zero in 2007-08 to 100% in 2005-06 and 2008-09. Storage capacity was above 90% during two years, while it ranged between 70 - 80% for three years. During five years, it was below 70%. Steep decrease in storage capacity was observed during 2005 to 2009 indicating hydrological drought.

The above analysis shows that near normal water availability has been observed for five years in Jamni, three years in Sajnam and two years in Rohini reservoirs over an eleven year period. Considering 70% as the bare minimum live storage, it can be inferred that canal system from the three reservoirs can be operated to some extent for seven years. During the remaining four years, canal supplies for irrigation had to be curtailed significantly. During 2007-08, Jamni & Sajnam had just 17% of water left while in Rohini it was negligible. Therefore, availability of water is a serious issue, which was confirmed during stakeholder consultations both in the district as well as the project area as highlighted in chapter 5.

In Jamni canal system, actual irrigation during Rabi ranged from 21% in 2006-07 to above 100% of the recent normal during 2005-06. 2006-07 indicated drastic cut in canal irrigation due to minimum live storage capacity of reservoir. During five years out of ten years the canal system could irrigate only 75 - 80% of the maximum irrigation, while during four years, it was above 90%. During Kharif season, irrigation from canal system was observed minimum during 2002-03, 2003-04 and 2007-08. This may be attributed due to nearly 60% live storage in Jamni reservoir during 2001-02, 2002-03 and extreme drought year in 2007-08.

In Sajnam canal system, actual irrigation during Rabi ranged from 55% in 2007-08 to more than 100% of the recent normal during 2005-06. Six years out of ten years have been observed to be normal, where the canal system could irrigate near normal to maximum irrigation, while during three years canal irrigation have been found to be below normal and one year as drought year. During Kharif season, irrigation from canal system was observed minimum, during 2003-04, while it was maximum during 2010-11. This may be attributed to nearly 60% live storage capacity in Sajnam reservoir.

In Rohini canal system, actual irrigation during Rabi ranged from 20% during 2007-08 to above 100% during 2001-02 and 2004-05 & 2005-06. Six years out of ten years have been observed to be normal, where the canal system could irrigate normal to maximum irrigation, while during three years, canal irrigation have been found to below normal, while one year has been observed as drought year. During Kharif season, irrigation from canal system was observed minimum during 2003-04 and 2008-09, while it was maximum during 2005-06. Performance of canal system in terms of tail feeding from

2006-07 to 2011-12 indicates that irrigation was targeted only for 68% to 85% of the total tail ends during this period. Only 6% tail ends were fed during 2007-08 indicating drought conditions, while a maximum of 85% of the target was achieved during two years (2006-07 & 2008-09). This indicated that tail ends do not receive water during majority of years. This could be due to either non availability of water on account of deficit rainfall or due to deficiencies in the canal operating system e.g. water losses. Data from UPID indicates that water losses per km in Jamni canal ranges from 1.72 cusec/km to 1.84/km. Similarly, in Sajnam canal system, it ranges from 1.80 cusec/km to 2.33 cusec/km while in Rohini canal system, it is 1.09 cusec/km. FGD findings in the district Lalitpur and field interaction with the farmers confirm these findings.

4.10 Cost Implications of Groundwater Use for Irrigation

Increased dependence on ground water especially on private tubewells has significant cost implications. FGD findings in district indicate that cost of surface water irrigation for Rabi season (wheat & other food grain) is about Rs 100/ha to Rs 173/ha. These costs are inclusive of 3 cycles watering through canal system. Ground water costs through private tubewells range from Rs 150 - 200/hour. For irrigating one hectare about 10 to 12 hours of tubewells operations are required. This indicates that cost of ground water irrigation through private tubewells is about Rs 1500 - 2000 per hectare. FGD findings also indicate that cost of ground water irrigation through public tubewells is about Rs 600/ha. The difference in surface & ground water irrigation rates further necessitates interventions in improving performance of canal system.

4.11 Water Quality

Surface water quality of Bundelkhand region is assessed based data from Central Pollution Control Board (CPCB) water quality monitoring stations and UP Pollution Board. Data is available for five locations: three locations monitored by UP Pollution Control Board in Jhansi district and two locations by CPCB, on each in Hamirpur & Lalitpur district. . In 2008 & 2009**,** pH was found slightly alkaline in nature at all locations; Turbidity was found beyond the permissible limit; all biological oxygen demand and chemical oxygen demand was observed within the permissible limit at both locations and concentration of both total coliform and fecal coliform were found much lower in Betwa at Hamirpur as compared to Govind Sagar Dam.

4.11.1 Project Area Surface Water Quality

Water Quality in project area (Jamni, Sajnam & Rohni Dam and associated canal system) had never been monitored. Therefore, Pre- monsoon surface water quality has been analyzed in 2012 for the three reservoir systems. Surface water quality results are summarized in **Table 4.13** and show that:

- ***pH:*** The pH value at all locations wasbetween 7.0 and 7.8, within permissible limit (8.5). pH is highest at Right Sajnam Canal and lowest at Left Sajnam Canal;

- ***Dissolve Oxygen:*** Dissolve Oxygen (DO) wasbetween 6.2 and 8.1, which indicates good amount of Dissolve Oxygen and shows that water is fit for irrigation as well as for drinking purpose;
- ***Turbidity:*** Turbidity was found beyond the permissible limit (10 NTU) in all locations except Left Sajnam Canal and Right Sajnam Canal. Hardness was also observed within the desirable limit;
- ***Residual Chlorine:*** Residual Chlorine was found beyond the desirable limit (0.2 mg/l) at all locations while chloride was found below the desirable limit;
- ***Fluoride:*** Fluoride was observed slight beyond the permissible limit (1.5 mg/l) at Left Sajnam Canal and Right Sajnam Canal; Iron, Ammonia and Nitrate was observed within the limit at all locations.

Table 4.13: Water Sampling Results of Study Area

Location	Parameters										
	pH	DO	Turbidity	Hardness	RC	Cl	P	F	Fe	NH_3	NO_3
Jamni Dam (24°22'12.66"N; 78°41'5.12"E)	7.3	8.1	15	160	0.2	106.35	0.1	0.6	0.32	3	8
Sajnam Dam (24°30'35.30"N; 78°35'15.40"E)	7.2	7.5	12	145	0.8	65.3	0.3	1.2	0.3	3.2	4.5
Left Sajnam Canal (24°31'21.10"N; 78°34'44.70"E)	7	6.2	10	110	0.3	53.17	0.2	1.7	0.31	2.1	5.1
Right Sajnam Canal Outlet of Dam (24°31'21.80"N; 78°35'50.50"E)	7.8	7.2	11	115	0.32	40.14	0.1	1.8	0.3	3.7	3.9
Right Sajnam Canal near Aquaduct (24°34'22.20"N; 78°38'50.00"E)	7	6.4	10	100	0.21	124	0.2	0.32	0.33	3	3.5
Rohni Dam (24°21'18.64"N; 78°47'28.90"E)	7.5	8	16	122	0.3	35.45	0.1	1.5	0.3	3.5	6.5

There is no major industry which contaminates surface and ground water in the bundlelkhand region as well as project area of Lalitur district. Surface water quality analysis in the project area indicates that it is suitable for irrigation and also drinking purpose after treatment. This matches with the surface water quality trends of the Bundelkhand region.

4.11.2 Ground Water Quality- Project Area

Ground water quality in the project area is monitored under National Rural Ground water programme (Rajiv Gandhi National Ground Water Mission), Ministry of Ground Water and Sanitation. All the parameters of tested samples were compared with the Indian Standard for Ground Water–Specification IS 10500:1991 (BIS 1991 with amendments made in 1993 and 2004).

pH: The pH is found highest in Khiriqamisar, Bhawani, Gugarwara, Jaraoli, Kakdari & Pah villages of Bar block; Patsemra & Tenga village of Birdha block; Piprat & Ramgarha village of Mandawara block and Baryo, Dhurwara, Khatora, Kuraura, Luharra & Sindwaha village of Mehrauni block. The values in other villages are below permissible limit. Block wise ground water quality status is attached as **Annexure 4.5**.

Turbidity: The Turbidity is highest in Bamhori Kharait, Banoni, Billa, Semaria, Dashrara, Dailwara, Kakdari, Kuwagaon, Mathura Dang, Mirchwara, Khakron, Semrabhag, Nagar, Kailoni, Udaipura & Umari villages of Bar block; Bandar Gurha Village Of Birdha Block; Didonia Village Of Mandawara Block And Bamhori, Bahadursingh, Chhayan, Gadolikalan, Jakhaura, Kisarda, Bamhorighat, Rameshra, Sadumal, Samogar & Sindwaha village of Mehrauni block. Other village samples have below permissible limit.
Nitrate: Nitrate is observed highest in Billa, Daroni, Dashrara, Jaraoli, Mathura Dang, Todi & Udya Villages of Bar Block; Dongra Kalan & Pali Rural Village of Birdha Block; Bachhraoni, Dongra Kalan, Amora, Bhonta, Dhurwara, Chhapchhol, Deoran Kalan, Khatora, Bangaruwa, Mainwar, Bamhorighat, Rameshra, Saidpur & Samogar Village of Mandawara Block. Other village samples are below permissible limit.

Iron: Iron is found above permissible limit in Badokhara, Suri Khurd, Bamhori Kharait, Bhelonilodh, Daroni, Dashrara, Didaura, Bharoni, Jaraoli, Teela, Kakdari, Karmai, Kuwagaon, Mogan, Pah, Khakron, Pura Dhadkuwa, Semrabhag Nagar, Kailoni & Udaipura Villages in Bar Block and 4 Village in Birdha Block; 12 Village in Mehrauni block. Other village samples are below permissible limit.

Fluoride: Fluoride is found above permissible in 19 Villages of Bar Block, one village of Mandwara block and 19 Villages of Mehrauni Block. Other villages samples are below permissible limit.

Likely impacts of the project on ground water are limited and will be mitigated and monitored under the project:

- Irrigation and drainage infrastructure rehabilitation and modernization are unlikely to have any direct impact on groundwater quality and quantity.
- Reduced seepage from canals and improved drainage might result in limited reduction in groundwater recharge.
- However, increased availability of surface water in command area is expected to result in reduced groundwater abstraction.
- Possible increase of pesticides from agricultural development would result in degradation of groundwater quality; in this regard, a specific EMP on pest management has been prepared (see chapter 6).
- The specific project component on groundwater aims at improving groundwater assessment and developing aquifer management plans, hence improving management of the resource.
- Finally, water quality monitoring plans are described in chapter 7.

4.12 Forest & Biodiversity Aspect

4.12.1 Bundelkhand region

As per biodiversity report of UP, Bundelkhand has dry ecosystem. The vegetation of this region is tropical dry deciduous type, which can be further divided into mixed deciduous forests and dry thorn forests.

Natural Eco System

Mixed deciduous forests: The common constituents of these forests are the taller and dominant trees of Terminalia elliptica, T. bellerica, Tectona grandis, Pterocarpus marsupium, Bombax ceiba, Cochlospermum religiosum, Diospyros melanoxylon, Lagerstroemia parviflora, Buchanania lanzan, Mitragyna parviflora, Sterculia urens, gardenia gummifera, Acacia catehu, Holarrhena antidysentrica, Ziziphus maruitiana, Calotropis procera, Adhatoda zeylainca and Woodfordia fruticosa. Among the climbers and shrubs Rhynchosia minima, Atylosia scarabaeoides, Mucuna pruriens, Cissampelos pareira, Ichnocarpus frutescens, Hemidesmus indicus, Tinsopora cordifolia, Dioscorea hispida and Cuscuta reflexa (a parasitic climber) are seen. Several species of moist deciduous forest may also be found in the forest area of Karvi in Banda particularly in sheltered places. Stunted sal of dry type appears in association with several different species.

Dry thorn forests: These forests are mainly found in Jalaun, Lalitpur and Hamirpur areas. The scrub vegetation is characterized by Ziziphus xylocarpus, Prosopis spicigera, Butea monosperma, Acacia nilotica, Calotropis procera, Bombax ceiba, and Gardenia spinosa. The intermixed shrubs are usually Flacourtia indica, Grewia rothii, Ziziphus mauritiana and Z. nummularia. The common climbers with twinning branches entangled with shrubs are Abrus precatorius, Cissampelos pareira, Mukia maderaspatana, Mimordica dioica and Gymnema syvestre. There are two endemic species found within Bundelkhand which are given below.

Name of Species & Family	Place of Occurrence
Rorippa pseudoislandica (Brassicaceae)	Hamirpur
Alectra chitrakutensis(Scrophulariaceae)	Banda

4.12.2 Natural Ecosystem, Flora & Fauna in Project Area

As per biodiversity report of UP, the project area also has dry ecosystem. The vegetation of this region is tropical dry deciduous type, including both mixed deciduous forests and dry thorn forests. District forest cover is given in **Table 4.15**.

Table 4.15: Forest Cover in Project Area

(Area in km^2)

District	Year	Geographical Area (GA)	Very Dense Forest	Moderate Dense Forest	Open Forest	Total	% of GA	Change	Scrub
Lalitpur	2011	5039	0	128	442	570	11.31	0	41
	2009	5039	0	128	442	570	11.31	0	41
	2005	5039	0	146	426	572	11.35	0	42

Source: Forest Survey of India Report, 2001, 2009 & 2005

Table 4.21 indicates that moderate dense forest has slightly decreased over a period from 2005 to 2009 and it remains same in 2011. Total forest area has also slight reduced from 572 km^2 to 570 km^2 during the 2005 to 2009.

4.12.3 Wetlands

Wetlands can be variously defined. The modified definition of Wetlands by International Union for the Conservation of Nature and Natural Resources (IUCN) is being used for the purposes of the present study. "All submerged or water saturated lands natural or manmade, inland or coastal, permanent or temporary, static or dynamic, vegetated or non–vegetated which necessarily have a land –water interface are defined as Wetlands". As per the National wetland inventory assessment, 2011, district wise wetland map inventory and description of Bundelkhand Area is given as **Annexure 4.6** and status of project area is discussed below.

The total wetland area in the Lalitpur district is 34119 ha. Major wetland types of the district are reservoir/barrages. There are 14 reservoirs/barrages covering an area of 23221 ha which account for 68.06% of total wetland area of the district. Other major wetland types are: River/stream (15.3%) and Tanks/pond (7.4%). There are also 1127 small wetlands (<2.25 ha) identified and demarcated as point feature. Wetland area estimates in the district are summarized in **Table 4.16**. Area under aquatic vegetation is 1261 ha in post-monsoon season while in pre-monsoon season it is reduced to 671 ha. Water spread area in post-monsoon season is 28405 ha and in pre-monsoon season it is 12657 ha. Low turbidity of water is observed during both the seasons.

Table 4.16: Area estimates of wetlands in Lalitpur

Area in ha

Sr. No.	Wetland Code	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Open Water	
						Post-monsoon Area	Pre-monsoon Area
	1100	**Inland Wetlands - Natural**					
1.	1101	Lakes/Ponds	34	1338	3.92	740	305
2.	1102	Ox-bow lakes/ Cut-off meanders	3	30	0.09	5	0
3.	1103	High altitude wetlands	-	-	-	-	-
4.	1104	Riverine wetlands	60	368	1.08	317	132
5.	1105	Waterlogged	83	275	0.81	213	24
6.	1106	River/Stream	38	5225	15.31	1908	1717

Sr. No.	Wetland Code	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Open Water	
						Post-monsoon Area	Pre-monsoon Area
	1200	**Inland Wetlands -Man-made**					
7.	1201	Reservoirs/Barrages	14	23221	68.06	23149	10137
8.	1202	Tanks/Ponds	371	2535	7.43	2073	342
9.	1203	Waterlogged	-	-	-	-	-
10.	1204	Salt pans	-	-	-	-	-
		Sub-Total	**603**	**32992**	**96.70**	**28405**	**12657**
		Wetlands (<2.25 ha), mainly Tanks	1127	1127	3.30	-	-
		Total	**1730**	**34119**	**100.00**	**28405**	**12657**
		Area under Aquatic Vegetation				1261	671
		Area under turbidity levels					
		Low				27352	27352
		Moderate				620	145
		High				433	63

Source: National Wetland Inventory Assessment Atlas, UP-2011

Project interventions in Rohani, Sajnam and Jamani dams have been planned in order to restore to their original design capacity. Environmental & social impacts both during construction and operation phase due to project interventions have been identified and described in Chapter 6.

Canal rehabilitation would improve irrigation service delivery and reduce seepage and water loss. This could adversely impact formation of seasonal small and nondescript wetlands that provide localized habitats for amphibians and birds (waders, kingfishers and bee eaters). A detailed Environment Management Plan, provisions for Biodiversity Offset Plans and special studies have been prepared to avoid and mitigate impacts.

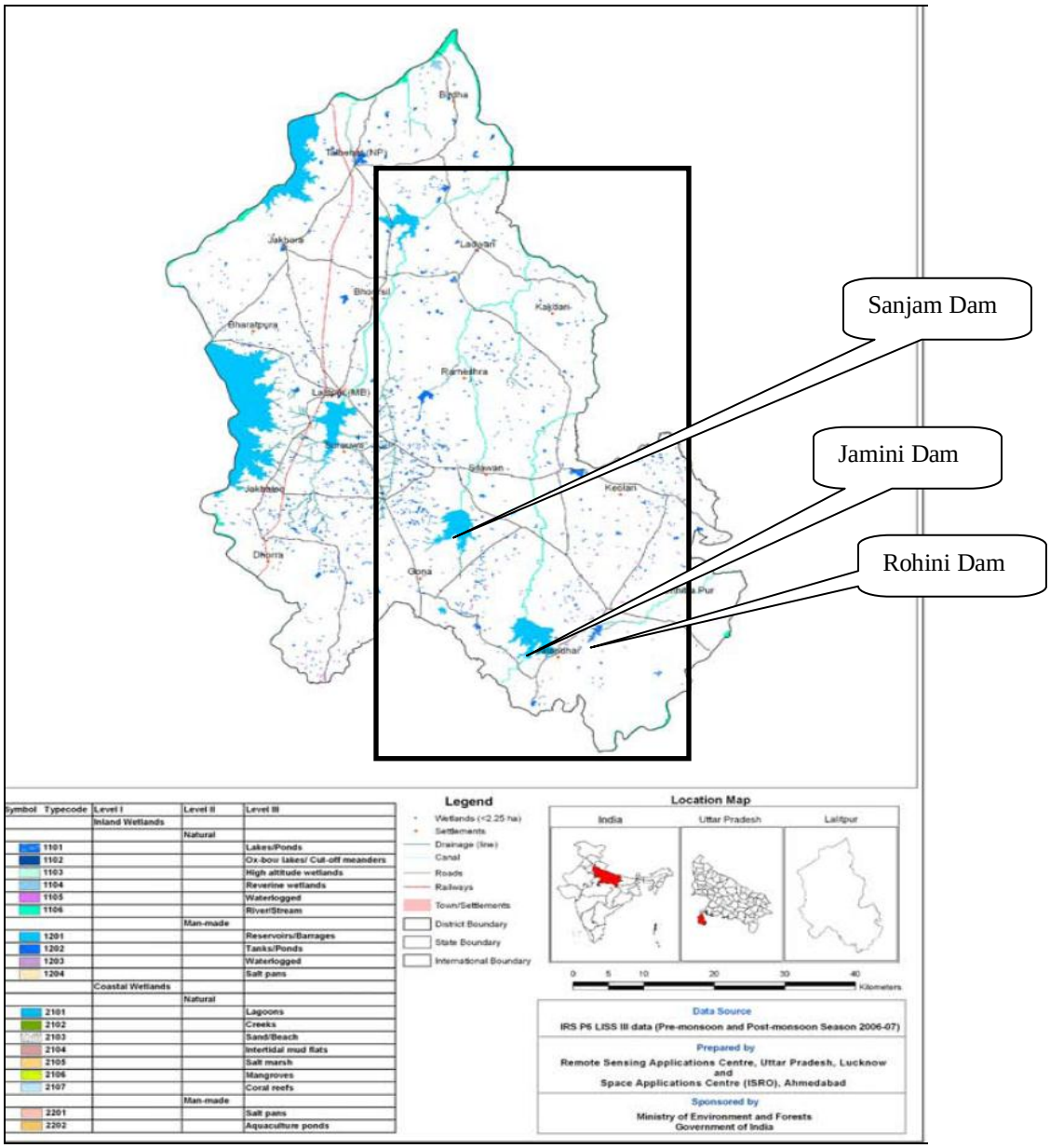


Figure 4.20: Wetland Area in Lalitpur and within Project Area

4.11.4 Protected Areas

A significant proportion of Uttar Pradesh biodiversity is found in the Bundelkhand protected areas. There are two wildlife sanctuaries and one bird sanctuary in Bundelkhand: Ranipur wildlife sanctuary in Chitrakoot, Mahavir swami wildlife sanctuary in Lalitpur, Vijay Sagar Bird sanctuary in Mahoba.. The distance between wildlife sanctuary and Phase II intervention are highlighted in Table 4.18 and shown in Figure 4.21.

Table 4.18: Distance to Protected Areas and Impact

Name of Protected Area (PA)	Phase-II Interventions	Distance between PA & Intervention	Potential Impact
Mahavir swami wildlife sanctuary, Lalitpur	**1.** Sanjam Dam **2.** Jamni Dam **3.** Rohni Dam	**1.** 16.0 km **2.** 23.5 km **3.** 29.3 km	No Impact

Figure 4.21: Interventions

Mahavir Swami Wildlife sanctuary in Lalitpur is located in a different sub-basin where project interventions are not planned. It is 16 km away from Sajnam Dam in East-North-East, 23.5 km away from Jamini in East-South-East and 29.3 km away from Rohni dam in East-South-East.

4.12 Health Issues

4.12.1 Water Borne Disease

Water borne diseases are infectious diseases spread primarily through contaminated water. Though these diseases spread either directly or through flies or filth, water is the medium for spread of these diseases and hence they are termed as water-borne diseases. These diseases are more prevalent in areas with poor sanitary conditions. Primary survey of household in Bundelkhand region indicated that 70% of the families living in kutcha and Kutcha and Pakka houses in both command & non-command areas do not have toilet facilities in their houses. The pathogens travel to water sources through various routes and infect susceptible persons directly through consumption of food and water. Primary survey also indicated that hepatitis, cholera, dysentery, and typhoid are the common water-borne diseases that affect considerable population both in command & non command area.

4.12.2 Vector Borne Disease

Secondary data indicates that vector borne disease in Bundelkhand region include Malaria, Filaria & TB. The number of patient affected by vector borne diseases is given in **Table 4.19**.

Table 4.19: Vector borne disease profile of the Bundelkhand Area

Area	District	Malaria		Filaria Endemic		TB	
		Occurrence	Number of Cases Reported	Occurrence	Number of Cases Reported	No. of Suspected Examined	Number of Positive Person
Bundelkhand	Banda	√	1775	√		11075	1471
	Chitrakoot	√	816	√		4465	703
	Hamirpur	√		√		6918	994
	Jalaun	√		√		8727	1378
	Jhansi	√				10699	1834
	Lalitpur	√				6849	1202
	Mahoba	√		√		4649	831
	Total		**2591**			**53382**	**8413**

Primary survey of households in command & non command area confirmed occurrence of Malaria & Filaria.

Chapter 5: Stakeholder Consultation & Summary of Issues

5.0 Introduction

Consultation with relevant stakeholders had been an important component of the social and environmental assessment exercise to obtain the perceptions and views of the stakeholders on social and environmental concerns pertaining to the local areas. The objective of stakeholder consultation was to identify environmental & social issues, impacts, and options to minimize potential negative impacts. The views held by the stakeholders were analyzed and are presented in this chapter.

Stakeholders were consulted through primary household surveys (see chapter 4), focus group discussions (FGD) and discussions with farmers groups held at the District and village level which were organized by district Chief Development Officers (CDO) and concerned Divisional Executive Engineer, Irrigation Department.

The focused group discussions were carried out between 02nd April 2012 and 07th May, 2012 in all districts of UP Bundelkhnad at district headquater and irrigation division. All district level line department officers were invited by CDO and Execuive Engineer, UPID for FGD. 7 focus group discussions were organized in Bundelkhand Districts, including one which took place in Lalitpur on 07th May 2012 under the chairmanship of Executive Engineer, Sinchai Khand (Irrigation Division), Lalitpur and which was attended by 15 senior officials of different departments including Irrigation, Jal Nigam, District Development Office, PWD, Health, Forest, Minor Irrigation and Blocks.

Discussions with farmers groups were organized in three villages in Lalitpur district during the same period as the FGD (May 2012), as well as in two to three villages in each of the other Districts. Farmers were asked about problems with canal irrigation, agriculture, horticulture, changes in cropping pattern, and job availability locally including MNREGA. UPID revenue staff informed the farmers about the organization of these meetings.

The methodology followed in these consultation workshops is given below.

- Inviting the key stakeholders to the workshops
- Circulation of FGD Guide among the participants prior to workshop.
- Motivating and encouraging interactions and deliberations on pertinent issues
- Eliciting feedback and responses from the participants and recording them
- Identification of ways and means to identify Environmental & Social issues, options & resolve conflicts, if any, between stakeholder groups.
- Consultations at the village level were carried out through a checklist.

The stakeholder consultations accordingly did provide an overview of the above issues and their relative importance. They have also provided insights into the complexity and diversity of interests, which were taken into account while planning for an effective ESMF.

5.1 Summary of Findings from FGD for Lalitpur District

Agriculture:

- Major crops in Rabi are Wheat, Gram, pulses and Mustard. In Kharif, major crops are Pulses, Maize, Til, Groundnut, Jwar and Soyabeen.
- Use of chemical fertilizer is increasing but organic fertilizer is still dominant.
- Generally farmers use HYV seeds but a significant proportion of them use a local variety of wheat seed (Katia) as it does not require many watering.
- There are no fodder cutting machines in Lalitpur.
- Under National horticulture mission, free saplings of Guava, Awonla, Lemon and Mango are given to farmers. Guava and Awonla are giving good return after about four years, bringing a net income of about Rs. 70000/- per hectare.
- The successful demonstration of horticulture crops was in village Palaura.

Irrigation:

- Dams have large amount of silt and the condition of dams is deteriorating but their restoration and maintenance is not possible due to serious shortage of funds. At least 3% of total project cost of dam would be required yearly for O&M.
- Canal Water is not reaching in a substantial part of Tail end due to illegal cutting of Canal/Minor, over use of water at head and middle ends, and frequent changes in cropping pattern.
- There is no practice of making mud boundary around the fields, so that water does not remain on the fields.
- About 22-24% of tubewell failures were recorded at the time of installation in Birdha, Jakhaura, Mehrauni and Mandawara block. There is no maintenance of tubewells.
- In the year 2011 a total 533 ground water samples were taken out of which only 4 samples were found contaminated.
- The electricity supply is very low in the district which leads to untimely watering.

Animal Husbandry:

- The menace of Anna Pratha practice, common in all the districts of Bundelkhand is seriously damaging crops in Lalitpur also. It is estimated that at least 20% of crops and about 30% of fruit saplings are destroyed by the stray cattles left by their owners to graze. The damage is more significant in Kharif season.
- Under Swarn Jayanti Gram Rozgar Yojana people are encouraged to purchase good quality cattle. Unproductive cattle population can be checked if good quality and high yielding cattle are brought.
- The district has 8 BAIF centres who are engaged in improved breeding. They also bring good quality cattle from other states.

Water supply:

- Major source of drinking water is India Mark-II handpump. One handpump is available for every 70-90 families of rural area. Besides, supply through Tubewells and water from Govind Sagar is also used in certain areas of the district.

Ponds and fisheries:

- There were 91 ponds in an area of about 531 Hectare in the district for which Patta for fisheries was given. Besides, a large number of private ponds also exist. The production of fish in community ponds was between 20-25 Qtl/Ha while in private ponds average production was about 30 Qtl/Ha.
- Besides local consumption fish was also exported to Jhansi, Lucknow and Gorakhpur

Forest and biodiversity:

- In the district almost at every 10-12 km. there is mining activity which has serious impact on environment, on productivity of agricultural crops and on human health.
- The number of chiraungi tree is decreasing due to collection of seeds at early stage.
- The forest cover is reducing due to Anna Pratha. Animals eat the newly grown plant. Fencing/barricading is needed.
- The district has a large number (aprox. 50) of medicinal species in the forest area. The varity of small medicinal trees are Bhangraj, Bhum amla, Shankh pushpi, Safed Musli, Shatabar, Harjor, Ashwgandha, Arusa, Thuar, etc. The tall verities of trees are Gudmarg, Amla, Bel, Beejasal, Mahua, Duddhi, Neem, Jamun, Arjun, Reetha, etc. Trainings are provided to village forest samiti members at district level for identification of medicinal plant, flower and fruits.
- Collection centers have been set up for collection of medicinal substances and fruits.
- Blue bulls, Haimah, Pig and Bhalu are found in the mandawara Block. Sometimes tiger and leopard also seen in this forest area they are coming from Madhya Pradesh
- Arjun, Shankh pushpi and Jamun are found in abundance on both sides of river, canal and drains in the district.
- Sandal trees are found in block Bar. Illegal cutting of sandal trees is a major problem.

Socioeconomics:

- The average family size is about 8-10 person.
- Birth rate and population growth in the district are high.
- There were no starvation deaths on record even during the period of drought.
- There is no problem of availability of labour for working under MNREGA.
- Labour engaged under MNREGA work for levelling of farms of Marginal and Small farmers. They are also engaged for plantation of Awonla and Guava trees and in crops of vegitables and spices.
- The pattern of migration is such that in some villages most of the families migrate to work in agriculture in Madhya Pradesh. Their migration is mostly seasonal. Due to higher migration, the district faces lack of labour during agriculture season.
- Some areas have high rates of unmarried men, particularly villages Dhani Sagar, Bundua and Bichlan of block Mandawara and 15 villages of Block Maraura. This is because of the poverty levels in these villages and lack of infrastructure.
- There is a Tribe known as Shaharya in the district. Their population is about 70000. They are dependent on forest produce, such as Tendu leaves, Chironji, Mahva, Arjun ki chhal and Bel, which they collect and sell to the forest depots. Their literacy level is very low. However, their population in the project area is very low and they do not represent indigenous people as per OP 4.10.

- People spend a large part of their earnings on alcohol and Biri Smoking.
- Men are generally lazy. They spend their time in drinking alcohol and in playing cards. They work for a few days and till the earning is exhausted they will not work to earn while women in the area are hard working.
- Child Marriage among girls in the age group of 12-16 years is a serious problem in the district.
- Hooch distilleries are very common in the district. People engaged in this activity are not ready to leave it as earnings are substantial.
- Those who work in mining suffer from serious diseases of lungs including T.B. and have low life expectancy.
- The district has about 150 historical/ religious places but they have not been publicized as tourist spot.

Institutions:

- A number of NGOs are working in the district. Their activities relate to Tribal welfare, women welfare and awareness generation against social evils such as child marriage, illiteracy etc
- Lack of funds is a major problem for strengthening institutional infrastructure.
- There are 4484 Self Help Groups (SHGs) in the district out of which 1029 are exclusively for women. 353 SHGs are defunct, 2209 SHGs have passed grade-I and 1392 grade II. A total of 1316 SHGs are provided financial assistance.
- Activity-wise 235 SHGs are working in the area of Irrigation/agriculture, 1367 in Livestock/dairy and 73 in village Industry. A number of SHGs are engaged in preparation of spices, Achars and Murabbas.

5.2 Socio-Economic and Environmental Issues in the project area

Socio economic & environmental issues have been analyzed with a special focus on Jamini, Sajnam and Rohini Dams and canal systems, on the basis of secondary data, household surveys and focused group discussion. Issues identified through various consultations are in response to proposed project activities. The major finding/issues of this analysis are provided in Table 5.2, 5.3 and 5.4.

The project design addresses well stakeholders recommendations. Modernization and rehabilitation of irrigation and drainage systems and other project activities will result in:

- Expansion in irrigation service and increased efficiency of surface water irrigation
- Increased water availability for command area.
- Reduced dependence on groundwater for irrigation.
- Increased opportunity in agriculture and employment opportunity.
- Increased food graind availability.
- Reduced load on electricity due to reduced load on tubewells for irrigation.
- Implementation of participatory approach in water resource management.
- Improvement in conjunctive use of water.
- Promotion of integrated water resources management.
- Regular monitoring of surface and groundwater quality.

The project interventions might result in increased use of fertilizer and pesticides in the command area. The project however also provides the scope for awareness building and pilot demonstration on appropriate fertilization and pest management practices. In this regard, a pest management plan has been prepared for sustainable use of pesticide (see chapter 6 and Annexure 6.1). This management plan will be implemented mostly through the Farmer Water Schools. A negative list of WHO category 1a, 1b or 11 pesticides including pesticides banned in India has been prepared and is included in Annexure 6.1 as 6.1.4.

A few of the stakeholders recommendations are outside of the project scope; these could be addressed by the national and State level programs and schemes on these topics:

- Increased water availability in reservoirs / dams could improve fish production & provide additional source of livelihood.
- Pilot demonstrations on forestry programs in the area and promotion of afforestation programs.
- Pilot demonstration of livestock rearing as an alternate to Anna Pratha.

Table 5.2: Major Social Issues / Findings Based on Secondary Data for Proposed Project

Major Social Issues	Cause	Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in Project Area	Stakeholder's Recommendations / Suggestions as outcome of Proposed Project Intervention
Agriculture & Livelihood	Poor Rainfall, Insufficient/Untimely availability of water, Trend of getting single crop from farm field.	Declining trend of cropping intensity in Banda, Chitrakoot and Hamirpur, while increasing trend in Mahoba and Lalitpur has been observed.	Increasing trend of cropping intensity has been observed	Increasing trend of cropping intensity has been observed	Increased water availability for command area
Irrigation, infrastructure, agriculture & livelihood	Poor Rainfall, Insufficient/Untimely availability of water.	Lower availability of water for irrigation is one of the major reason for lower cropping intensity. This gets confirmed by increasing trend in pulses production in all districts since they consume less amount of water. Irrigation intensity is decreasing in Chitrakoot, Mahoba and Hamirpur while it is constant in Lalitpur. Increasing trend of irrigation from ground water sources indicates increasing dependence on ground water. Any decrease in ground water level therefore impacts the ground water availability and agriculture production.	Stagnant irrigation intensity	Lower irrigation intensity than the district	Higher water availability and so higher irrigation intensity
	Insufficient/Untimely availability of canal water.		Increased dependence on ground water for irrigation	Increased dependence on ground water for irrigation	Reduced dependence on ground water for irrigation
	Poor Rainfall, Insufficient/Untimely availability of water. Pulses & Oilseeds consume less amount of water.		Increase in coverage area & productivity of pulses & oilseeds	Increase in coverage area & production of pulses & oilseeds	Existing trend may continue
Performance of Irrigation infrastructure	Stagnating efficiency of infrastructure due to canal cutting/ blocking and deficiency in rainfall.	Decreasing area irrigated by surface water in Banda, Chitrakoot, Mahoba and Hamirpur is indicative of lower efficiency of irrigation infrastructure deficit rainfall. Same area under surface water irrigation and stagnating irrigation intensity during last decade in Lalitpur is indicative of stagnating efficiency of irrigation infrastructure which may not be able to cater to increasing cropping intensity and increasing area under main crops in the district.	Stagnant efficiency of surface water irrigation infrastructure i.e. Dams & Canal System	Stagnant efficiency of surface water irrigation infrastructure i.e. Dams & Canal System	Increased efficiency of surface water irrigation infrastructure

Major Social Issues	Cause	Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in Project Area	Stakeholder's Recommendations / Suggestions as outcome of Proposed Project Intervention
Shift in occupational pattern & livelihood	Lower wages of agriculture labour than non-agriculture labour, Insufficient storage facility of agriculture produce, Poor condition of roads/ connectivity of marketing, Majority of farmers not getting benefits of minimum support price of agriculture produce.	Declining trend in labor force for agriculture and increasing trend in marginal workers is indicative of declining opportunities in agriculture. Therefore, agriculture and allied activities as well as major source of livelihood is decreasing.	Changes in occupational patterns to areas other than agriculture allied activities	Increase in number of marginal workers	Increased opportunity in agriculture
Shift in occupational pattern & livelihood	Fragmentation of families and buy agriculture land by marginal farmers/ landless from small and large farmers.	Increase in marginal farmers, while decrease in small & large farmers	Increase in marginal farmer while decrease in small & large farmers	Increase in marginal farmers while decrease in small & large farmers	Due to fragmentation of land holding, this trend may continue even when increased opportunity in agriculture is anticipated.
Shift in occupational pattern & livelihood, migration	Limited opportunity in agriculture, Low wages, Insufficient storage facility of agriculture produce, farmers not getting benefits of minimum support price of agriculture produce.	Decline in proportion of farmers & agriculture labour in main workers	Decline in proportion of farmers & agriculture labour in main workers	Decline in proportion of farmers & agriculture labour in main workers	Additional opportunity in agriculture due to project may arrest the current declining trend.
Livelihood	Limited employment opportunities and increased population	BPL families are increasing in Banda and Chitrakoot but decreasing in Mahoba, Hamirpur and Lalitpur.	BPL families are decreasing	BPL Families are increasing	Additional opportunity & income due to project may arrest this trend.
Livelihood & Food security	Increased production of agriculture produce, Shift in occupational patterns	Trends in food availability is increasing in all districts.	Increase in per capita food grain availability	Increase in per capita food grain availability	Increased agriculture productivity will ensure increased food grain availability.

Major Social Issues	Cause	Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in Project Area	Stakeholder's Recommendations / Suggestions as outcome of Proposed Project Intervention
Dependence on electricity	Insufficient and untimely supply of canal water, electricity run tubewells cheaper than diesel engine run tubewells, Farmers getting subsidy on electricity connection	Except for Chitrakoot, Hamirpur, Jalaun & Mahoba, all other districts are 100% electrified	99.9% electrified village	99.9% electrified village	Reduced load on electricity due to reduced load on tubewells for irrigation
Connectivity to Agri-market infrastructure	Government initiatives to provide better connectivity.	Increased road density	Increased road density	Increased road density	Project will not have any impact on road infrastructure.
Livelihood	Insufficient water availability, poor care and maintenance of small water bodies, Lack of HYV seedling and awareness.		Reservoir fish production exists	Declining reservoir fish production	Increased water availability in reservoirs / dams will improve fish production & additional source of livelihood.
Water & soil contamination	Easy process of procurement and application of chemical fertilizers	Increase in fertilizer consumption in five districts other than Lalitpur & Mahoba	Decrease in consumption of fertilizer	Decrease in consumption of fertilizer	Project might result in increased usage of fertilizers
Water & soil contamination	Farmers tried to get more production from farm field, Easy process of procurement and application of chemical & bio pesticide	Usage of chemical & bio pesticide	Usage of chemical pesticide & biopesticide	Usage of chemical pesticide & biopesticide	Project might result in increased usage of chemical pesticides & biopesticides.

Table 5.3: Major Social / Findings Based on Primary Survey for Proposed Project

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
Agriculture & Livelihood	Trend of sowing local wheat variety called "Katia". Insufficient/untimely supply of canal water, Majority of canals were run only in rabi season	90% sown area fall in Rabi. Decreasing agriculture productivity due to lack of water.	Major crops in Rabi are Wheat, Gram, Pulses and Mustard. Generally farmers use HYV seeds but a significant proportion of them used a local variety of wheat seed (Katia) as it does not require many watering. However, productivity of Katia is low.	Blockwise, in command area of block Mandwara about 96% of area was sown during Rabi followed by Talbehat (93%) and Birdha (90.0%). In non-command area also higher proportion of sown area was covered in Rabi in Mndwari (98%) followed by Birdha (94%) and Talbehat (92%). In the command area, a higher proportion irrigated area was covered by canal in the district (48.5%), highest in Block Talbehat (64.5%) followed by Birdha (54.5%) and only 30.2% in Mandwara. Despite a significantly higher proportion of irrigated area getting water from canal, about 4% to 9% irrigation is carried out by dug wells / ponds and 20% to 58% through tubewells. There was also heavy dependence on Rainfall i.e. 43% in Talbehat, 40% in Birdha and 20% in Mandwara. Situation suggests inability of canal system to provide adequate and timely water for irrigation. In command area only about 80% of the total number of required watering for wheat crop were reportedly given – about 52% were timely and 48% late.	Increased water availability for command area
Deteriorating Performance of Irrigation Infrastructures, Agriculture & Livelihood.	Insufficient/untimely supply of canal water and shortage of HYV seeds.	Decreasing agriculture productivity due to untimely water supply and shortage of HYV seeds.	Decreasing agriculture productivity due to untimely water supply and shortage of HYV seeds.	Untimely water supply shortage of HYV seeds also lead to lower agriculture productivity.	Increased water availability for command area
Deteriorating Performance of Irrigation	Insufficient/untimely supply of canal water and poor rainfall	50% Sown Area in Kharif. Decreasing productivity due to lack	In Kharif Pulses, Maize, Til, Groundnut, Jwar and Soyabean.	During Kharif, a higher proportion of sown area (49.7%) was covered in command area of the district, highest in Block Mandwara	Improve efficiency of surface water

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
Infrastructures, Agriculture, Livelihoods		of water. The farmers who were solely / mainly depending on irrigation through reservoir / dam / canal reported that they could not give all the required number of watering to their crops.		(54%) followed by Birdha (50%) and Talbehat (41%) against 43%, 47% and 39% respectively in non command area. In the command area, a higher proportion irrigated area was covered by canal in the district (48.5%), highest in Block Talbehat (64.5%) followed by Birdha (54.5%) and only 30.2% in Mandwara. Despite a significantly higher proportion of irrigated area getting water from canal, about 4% to 9% irrigation is carried out by dug wells / ponds and 20% to 58% through tubewells. There was also heavy dependence on Rainfall i.e. 43% in Talbehat, 40% in Birdha and 20% in Mandwara. Situation suggest inability of canal system to provide adequate and timely water for irrigation. In command area only about 80% of the total number of required watering for wheat crop were reportedly given – about 52% were timely and 48% late.	irrigation system
Deteriorating Performance of Irrigation Infrastructure	Lower water availability in Dams/Reservoirs/canal due to poor rainfall and poor water management system such as canal cutting/blocking, damaged canal lining, seepage, silting, etc.	90% Sown Area Irrigated in both command and non command area farmers were depending on more than one source of irrigation including rainfall.	About 90% of net sown area was irrigated.	In command area of block Mandwara, a larger proportion of sown area was reportedly irrigated (53%) followed by Talbehat (48%) and Birdha (36%) while in non command more area in block Mandwara (57%) was reportedly irrigated followed by Birdha (48%) and Talbehat (45%). In non command area, since canal was reportedly not available about 53% of the irrigated area was covered through Private Tubewell, 40% through Pond / Well and 3% through Reservoir / Dam in the district. Block-wise almost the entire irrigated land in Birdha was covered by Pond / Well (99.7%), followed by Private Tubewell 99%) and Reservoir / Dam (9%); in Talbehat and Mandwara there	Improve efficiency of surface water irrigation system

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
				was heavy dependence on Private Tubewell as 79% and 71% of area was irrigated through this source. About 12% of irrigated area in Mandwara and 10% in Talbehat was covered through Pond / well. Dependence on rainfall in non-command area was lower than in command area.	
Heavy dependency on ground water, costly source of irrigation. Dependence on electricity	Insufficient/untimely supply of canal water and poor rainfall. Watering through diesel run engine tubewell due to inadequate electricity supply.	Ground water as preferred source of irrigation though gradually depleting & operating with erratic electric supply and high cost irrigation, 57% irrigation through Tube well (Private). Depth of Ground water in the district was about 40-45 metre). The electricity supply is erratic with fluctuations in the district which leads to untimely watering.	In block Birdha and Bar, the ground water level is very deep (70-80 metre). About 22%-24% of tubewells failure were recorded at the time of installation in Birdha, Mehrauni and Mandawara block. There is no maintenance of tubewells.	When enquired about farmer's preferred source of irrigation 58% in command preferred Tubewell as compared to 52 % farmers preferring through canal. In non command area 93% each mentioned their preferred source would be Tubewell and canal. Therefore, ground water is the preferred source though there is regular power failure and high cost of irrigation.	Conjunctively use of surface & ground water
Deteriorating Performance of Irrigation Infrastructure	Insufficient/untimely supply of canal. Irrigation through tubewells.	Less dependence on canal system for irrigation: 28% by Canal System.	Canal system irrigation through Jamni, Sajnam & Rohini at less than recent normal.	The respondents belonging to the three blocks reported that the level of canal water generally remain high during November-December while during March-June they (Canal) remain dry. Such a pattern of response in favour of tubewells indicate that either canal was not serving their entire area or the supply was untimely / inadequate.	Improve efficiency of surface water irrigation system
Alternate & traditional sources of irrigation	Get water easier and at minimum cost than tubewells.	Dependence on dug wells & ponds for irrigation: 10% by Dug well 5% by Pond & Other		In Talbehat, 9% of the area irrigated through pond / well; In Mandwara 7% of the area irrigated through pond/well; In Birdha about 50% of the area irrigated through ponds & well.	Rehabilitation / Modernization of ponds

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
		sources			
Loss of Livelihood	Traditional practice of "Anna Pratha".	20% of the Crop get damaged due to Anna Pratha	Cattle damage not only canal banks but also forest land.	The menace of stray animals due to Anna Pratha destroy a considerable part of crops while there is no check on them to prevent the loss due to social practice as well as the influence of owners of such cattle.	Improved irrigation efficiency for improved fodder production
Poverty Alleviation & Alternate sources of Livelihood	Better Employment opportunities. Low wages as compared to other place.	Migration: In Some village most families migrate affecting local labor during harvesting.	The pattern of migration is such that in some villages most of the families migrate to work in agriculture sector in Madhya Pradesh. Their migration is mostly seasonal.	Proportion of migrated workers was significantly higher in command area of block Talbehat (33%) and Mandwara (27%) than in Birdha (6%). Similar position was found in non command area, though not significantly. Migratory pattern was seasonal with very limited permanent migration.	Increase opportunity in agriculture & allied activity
Deteriorating Performance of Irrigation Infrastructure. Lack of participatory approach for water use.	Poor Water management Practices, Canal cutting/Blockage, illegal lifting of canal water, Excess use of canal water at head and middle of the canal.	4. Water not reaching tail end	Canal water was not reaching in a substantial part of tail end due to illegal cutting of Canal / Minor, over use of water at head and middle ends, frequent changes in cropping pattern. Since there is no practice of making mud boundary around the farms due to which water does not remain in farms.	A pattern of response in favor of tubewells indicates that either canal was not serving entire area or the supply was untimely or inadequate. Sources of irrigation show that the farmers were depending on more than one source in both command and non-command area. This situation suggests inability of canal system to provide adequate and timely water for irrigation. In both Command and non-command area farmers were depending on more than one source of irrigation including rainfall. There was no role of farmers in recording of irrigation through canal; and that they reported that repair of canal was undertaken neither annually nor season-wise. They had also no knowledge about the fine imposed on any one for unauthorized use of canal water or any case filed on canal crime.	Participatory approaches for improved performance of irrigation infrastructure e.g. implementation of PIM

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
Poverty Alleviation & Alternate sources of Livelihood	Diversify income generation activities	Fisheries Reservoirs: There are 91 ponds in an area of about 531 ha in the district for which patta for fisheries were given. Besides, a large number of private ponds also exist. The production of fish in community ponds was between 20-25 Qtl/ha while in private ponds average production was about 30 Qtl/ha. Besides local consumption, fish are also exported to Jhansi, Lucknow and Gorakhpur.	Reservoirs in project area are sources of fishes. Besides local consumption fish was also exported to Jhansi, Lucknow and Gorakhpur.		Improved income through alternate livelihood from water resources
Lack of participatory approach in water resource management	There was no Water Users Association, There was no NGO's working in participatory irrigation and water resource management.	Activities of NGOs: A number of NGOs were working in the district. Their activities were related to Tribal welfare, women welfare and awareness generation against social evils such as child marriage, illiteracy etc.	A number of NGOs were working in the district. Their activities were related to Tribal welfare, women welfare and awareness generation against social evils such as child marriage, illiteracy etc.	None of the respondents in command area had any knowledge of the NGOs working in their area while 6 respondents in non command (5 in block Talbehat and 1 in Mandwara) knew the NGOs in their area. Among the 6 respondents 5 also reported their families had benefited from the activities of the NGOs. Thus, activities of the NGOs seems to be limited. There was no Water Users Association in the district. In command area only two respondents reported that they discuss about sharing of canal water with fellow farmers; None reported about any type of arrangement for distribution of canal water.	Implementation of PI and participatory approach for water resource management
Lack of participatory approach in water	There was no Water Users Association, There was no SHG's working in	Activities of SHGs: There were 4484 Self Help Groups (SHGs) in		A total of 9 respondents, 5 in command and 4 in non command informed about the existence of self-help groups in their area.	Implementation of PI and participatory

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
resource management	participatory irrigation and water resource management.	the district out of which 1029 were exclusively for women and most of the remaining, i.e. 3455 were had passed grate-I and 1392 were grade – II pass. A total of 1316 SHGs were provided financial assistance. Activity wise 235 SHGs were working in the area of irrigation / agriculture 1367 in Livestock / dairy and 73 in village Industry. A number of SHGs were engaged in preparation of spices, Achars and Murabbas. Some SHGs were engaged in making Terrakota and in weaving famous Chanderi Saries.		These SHGs were working for improvement in Animal Husbandry and some were also helping their members for small business. None of the family members of the respondents were, however, associated with the SHGs. It therefore suggest their area of activities was limited. There was no Water Users Association in the district. In command area only two respondents reported that they discuss about sharing of canal water with fellow farmers; None reported about any type of arrangement for distribution of canal water; there was no role of farmers in recording of irrigation through canal; and that they reported that repair of canal was undertaken neither annually nor season-wise. However, a large majority of Women respondents reportedly voted in elections in both command (95.5%) and non command (95.3%) area which indicate a higher degree of consciousness about the importance of elections.	approach for water resource management
Poverty	Increased population, low employment opportunities and low crop productivity.	BPL families: About one third of the families in rural areas were living below the poverty line.	About one third of the families in rural areas were living below the poverty line.	The respondents were asked to identify a critical situation that they faced due to poverty. About half of the sample in command (52%) and non command (51%) mentioned that they could not arrange medical treatment of family member; about 31% in command 37% in non command reported that they could not marry their daughter while about 17% in command and 13% in non command reported their children had to drop out of school due to non payment of fee. Non availability of medical	Improve income opportunities due to short & long term project intervention

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
				treatment due to poverty was reported by more respondents in block Talbehat and Mandwara in both command and non command areas as compared to block Birdha. As regards programs related to poverty alleviation, people mentioned only MNREGA.	
Soil & Water Pollution	Application of chemical fertilizers by large and small, Higher population of domestic animals particularly with marginal farmers.	Use of chemical fertilizer & bio pesticide: Use of chemical fertilizer was increasing but farmers were still using organic fertilizer more.	Use of chemical fertilizer was increasing but farmers were using organic fertilizer more.	The farmers were using chemical and Bio-fertilizer and Chemical Pesticide in the district (Bio-Pesticide used only in Block Mandwara). The average quantity of Bio-fertilizer used per Ha was higher (339.9 Kg.) than the quantity of Chemical fertilizer (282.8 Kg) in command and non command (334.5 Kg and 264.7 Kg respectively) area. The quantity of chemical as well as Bio-fertilizer per hectare was higher in command than in the non-command area. The average quantity of chemical Pesticide used in Command area was also higher (17.5 Kg/Litre) than in non-command area (7.0 Kg/Litre). The highest quantity of Bio fertilizer and Chemical Pesticide were used in Block Mandwara in both Command and non-Command area, Bio-fertilizer @ 376.9 Kg in Command and 389.5 Kg in non-command and chemical Pesticide @ 46.2 Kg/Litre in Command and 15.3 Kg/Litre in non-Command which were very high as compared to other Blocks.	Awareness building & Pilot demonstration of bio-fertilizer and bio-pesticides
Seasonal availability of agriculture labour	One hundred days employment in MNREGA scheme provides labour for preparation of farms. Beyond 100 days labour is available for other	Availability of agriculture labour: There was no problem of availability of labour for working under MNREGA. Labour engaged under	There was no problem of availability of labour for working under MNREGA. Labour engaged under MNREGA are used for leveling of farms of Marginal and Small		Improved empowerment opportunities

Major Social Issues	Cause	Major Findings in Lalitpur District through FGD	Major findings in Project Area through FGD	Major findings in Command & Non Command Area through Primary Survey	Recommendations / Suggestions as outcome of Proposal Project Intervention
	agricultural activities.	MNREGA are used for leveling of farms of Marginal and Small farmers. They are also engaged for plantation of Awonla and Guava trees and in crops of vegetables and spices.	farmers. They are also engaged for plantation of Aownla and Guava trees and in crops of vegetables and spices.		
Low cost of irrigation service delivery impacting financial performance of irrigation system	Insufficient funds for care & maintenance of irrigation infrastructure.	Lack of funds for maintenance of Dams: Dams have large amount of silt. The condition of Dams was deteriorating but their restoration and maintenance was not possible due to serious shortage of funds. Lack of funds is a major problem for strengthening institutional infrastructure in the district.	The condition of Jamni, Sajnam & Rohini Dams was deteriorating but they lacked restoration and maintenance due to serious shortage of funds. Lack of funds is a major problem for strengthening institutional infrastructure in the district.	Farmer in command area indicated that repair of canal was undertaken neither annually nor season-wise. Willingness to pay higher Water Tariff: A small proportion of farmers in the command area of district (12.4%) expressed their readiness to pay higher water Tariff if timely and adequate canal water supply is provided. It was also found that smaller than large farmers expressed their willingness to pay higher charges provided the timely and adequate water supply is assured.	Participatories water resources management. Revision of water tariffs

Table 5.4: Summary of Environmental Issues (UP-Bundelkhand)

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
Decreasing Fertility of soil & increasing consumption of fertilizer	Imbalance and higher use of chemical fertilizers, At the head end of canal command area reported reduction in Soil fertility due to sodicity. Very low practices of soil testing.	Soil Pattern in the region indicates that it supports agriculture in the region. However, primary survey of command & non-command area indicates decreasing fertility & increasing consumption of fertilizers.	Soil pattern suggest that soils support agriculture in district.	More farmers in non command (15%) than in command area (4%) reportedly got soil fertility of their farms tested during the last ten years, mostly once, and sometimes twice or more. The proportion of such farmers was significant in Block Birdha non-command (38%). About 21% of farmers in non-command and 12% in Command area reported reduction in Soil fertility of their farms, mostly due to sodicity. Block-wise about 19% of farmers in Mandwara, 15% in Talbehat and 7% in Birdha in Command area reported reduction in soil fertility of their farms while in non-command area about 27% of farmers in Birdha, 19% in Mandwari and 18% in Talbehat reported similar condition of soil fertility of their farms. Further shortage of fertilizer is a serious constraint for a significant proportion of farmers in both command and non-command area.	Agriculture extension sercrees for promoting conjunctive use of water to prevent waterlogging & sodicity. Pilot demonstration for soil & water conservation Bio fertilizers.
Changes in land use particularly in catchment area e.g. decreasing forest cover & diversion of	Forest cover is going to reduce due to stray animals eat the newly grown plant (Anna Pratha Practice) and	Change in land use pattern from 2000-01 to 2008-09 indicate that forest area in the Bundelkhand declined	Gross sown area increased from 49.71% in 2000-01 to 59.93% in 2008-09. Net sown area in command area increased from	Primary survey indicates tha overall gross sown area increased in 2008-09 in comparison to 2000-01. This increase in 2008-09 is because of increase in gross sown area in all	Preparation of knowledge base through GIS mapping of catchmernt &

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
land for other uses (non agriculture)	illegal cutting of forest for firewood and other uses.	from 268660 ha in 2000-01 to 244578 ha during 2008-09. Present fallow land increased from 145904 ha in 2000-01 to 184415 ha in 2008-09. Overall gross sown area increased in 2008-09 in comparison to 2000-01. This increase in 2008 is because of increase in gross sown area in Jalaun, Lalitpur & Mahoba, while in all other districts it declined.	52.38% to 55.99%. Mehrauni (72.83%) block has highest net sown area followed by Bar (63.96%) and Birdha (55.30%) while Mandawara (50.74%) block was lowest. Area sown more than once of command area was 29.67% while in district it was 30.04%. Area sown more than once was highest in Bar (44.67%) block followed by Mehrauni (30.10%) and Birdha (27.48%) blocks. During the 2000-01, cropping intensity was 128.50% in 2008-09 it was 149.59%. FGD findings indicate that about 14% (75000 Ha) of the geographical area of Lalitpur was under forest cover, 70% open forest and 30% was dense forest. About 20,000 Ha of forest cover was protected forest.	blocks of command area. Further, gross sown area showed an increasing trend during Kharif except during 2005-06 & 2006-07, which can be attributed to drought years. This indicates that availability of water can further increase the gross sown area in the command. Forest area has decreased, while land put to use other than agriculture has increased. Primary survey in command area indicates that out of 110 families in Command area 12 having 12.6 Ha land and 28 families out of 190 in non command having 30.3 Ha land reportedly suffered from drought. The affected size of landholding suggests that most of them were Marginal farmers. Block wise 8 in Birdha and 2 each in Mandwari and Talbehat in Command and 11 in Birdha, 10 in Talbehat and 7 in Mandwari in non command had suffered due to drought. Only two farmers in command and 5 in non command area had a total Barren land of 1.8 Ha and 9.6 Ha respectively while one farmer each in command and non-command area complained about water logging. FGD findings indicate that the forest cover is going to reduce due to Anna	command area and promote pilot demonstration of interventions like forestry programs in catchment area. Pilot demonstration of livestock rearing as an alternate to Anna Pratha.

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				Pratha. The stray animals eat the newly grown plant.	
Extreme climatic conditions, rainfall deficiency & drought	Lower forest cover, insufficient natural surface water resources, topography of the local area, lack of knowledge regarding water conservation and selection of crops.	Maximum to minimum temperature ranges from 5.4ºC to 49.5ºC. Rainfall data from year 2000 to 2009 indicates declining trends in all the districts of Bundelkhand. Average rainfall ranges from 841 mm in 2000 to 619 mm in 2009. Year 2006, 2007 and 2008 indicate highly rainfall deficit years in Bundelkhand. This phenomena prevailed continuously for three years and had impacts on water resources. A simple root cause analysis indicates that rainfall deficiency triggers reduced water availability in canals, which may further trigger decline in agriculture production and water for other uses.	Maximum to minimum temperature range from 5.4ºC to 49.5ºC in the district. Rainfall profile in Lalitpur district from 1971 to 2009 indicates that rainfall deficiency is observed after seven to eight years. Rainfall data from year 2000 to 2009 for Lalitpur indicates declining trends over the years.	Primary survey indicated that the period of heavy rains in the area was reportedly July-August in all the three blocks of both command and non-Command area. During the last 10 years, crops of a majority of farmers in Command (74%) and non-command (62%) area were affected for 3-4 times due to occurrences of drought, which is a considerably large number as one failure of crop affects the economic condition of farmers for more than two crop seasons. About 88% of farmers in command area reported their crops were affected by drought between once and six times in the last 10 years. About 96% of affected farmers were in Block Birdha and Mandwari while in Talbehat about 65% of the farmers were affected. About 79% of farmers in non-command reported their crops were affected between once and 8 times in the last 10 years. About 96% of farmers in Birdha, 92% in Talbehat and 55% in Mandwari suffered from such	Promote integrated approach for alternate livelihood programs. Promote integrate water resource managementj program (IWRM) to improve irrigation efficiency and promote water conservation.

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				occurrences.	
Air quality deterioration	Unscientific practices in mining and crushing activities.	Recent mining activity is leading to deterioration of air quality.	FGD findings indicate that in the district almost at every 10-12 km., there is mining activity which has serious impact on environment.	FGD findings Indicate that air quality deteriorating due to mining activity in Command & Non-Command area.	Promote prevention of crop damage through coordination with agriculture extension service.
Limited availability of Surface Water	insufficient of funds for care and maintenance of surface water resources, insufficient manpower for water management and collection of water charges, lack of knowledge regarding water conservation and conjunctive use of water.	According to UPID data, about 2013 MCM of surface water is available from 28 existing reservoirs in UP Bundelkhand.	About 1014.6 MCM water is available from six reservoirs in Lalitpur district, which is more than 45% of the water available in UP Bundelkhand.	About 167 MCM water is available from Jamni, Sajnam and Rohini Dams, which is 16.4% of the total water available in Lalitpur district. Performance of Jamini reservoir live storage indicates that it ranged between 17.3% in 2007-08 to 100% during 2003-04 & 2005-06. Out of eleven year period, live storage ranged between 60 - 80% during four years, one year between 80 - 90% and above 90% during five years. During one year, the live storage capacity was less than 20%. Live storage trend indicates steep decrease during the period 2005 to 2009 indicating hydrological drought. Performance of Sajnam reservoir live storage indicates that it ranged between 17.9% during 2007-08 to 100% during 2005-06 & 2008-09. During eleven year period, it ranged between 60 - 80% during three years, while for one year, it ranged between 80 - 90%.	Rehabilitation & modernization of dams & hydraulic structures. Installation of hydrological instrumentation & data recording system for surface waqter resource management.

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				During the remaining seven years, the live storage was below 60%. Live storage trend indicates steep decrease in capacity during the period 2005 to 2009 indicating hydrological drought. Further, near normal conditions are indicated during three years, when live storage capacity was above 90%. Live storage capacity of Rohini dam from 2000-01 to 2010-11 indicated that it ranged from zero in 2007-08 to 100% in 2005-06 and 2008-09. Storage capacity was above 90% during two years, while it ranged between 70% - 80% for three years. During five years, it was below 70%. Steep decrease in storage capacity was observed during 2005 to 2009 indicating hydrological drought. Above analysis indicates that near normal water availability have been observed for five years in Jamni, three years in Sajnam and two years in Rohini reservoirs during eleven year period. Considering 70% as the bare minimum live storage, it can be inferred that canal system from the three reservoirs can be operated to some extent for seven years. During the remaining four years, canal supplies for irrigation had to be curtailed significantly. During 2007-08,	

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				Jamni & Sajnam reservoirs had just 17% of water left while in Rohini reservoir it was negligible. Therefore, availability of water is a serious issue, which was confirmed during stakeholder consultations both in the district as well as the project area as highlighted in chapter 3.	
Limited availability of Ground Water	Overuse of ground water for irrigation, deficiency in rainfall, lower recharge due to topography and geological conditions of the region.	According to Central Ground Water Board[5], the total ground water resources of the Bundelkhand region are 8397 Million Cubic Meter (MCM) out of which 4632 MCM (55.1%) is in Uttar Pradesh. Utilizable potential for irrigation in Bundelkhand region is around 6419 MCM out of which 3544 MCM (55.2%) is in Uttar Pradesh. Level of utilisation in Uttar Pradesh, till 2001 was 1019 MCM and balance ground water available for future development was thus 2525 MCM	Currently annual ground water recharge of the district is 67813.67 ham. The net annual ground water availability is 62274.29 ham. The existing gross ground water draft for all uses is 32195.90 ham. The net ground water availability for future irrigation development is 28824.87 ham. The stage of ground water development is 51.70%. As per CGWB, 4 blocks fall in safe category and the remaining 2 blocks Bar & Talbehat fall under semi-critical category. The maximum stage of ground water development is in Bar block (82.28%) and minimum stage of ground water development is in Birdha block (31.38%). The southern part of the area i.e. Mandwara & Mahrauni blocks have a good scope for further	Pre & Post Monsoon 2006, depth to water table of the district indicates that premonsoon water level varies from 0.77 (Talbehat) to 11.85 mbgl (Madawara). In post monsoon period, depth to water level varies from 0.70 to 10.38 mbgl. Water level fluctuation varies from 0.07 m (Talbehat) to 2.60 m (Lalitpur) Shallow water level is observed in canal commands and the deeper water level is noticed at southeastern part of the district mainly in Madawara block. The shallow water level (0.00 - 3.00 mbgl) are occurring in the form of small pockets along the surface water bodies in Talbehat areas. FGD findings indicate that depth of Ground water in the district was going down & had recently reached 40-45 Metre. In block Birdha and Bar, the water level is very deep (70-80 metre).	Awareness Promotion of conjunctive use of water, water conservation & IWRM. Rehabilitation & modernization of canals for improving their efficiency & water delivery at the tail end.

[5] Hydrogeology of the Bundelkhand region, CGWB, 2001

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
		(53%). CGWB data indicates that ground water development has increased from 37.56% in 2001 to 54% in 2009. While the CGWB report suggest availability of additional potential that can be tapped, the recent drought cycle of four years has completely depleted the available resource in drought prone districts in the absence of recharge from rainfall; during this period. Further yield and re-charging in the drought prone districts seem to be poor and additional ground water development appears to be economically unsustainable because of rocky terrain in Bundelkhand and cost of developing dug wells/tube wells being	ground water development through tubewells.	About 22-24% of tubewells failure was recorded at the time of installation in Birdha, Jakhaura & Mehrauni and Mandawara block. This drop could be attributed to recent drought years and absence of recharge. Further these findings also confirm Bar as semi critical block.	

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
		very high.			
Surface & Ground Water Quality	Surface water quality was good due to lack of water polluting industries, Lower rainfall, higher use of organic fertilizer and trend of getting single crop from farm field. Drinking water quality was observed above permissible limit in some part of bundelkhand due to lower strata and geological conditions of the region. It may also be due to unscientific practices such as improper management of sewage and solid waste.	**Surface Water Quality** Surface water quality at all monitored locations is falling under class C and has the similar trend from 1985 to 2009. Class C indicates that water is fit for both drinking water purposes after conventional treatment & disinfection and also for irrigation as per national water quality classification criteria. **Ground Water Quality** pH: Out of 151 samples, 13 samples were found above permissible limit (pH 8.5) in Jalaun district, in Jhansi district and in Lalitpur district. Total Dissolved Solid (TDS): A total 11 samples were found above permissible limit (2000 mg/l) in Jalaun	**Surface Water Quality** Surface water quality at all location is falling under class C and has the similar trend from 1985 to 2009. Class C indicates that water is fit for both drinking water purposes after conventional treatment & disinfection and also for irrigation as per national water quality classification criteria. **Ground Water Quality** pH: Khiriya Dang village of Talbehat block in Lalitpur district ground water sample had with pH found above the permissible limit. Total Dissolved Solid (TDS): TDS is found above permissible limit while other samples in other district are found below permissible limit. Hardness: Hardness is found above permissible limit in Bamhori Bansha, Jharkon, Andher, Kalyan	**Surface Water Quality** Project area (Jamni, Sajnam, Rohni Dam and canal system) has never been monitored by any agency. So, Pre-monsoon surface water quality assessment has been carried out in the command area of Jamini Dam, Rohni Dam and Sajnam Dam. • Turbidity is found beyond the permissible limit (10 NTU) in all locations except Left Sajnam Canal and Right Sajnam Canal. Hardness is also observed within the desirable limit. • Residual Chlorine was found beyond the desirable limit (0.2 mg/l) at all locations. • Fluoride was observed slight beyond the permissible limit (1.5 mg/l) at Left Sajnam Canal and Right Sajnam Canal. **Ground Water Quality** • **pH:** was highest in Khiriqamisar, Bhawani, Gugarwara, Jaraoli, Kakdari & Pah villages of Bar	Regular monitoring of surface & ground water quality for developing database to identify sources of pollution & prevention.

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
		district and in Jhansi district. Hardness: Out of 151 ground water samples, 33 ground water samples are observed above the permissible limit (600 mg/l) in Jalaun, Jhansi and Lalitpur districts. Nitrate: Out of 151 ground water sample, 106 ground water samples were found above permissible limit. in Jalaun; Jhansi, Lalitpur and Mahoba. Iron (Fe): A total 8 water samples were observed above permissible limit (1 mg/l), in Jalaun district, in Jhansi district Fluoride: A total 12 samples were found above permissible limit (1.5 mg/l). in Jalaun district; in Jhansi district and in Lalitpur district.	Pura, Nadan Wara & Piprai village of Birdha block and Bari kalan & Chungi village of Talbehat block in Lalitpur had hardness above permissible limit. Nitrate: 30 samples in Lalitpur were found above permissible limit. Iron (Fe): Samples from Rangaon village of Birdha block and Targuwan village of Talbehat block in Lalitpur district were with iron found above permissible limit. Fluoride: Sample from Raipur village of Birdha block in Lalitpur district was found with Fluoride within above permissible limit.	block; Patsemra & Tenga village of Birdha block; Piprat & Ramgarha village of Mandawara block and Baryo, Dhurwara, Khatora, Kuraura, Luharra & Sindwaha village of Mehrauni block. • **Turbidity:** was highest in Bamhori Kharait, Banoni, Billa, Semaria, Dashrara, Dailwara, Kakdari, Kuwagaon, Mathura Dang, Mirchwara , Khakron, Semrabhag, Nagar, Kailoni, Udaipura & Umari villages of Bar block; Bandar Gurha Village Of Birdha Block; Didonia Village Of Mandawara Block And Bamhori, Bahadursingh, Chhayan, Gadolikalan, Jakhaura, Kisarda, Bamhorighat, Rameshra, Sadumal, Samogar & Sindwaha village of Mehrauni block. • **Nitrate:** was highest in Billa, Daroni, Dashrara, Jaraoli, Mathura Dang, Todi & Udya Villages of Bar Block; Dongra Kalan & Pali Rural Village of Birdha Block; Bachhraoni, Dongra Kalan, Amora, Bhonta, Dhurwara, Chhapchhol, Deoran	

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				Kalan, Khatora, Bangaruwa, Mainwar, Bamhorighat, Rameshra, Saidpur & Samogar Village of Mandawara Block. • **Iron:** was found above permissible in Badokhara, Suri Khurd, Bamhori Kharait, Bhelonilodh, Daroni, Dashrara, Didaura, Bharoni, Jaraoli, Teela, Kakdari, Karmai, Kuwagaon, Mogan, Pah, Khakron, Pura Dhadkuwa, Semrabhag Nagar, Kailoni & Udaipura Villages in Bar Block and 4 Village in Birdha Block; 12 Village in Mehrauni block. • **Fluoride:** was found above permissible in 19 Villages of Bar Block, one village of Mandwara block and 19 Village of Mehrauni Block.	
Increasing dependence on ground water for irrigation in comparison to surface water.	Untimely and insufficient availability of canal water, Water not reach at tail end, Lack of awareness regarding conjunctive use of water, water conservation &	Third census of minor irrigation schemes (2001) suggests nearly 14% of net sown area of about 19 lakh ha is irrigated by major and medium schemes, 13% by gravity water and 1% by other surface water	In Lalitpur district, canals are the (more than 35%) major source of irrigation followed by wells (25%). The two sources contribute more than 60% irrigation. Districtwise temporal variation (eight years) of source of irrigation indicates significant increase in ground water irrigation during from 2000-	Block wise temporal variation (Ten years) of source of irrigation indicates slight reduction of canal irrigationo and increase in ground water irrigation during 2006 & 2007. The decreased canal irrigation is indicative of reduced water availability in the canal system during the subsequent years. This further indicates fluctuation in rainfall	Improving efficiency of canal irrigation by rehabilitation & modernization of canal system to prevent water losses and ensuring service delivery at

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
	integrated water resource management.	resources. Kharif irrigation is about 5% and Rabi about 95%. Nearly 70% of the area continues to be rain dependant. A comparative analysis of irrigated area of the Bundelkhand covered under different sources (Source: District Statistical Handbook) for 2000-01 and 2008-09 indicates that ground water use covers 16% of the reported irrigated area in the year 2000-01 and 28% in 2008-09. Surface water use covers 49% in 2000-01 and 45% in 2008-09. The data indicates that source of irrigation increased by 12% through ground water in Bundelkhand region.	01 to 2008-09. The decreased canal irrigation has been observed in 2007-08 and is indicative of reduced water availability in the canal system due to drought condition. Analysis also indicates heavy dependence on private tubewells & wells for irrigation in comparison to public tubewells. FGD findings in Lalitpur district, further confirms this trend.	during these two years. Except for Mehrauni block, all the blocks showed increased dependence on ground water. It also indicates that Mehrauni block located on the head of the canal system gets the maximum advantage of canal irrigation. Further, Bar block, which is located at the tail end area of canal system indicates maximum dependence (43% to 69%) on ground water for irrigation. This increased dependence on ground water in Bar has resulted in 82% of ground water development in the block, thereby ranking it into semi critical category as per CGWB. This limits the scope of further development of ground water resources up to 8 - 10% in the block and require interventions for increasing efficiency in Canal System on the upstream side in order to deliver water in the tail end. In Jamni canal system, actual irrigation during Rabi ranged from 21% in 2006-07 to above 100% of the recent normal during 2005-06. 2006-07 indicated drastic cut in canal irrigation due to minimum live storage capacity of reservoir. During five years out of ten years the canal system could irrigate only 75% to 80% of the maximum	the tail end. Awareness Promotion of conjunctive use of water, water conservation & IWRM.

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				irrigation, while during four years, it was above 90%. During Kharif season, irrigation from canal system was observed minimum during 2002-03, 2003-04 and 2007-08. This may be attributed due to nearly 60% live storage in Jamni reservoir during 2001-02, 2002-03 and extreme drought year in 2007-08. In Sajnam canal system, actual irrigation during Rabi ranged from 55% in 2007-08 to more than 100% of the recent normal during 2005-06. Six years out of ten years have been observed to be normal, where the canal system could irrigate near normal to maximum irrigation, while during three years canal irrigation have been found to be below normal and one year as drought year. During Kharif season, irrigation from canal system was observed minimum, during 2003-04, while it was maximum during 2010-11. This may be attributed to nearly 60% live storage capacity in Sajnam reservoir. In Rohini canal system, actual irrigation during Rabi ranged from 20% during 2007-08 to above 100% during 2001-02 and 2004-05 & 2005-06. Six years out of ten years have been	

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				observed to be normal, where the canal system could irrigate normal to maximum irrigation, while during three years, canal irrigation have been found to below normal, while one year has been observed as drought year. During Kharif season, irrigation from canal system was observed minimum during 2003-04 and 2008-09, while it was maximum during 2005-06. Performance of canal system in terms of tail feeding from 2006-07 to 2011-12 indicates that irrigation was targeted only for 68% to 85% of the total tail ends during this period. Only 6% tail ends were fed during 2007-08 indicating drought conditions, while a maximum of 85% of the target was achieved during two years (2006-07 & 2008-09). This indicated that tail ends do not receive water during majority of years. This could be due to either non availability of water on account of deficit rainfall or due to deficiencies in the canal operating system e.g. water losses. Data from UPID indicates that water losses per km in Jamni canal ranges from 1.72 cusec/km to 1.84/km. Similarly, in Sajnam canal system, it ranges from 1.80 cusec/km to 2.33	

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
				cusec/km, while in Rohini canal system, it is 1.09 cusec/km. FGD findings in the district Lalitpur and field interaction with the farmers confirm these findings.	
Decrease in forest cover, vulnerability of Flora & Fauna	Stray animals eat the newly grown plant (Anna Pratha Practice) Rainfall deficiency and high temperature also affect on newly grown plant. Illegal cutting of forest for firewood for cooking and other uses.	Landuse statistics indicate decrease in Forest cover. As per biodiversity report of UP Bundelkhand has dry ecosystem. The vegetation of this region is tropical dry deciduous type, which can be further divided into mixed deciduous forests and dry thorn forests. Two endemic plant species is found in Lalitpur district. Rorippa pseudoislandica (Brassicaceae) & Alectra chitrakutensis (Scrophulariaceae) is found in Hamirpur & Banda.	As per biodiversity report of UP, project area has dry ecosystem. The vegetation of this region is tropical dry deciduous type, which can be further divided into mixed deciduous forests and dry thorn forests. Moderate dense forest has slightly decreased over a period from 2005 to 2009 and it remains same in 2011. Total forest area has also slightly reduced from 572 km^2 to 570 km^2 during the 2005 to 2009. No endemic species is found in Lalitpur.	FGD findings indicate that the district has a large number (aprox. 50) of medicinal species in the forest area. The varity of small medicinal trees are Bhangraj, Bhum amla, Shankh pushpi, Safed Musli, Shatabar, Harjor, Ashwgandha, Arusa, Thuar, etc. The tall varities of trees are Gulmarg, Amla, Bel, Beejasal, Mahua, Duddhi, Neem, Jamun, Arjun, Reetha, etc. Arjun, Shankh pushpi and Jamun are found in abundance on both sides of river, canal and drains in the district. About 14% (75000 Ha) of the geographical area of Lalitpur was under forest cover, 70% open forest and 30% was dense forest. About 20,000 Ha of forest cover was protected forest. Other forest produce from the blocks are Tendu leaves, Chironji, Mahva, Arjun ki chhal and Bel, which are collected and sold to the forest doptes. Sandal trees are found in block Bar. Illegal cutting of sandal trees is a major problem.	Promote afforestation programs & canal side plantations through ongoing forestry programs of forest department.
Vulnerability of	Rainfall deficiency,	About 120067 ha of	The total wetland area in the	Mahavir Swami Wildlife sanctuary is	Ensure water

Major Environment Issues	Cause	Major Findings in Bundelkhand Region	Major Findings in Lalitpur District	Major Findings in (Command & Non-command) Project Area	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
Protected Areas & Wetlands	Lack of manpower and funds.	wetland area falls in UP. The area under aquatic vegetation is 7152 ha during Post Monsoon & 3484 ha during Pre monsoon. A significant proportion of the states biodiversity is covered with the protected area network in the Bundelkhand consisting of two wildlife sanctuaries and one bird sanctuary.	district is 34119 ha. Major wetland types of the district are reservoir/barrages. There are 14 reservoirs / barrage in number with 23221 ha area and accounting for 68.06% of the total wetland area of the district. Other major wetland types are: River/stream (15.3%), Tanks / pond (7.4%). There are 1127 small wetlands (<2.25 ha) identified and demarcated as point feature. Area under aquatic vegetation in pre-monsoon season is 1261 ha during post-monsoon season while in pre-monsoon season it reduced to 671 ha.	~16 km from the nearest Dam (Sajnam) where interventions are proposed and is not located downstream to it. As per the Environment Impact Assessment notification, 2006, the project site should be 10 km away from the eco-sensitive zone. So, proposed activities do not invoke EIA notification.	quality management of water bodies to maintain its aquatic flora & fauna

Chapter 6: Environmental and Social Impacts and their Management and Mitigation

6.0 Introduction

A social and environmental assessment (SEA) has been carried out based on impact evaluation criteria. This assessment has informed the design of the Environmental & Social Management Framework (ESMF), which is to be implemented as part of the UPWSRP Phase II. The ESMF presented here meets the requirements of the World Bank's OP 1.01 on Project's Environmental Management Plan and comprises of the following elements:

- Potential Environmental and Social Impacts
- Screening
- Categorization of activities
- Environmental and Social Management Framework.

6.1 Potential Environmental and Social Impacts

The potential environmental and social impacts would largely center on the investments in irrigation service delivery. Adverse environmental impacts may arise due to certain planned activities, like disposal of silt during rehabilitation of irrigation infrastructure, construction and installation of irrigation control structures, small bridges over canals, potential increased used of agro-chemicals for increasing crop productivity etc. Adverse impacts could also arise due to poor construction quality and unsafe construction practices. A summary of component wise planned investments, their likely impacts and proposed nature of mitigation is given in Table 6.1.

Table 6.1: Identified Impacts

Component	Nature of planned investments	Potential adverse/positive impacts and intensity	Nature of mitigation
1. Strengthening of State-Level Water Institutions and Inter-Sector Coordination	Training, Exposure visit, IT Equipment, Research & Studies, HR contracting	Low & limited, health & safety Improved water resource management	Environment & Social awareness building
2. Modernization and Rehabilitation of Irrigation and Drainage Systems and Groundwater Management	Design & Survey, de-silting, canal lining, re-sectioning, control structures, bridges, weirs, sluice, measurement devices, office buildings upgrading, water storage structures (dams). Groundwater management (groundwater assessment and aquifer management plan).	Moderate to high, unsafe construction related, impacts on wetlands, local biodiversity, material handling and storage, labor camps, issues related to safety of dams etc Improved resource conservation	Negative list, screening, mitigation measures, EMP, biodiversity offsets, awareness, compensation, social best practices, labor laws, construction management, capacity building
3. Consolidation and Enhancement of Irrigation Institutional Reforms	Training & Capacity Building, equipment support (earth movers, IT etc.), awareness building, NGO contracting	Low & limited, Social cohesion, equity, transparency, participation, minor civil	Environment & Social awareness building, training, social safety nets, local governance improvement

Component	Nature of planned investments	Potential adverse/positive impacts and intensity	Nature of mitigation
		works Better resource ownership	
4. Enhancing Agriculture Productivity and On-Farm Water Management	Farmer Water Schools, Training & Capacity Building, equipment purchase (laser levelers), land leveling, irrigation equipment, soil testing, IPNM, cropping etc	Moderate to high, pesticide handling & storage, agro-chemicals, health & safety related Improved food security, water resource management, reduced pollution load	Negative list, screening, mitigation measures, EMP, Pest Management Plan, IPM/INM, Environment & Social awareness building
5. Feasibility Studies and Preparation Activities for the Next Phase	Design & survey consultancy, Research & Studies	Low & limited	Environment & Social awareness building
6. Project Coordination and Monitoring	Consultancies, Remote sensing, office equipment	Low & limited	Environment & Social awareness building

6.2 Screening

A screening exercise was carried out to delineate the potential environmental and social impacts due to the components identified in the planning stage. The screening has been carried out based on following three major parameters and eight sub parameters.

1. Adverse impact on:
   - Land Environment
   - Air Environment
   - Water Environment
   - Biological Environment

2. Nature of Impact:
   - Reversible
   - Irreversible

3. Duration
   - Temporary
   - Permanent

A negative score of more than 4 on the above mentioned eight parameters identifies the impact as significant requiring mitigation measures. A negative score of 1 to 4 identifies the impact of medium significance requiring precautionary approach. A score of 0 to 1 identifies the impact as insignificant.

6.3 Categorization of Activities /Components

Categorization of activities/components envisaged in the project has been done and shown in **Table 6.2** based on their extent of adverse environmental and social impacts. Based on Potential

environmental and social impacts associated with each activity/component, these components have been classified under three categories.

Category A: Activity/Components which have major environmental/social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bid document and contractor/implementing agencies has to follow this during construction as well as operation.

Category B: Components which have moderate environmental and social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during construction as well as operation.

Category C: Components which have negligible or nil environmental and social impacts and as such no mitigation measures have been proposed for these activities.

Table 6.2: Categorization of Project Intervention

Socio - Economic Components / Activities	Category A	Category B	Category C
Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination			
➢ Component A1: Operationalizing the State Water Regulatory Commission.			√
➢ Component A2: Strengthening the Knowledge Base and Analytical Capacity for Integrated Water Resources Management.			√
➢ Component A3: Strengthening the Water and Land Management Institute.			√
Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems.			
➢ Component B1: Expansion of Irrigation and Drainage Investments.	√		
➢ Component B2: Modernization of Regulation System and Service Delivery in Phase I Areas.			
o Rehabilitation and Modernization Canal System	√		
o Drainage Rehabilitation	√		
o Lining of Canal	√		
o Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.	√		
➢ Component B3: Groundwater Management Activities.			√
➢ **Component C: Consolidation and Enhancement of Irrigation Institutional Reforms**			
➢ Component C1: UPID Modernization and Capacity Building.			√
➢ Component C2: Water Users Associations (WUAs) Strengthening and Implementing Participatory Irrigation Management.			√
o Hiring of services for formation of WUAs			√
o Awareness and village motivation campaign on PIM			√
o Preparation of landholders list and voter list for selected area			√
o Election of water users' associations for selected area			√
o Registration and handling over of management of irrigation system to the WUAs			√
o Capacity building of UPID and WUAs; Training of PIM cell at division and circle			√

Socio - Economic Components / Activities	Category A	Category B	Category C
○ Construction of office for WUAs	√		
Component D: Enhancing Agriculture Productivity and On-Farm Water Management			
➢ Construction of field channels and other identified on-farm works.		√	
➢ Concurrent Training and Awareness Campaigns for the farmers, water user association, various departmental functionaries and other stakeholders.			√
➢ Agriculture development and allied activities through training & capacity building & demonstration projects. (Refer to World Bank Project Appraisal Document)		√	
Component E: Next Phase			
➢ Feasibility Studies and Preparation Activities for the Next Phase			√
Component F: Project Coordination and Monitoring			
➢ Component F1: Project Activities Coordination Team (PACT)			√
➢ Component F2: Monitoring of Crop Performance using Remote Sensing Imagery.			√

6. 4 Environmental and Social Management Framework

The Environmental and Social Management Plan (ESMP) is described in table 6.3. It details out impacts due to project activities during construction and operation of the project. The ESMP also details the mitigation/ enhancement measures which will be required over and above the project design. Implementation schedule for each of the suggested measures along with the primary responsibility for implementation is also incorporated in the ESMP and an annual environmental and social audit should be carried out to evaluate the performance and effectiveness of ESMF implementation.

6.4.1 Negative list of activities

The project will not finance the following activities:

- Any activity that convert or lead to conversion and/or degradation of significant areas of critical natural habitats (areas officially protected or proposed to be protected) and/or other natural habitats (including wetlands of significance)
- Construction of any new irrigation reservoir dam
- Realignment of any existing canal, branch canal and offtake
- Realignment of any existing drain
- Construction of new canals, branch and offtake
- Construction of any new drain
- Any activity that violates the provisions of applicable National and State laws
- Any activity that is against the provisions of the PIM Act
- Procurement of banned pesticides (Class I and Class IIA & IIB of the WHO list)

6.4.2 Environmental and Social Management Plan

Table 6.3: Environmental and Social Management Plan (ESMP) for Components proposed under UPWSRP Phase II

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
1.	**Component B: Rehabilitation and Modernization of Rohini, Sajnam, Jamini Reservoirs and canal systems in Bundelkhand: (types of activities may include regulators, weirs, canal lining, re-sectioning, de-silting, dam improvements and up gradation)** • Lead to greater surface water availability at tail end thereby reducing dependence on ground water resources in tail end • Lead to preparation & implementation of Crop Plan, which will lead to agriculture intensification & diversification • Lead to greater water availability resulting is increase in net sown area and bringing additional land into agriculture & allied activities • Lead to increased opportunities for sustainable livelihood through agriculture & allied activities thereby arresting changes in occupational pattern; reduction in indebtedness & reduction in risk & vulnerability. Implementation Period: Year 1-3							
2.	Dredging / Desiltation or Excavation	Air / Noise Pollution	A	➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➢ All crusher used in construction should Conform to relative dust emission devices ➢ Low emission construction equipment generator sets and pollution free certified vehicles may be used ➢ Air quality monitoring may be conducted at construction sites.	Contractor	Executive Engineer	Third Party / PACT	C
3.		Water Pollution (Surface Water)	A	➢ Dump solid waste in specified place to minimize contamination of water ➢ Discharge wastewater at authorized locations and after treatment	Contractor	Executive Engineer	Third Party/PACT	C
4.		Seasonal water bodies created on the sides of canals due to seepage will get either reduced due to better drainage.	A	➢ This may be offset by interventions for strengthening existing notified wetlands in the project area.	Contractor	Executive Engineer	Third Party/PACT	C
5.		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills	Contractor	Executive Engineer	Third Party/PACT	C
6.		Trucks Traffic will lead to Air Pollution	A	➢ Pollution Free certified vehicles to be allowed ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation	Contractor	Executive Engineer	Third Party/PACT	C
7.		Worker/Local people exposure	A	➢ Provide safety measures (mask, gloves, hat etc) to minimize exposure ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camps ➢ Child labour must be strictly prohibited ➢ Provide signages near work sites ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure	Contractor	Executive Engineer	Third Party/PACT	C
8.		Disposal of Excavated Material (Soil/Silt/vegetation) will	A	➢ A silt disposal plan with quantum (generated/ utilized/ disposed off) shall be part of contract agreement ➢ Disposal Area shall be pre-identified with due consent of local community prior to initiate work	Contractor	Executive Engineer	Third Party/PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
		lead to Air, Water, Soil Pollution		➢ Quality of silt shall be assessed before disposal ➢ Remove extra silt and vegetation material as soon as possible from site ➢ Dumping of silt/vegetation only in designated place by the engineers to minimize impact on environment ➢ Major Drains (if any) contract agreement shall also have silt disposal plan ➢ Slope of drains/canals shall not be more than 1 m height and 2 m in width ➢ Technical specifications shall be part of contract agreement				
9.		Water Delivery Reduction Interruption	A	➢ Prior water use plan shall be prepared and arrange alternate source of water to fulfil more basic needs	Contractor	Executive Engineer	Third Party/PACT	C
10.	Heavy Machinery Handling and Haulage of Machinery	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
11.		Soil Pollution	A	(Refer Row5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
12.		Worker/Local people exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
13.	Material Handling And Storage	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
14.		Soil Pollution	A	(Refer row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
15.		Worker/Local people exposure	A	(Refer 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
16.	Debris Disposal	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
17.		Water Pollution (Surface Water)	A	(Refer Row 3, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
18.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
19.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
20.		Landscape Degradation	A	➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame waste disposal program ➢ Frame quarry & borrow area rehabilitation program ➢ Develop green belts along approach road ➢ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site	Contractor	Executive Engineer	Third Party/PACT	C
21.	Transport of Materials	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
22.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive	Third	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
						Engineer	Party/PACT	
23.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
24.	Small Tools and Pumps	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
25.	Borrow Materials/ Area	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
26.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
27.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
28.		Soil Erosion	A	➢ Limitation of earth moving to dry periods ➢ Protection of vulnerable areas with mulch ➢ Protection of drainage channels with beams, straw or fabric barriers Installation of sedimentation basins ➢ Seeding or planting of erodible surfaces as soon as possible	Contractor	Executive Engineer	Third Party/PACT	C
29.		Worker/Local people Exposure	A	(Refer Row 7, column 4)	Contractor	Executive Engineer	Third Party/PACT	C
30.		Generation of Excavated Material	A	(Refer Row 8, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
31.		Landscape Degradation	A	Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
32.	Quary Materials/ Area	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
33.		Soil Pollution	A	(Refer Row 5, column 4)	Contractor	Executive Engineer	Third Party/PACT	C
34.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
35.		Worker/Local people Exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
36.		Generation of Excavated Material	A	(Refer Row 8, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
37.		Landscape Degradation	A	(Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
38.	Resettlement & Rehabilitation	Land Acquisition	A	➢ Follow applicable guidelines and policies, in particular World Bank OP 4.12, National R&R Policy 2007, Uttar Pradesh Water Sector R&R Policy 2001, and Uttar Pradesh Land Acquisition Policy 2011. ➢ See Rehabilitation and Resettlement Policy Framework (Annexure 6.2). ➢ Involuntary resettlement and land acquisition will be avoided wherever feasible, or minimized, by exploring all viable alternatives. ➢ Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities will be implemented. Affected Persons will be meaningfully consulted and will have opportunities to participate in planning and implementing the R&R programme.	Contractor	Executive Engineer	Third Party/PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
				➢ Affected Persons will be assisted in improving their livelihood and standards of living ar at least to restore them prior to the beginning of the project. ➢ The transition period will be minimized in the resettlement process. ➢ Completion shall be paid and efforts will be made to complete the R&R before taking possession of land/ properties.				
39.		Impact on local/ tribal communities	A	➢ States policy for tribal community has to be followed if livelihood is going to be affected. ➢ Tribal Development Plan shall be prepared, laying down the detailed procedure for settling land rights The Plan shall contain a programme for development of alternate fuel, fodder and nontimber forest produce (NTFP) resources on non-forest lands ➢ In cases of involuntary displacement of two hundred or more Scheduled Tribes families from the Scheduled Areas, the concerned Tribes Advisory Councils (TACs) may be consulted. ➢ Each affected family that is displaced and has cattle, shall get financial assistance for construction of cattle shed. ➢ Each affected family that is displaced must be provided with a one-time financial assistance of such amount as the appropriate but not less than ten thousand rupees, for shifting of the family, building materials, belongings and cattle. ➢ Each affected person who is a rural artisan, small trader or self-employed person and who has been displaced shall be provided a one-time financial assistance. ➢ Preference to the affected families ➢ at least one person per nuclear family - in providing employment in the project ➢ The affected persons shall be offered the necessary training facilities for development of entrepreneurship, technical and professional skills for self employment. ➢ Offer scholarships and other skill development opportunities to the eligible persons from the affected families	Contractor	Executive Engineer	Third Party/PACT	O
40.	Labour Camps	Worker/Local people Exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
41.		Impact on Human health, especially workers working at construction sites (Labour Camps)	A	➢ Routine medical check up of Field staff and labours ➢ Provision of potable drinking water at site ➢ Provision of proper sewage and waste disposal system. Sanitation facilities have to be provided at the camp sites. ➢ Awareness program on HIV Aids and other communicable disease may be provided to the work force. ➢ First aid facilities to be provided at the construction camps. Any case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellant to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. ➢ Proper ventilation may be provided in labour camps ➢ Sufficient fuel may be provided to the work force at campsite. Alternate	Contractor	Executive Engineer	Third Party/PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
				arrangement for fuel such as provision of LPG, Kerosene etc. to be provided to the camp ➢ Head phones, ear plugs to be provided to the workers at construction site. ➢ All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective eye shields ➢ Adequate precaution must be taken to prevent danger from electrical equipments				
42.	Hot Mix Plant	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
43.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
44.		Worker/Local people Exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
45.	Concrete Mixture and Heavy Pumps	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
46.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
47.		Worker/Local people Exposure	A	(Refer Row 12, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
48.	Temporary Land Acquisition	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
49.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
50.		Worker/Local people exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
51.	Tree Felling, Vegetation Clearance	Landscape Degradation	A	(Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
52.		Impact on Flora	A	➢ Frame compensatory afforestation plan ➢ If any rare and endangered species present in the area frame conservation plan for the species ➢ Encourage farming of medicinal plants found in the area Distribute fruit plants grown in the region ➢ Plantation with native species along dam periphery, approach road and colony area ➢ Protection/fencing of planted area, provision of guard for three year ➢ Location of camp away from forest area.	Contractor	Executive Engineer	Third Party/PACT	O
53.		Soil Erosion	A	(Refer Row 28, Column 4)	Contractor	Executive Engineer	Third Party/PACT	O
54.	Sheds to keep Machines and Tools	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
55.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive	Third	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
						Engineer	Party/PACT	
56.		Worker/Local people exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
57.		Landscape Degradation	A	(Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
58.		Generation of Debris /waste material	A	➢ Identification of debris disposal site to minimize the impact on environment and local people. ➢ Debris disposal site should be located at least 500m away from any human settlement and prior NoC has to be obtained from the State Pollution Control Board before duping debris on the identified site. ➢ Debris can be used as filling material or river embankment protection material.	Contractor	Executive Engineer	Third Party/PACT	C
59.	**Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.**							
60.	May require land							C
61.	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
62.	Heavy machinery	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	(Refer Row 7, Column 4) (Refer Row 5, Column 4) (Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
63.	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
64.	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
65.	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
66.	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation	A	(Refer Row 2, Column 4) (Refer Row 3, Column 4) (Refer Row 5, Column 4) (Refer Row 6, Column 4) (Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
67.	Transport of	➢ Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive	Third	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
	materials	➢ Soil Pollution ➢ Trucks Traffic will lead to Air Pollution		(Refer Row 5, Column 4)		Engineer	Party/PACT	
68.	**Component C: Consolidation and Enhancement of Irrigation Institutional Reforms**							
69.	Construction of office for WUAs in project areas area (if applicable)		A					C
70.	May require land						C	
71.	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)	A	(Refer Row 7, Column 4) (Refer Row 41, Column 4)	Contractor	Executive Engineer	C	C
72.	Heavy machinery	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
73.	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
74.	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
75.	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
76.	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation	A	(Refer Row 2, Column 4) (Refer Row 3, Column 4) (Refer Row 5, Column 4) (Refer Row 6, Column 4) (Refer Row 20, Column 4)	Contractor	Executive Engineer	C	C
77.	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Trucks Traffic will lead to Air Pollution	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 6, Column 4)	Contractor	Executive Engineer	C	C
78.	**Component D: Agriculture Water Use and Productivity Efficiency Improvement Program & On Farm Management.**							
79.	Construction of small scale on-	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
	farm development works (e.g. field channels, subplots)							
80.		Water Pollution	B	(Refer Row 3, Column 4)	Contractor	WUA	EE / PACT	C
81.		Soil Pollution	B	(Refer Row 5, Column 4)	Contractor	WUA	EE / PACT	C
82.		Trucks Traffic will lead to Air Pollution	B	(Refer Row 6, Column 4)	Contractor	WUA	EE / PACT	C
83.		Worker/Local people exposure	B	(Refer Row 7, Column 4)	Contractor	WUA	EE / PACT	C
84.		Disposal of Excavated Material (Silt/vegetation)	B	(Refer Row 8, Column 4)	Contractor	WUA	EE / PACT	C
85.		Water Delivery Reduction Interruption	B	Prior water use plan shall be prepared and arrange alternate source of water to fulfil more basic needs	Contractor	WUA	EE / PACT	C
86.	Material Handling And Storage	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
87.		Landscape Degradation	B	(Refer Row 20, Column 4)	Contractor	WUA	EE / PACT	C
88.	Transport of Materials	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
89.		Soil Pollution	B	(Refer Row 5, Column 4)	Contractor	WUA	EE / PACT	C
90.		Trucks Traffic will lead to Air Pollution	B	(Refer Row 6, Column 4)	Contractor	WUA	EE / PACT	C
91.	Small Tools and Pumps	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
92.	Resettlement & Rehabilitation	Land Acquisition	B	(Refer Row 38, Column 4)	Contractor	WUA	EE / PACT	C
93.		Impact on local/ tribal communities	B	(Refer Row 39, Column 4)	Contractor	WUA	EE / PACT	O
94.	Temporary Land Acquisition	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
95.		Soil Pollution	B	(Refer Row 5, Column 4)	Contractor	WUA	EE / PACT	C
96.		Worker/Local people exposure	B	(Refer Row 7, Column 4)	Contractor	WUA	EE / PACT	C
97.	Tree Felling, Vegetation Clearance	Landscape Degradation	B	(Refer Row 20, Column 4)	Contractor	WUA	EE / PACT	C
98.		Impact on Flora	B	➢ Frame compensatory afforestation plan ➢ If any rare and endangered species present in the area frame conservation plan for the species ➢ Encourage farming of medicinal plants found in the area Distribute fruit plants grown in the region ➢ Plantation with native species along dam periphery, approach road and colony area ➢ Protection/fencing of planted area, provision of guard for three year	Contractor	WUA	EE / PACT	O

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
				➢ Location of camp away from forest area.				
99.		Soil Erosion	B	(Refer Row 28, Column 4)	Contractor	WUA	EE / PACT	O
100.	Sheds to keep Machines and Tools	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	O
101.	Agriculture Development on farm demonstrations	Water losses through seepage	B	➢ Field Bunding, Alternate cropping pattern and usage of water conservation technologies	WUA	Executive Engineer	PACT	O
102.		Water Pollution	B	➢ Usage of IPN / IPNM Reduction in use of chemical fertilize & pesticides	WUA	Executive Engineer	PACT	C
103.		Soil Pollution	B	➢ Usage of farm yard manure / biofertilizers. Usage of IPN & IPNM Reduce consumption of chemical fertilizer & pesticides.	WUA	Executive Engineer	PACT	C

Note: Column 8 indicates Stage C- Construction, Stage O- Operation

6.4.3 Environmental Management Plans

The mitigation / enhancement measures include specific environment management plans (EMPs) (given in annexure 6.1) which need to be implemented.

The following EMPs are included:-

1. ***Construction Camps Plan (Annexure 6.1.1)*:** During implementation phase, a large labor population is likely to influx in the project area. An Environmental Management Plan for construction camp has been formulated to control degradation of the surrounding landscape due to the location of the proposed construction camp. The Contractor must provide, erect and maintain necessary living condition and ancillary facilities at the camp and all this must be included in contract document provided to the Contractor.

2. ***Waste Management Plan (Annexure 6.1.2)*:** Waste generated from construction activities comprise of wood, reinforcement steel left over, pipes, bolt, nails, concrete bricks, electrical cutting, equipment parts etc. Domestic waste includes food containers such as beverage cans, coffee /tea cups wrapping papers, plastic, leftover food, glass etc. An Environmental Management Plan has been prepared and the Contractor must provide all facilities at the construction site.

3. ***Construction plants & equipment management Plan (Annexure 6.1.3)*:** During execution of the project, construction equipments, machinery and plants always have impact on the environment. The impact can be due to the emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. An Environmental Management Plan has been prepared and the Contractor must provide all facilities at the construction site.

4. ***Fertilizer & Pesticide Handling & Storage Plan (Annexure 6.1.4)*:** A fertilizer & pesticide handling & storage environmental management plan has been prepared. This plan addresses issues arising from the improper handling and storage of these chemicals.

5. ***Pest Management Plan (Annexure 6.1.5)*:** The project interventions might results in increased use of fertilizer and pesticides in the command area. A pest management plan, incorporating stakeholders recommendations, has been prepared for sustainable use of pesticide.

6. ***Nutrient Management Plan (Annexure 6.1.6)*:** The most appropriate strategy for increasing fertilizer use efficiency is to practice NMP. The basic principle of NMP is the maintenance of soil fertility, sustaining agricultural productivity and improving farmers' profitability through the judicious and efficient use of mineral fertilizers, organic manures and bio-fertilizers. The INMP package has area-specific implications depending upon the availability and performance of the various components. A management plan has been prepared for sustainable use of pesticide.

7. ***Health & Safety Management Plan (6.1.7)*:** The safety and health concerns of the workers and the general public can be impacted due to the hazards created by construction activities. An Environment Management Plan for Public and Worker's Health and Safety has been prepared to describe the hazards and necessary mitigation measures.

8. ***Cultural Properties Plan (Annexure 6.1.8)*:** Cultural properties can be located close to the service road might be impacted by construction activities. Most of the properties are avoided in general during interventions. A detailed Environment Management Plan has been prepared to avoid any impact.

9. ***Tree Plantation Plan (Annexure 6.1.9)*:** The system rehabilitation and modernization is unlikely to involve any need for vegetation cleaning or trees felling. This EMP provides for a specific plan for tree plantation.

10. ***Silt Disposal Plan (Annexure 6.1.10)*:** This plan procedure is required for handling, reuse and disposal of silt during construction.

11. ***Biodiversity Offset Plan (Annexure 6.1.11)*:** Canal rehabilitation would improve irrigation service delivery and reduce seepage and water loss. This could adversely impact formation of seasonal small and nondescript wetlands that provide localized habitats for amphibians and birds (waders, kingfishers and bee eaters). A detailed Environment Management Plan has been prepared to avoid and mitigate impacts.

12. ***Canal Rehabilitation Plan (Annexure 6.1.12)*:-** A detailed Environment Management Plan has been prepared to avoid impact of canal rehabilitation.

13. ***Resettlement Policy Framework and Action Plan (Annexure 6.2)*:** The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). However, in the rare event that this is required, the provisions of the Bank OP 4.12 with the UP State R&R Policy will be applied.

6.5 Dam Safety & Related Issues

An independent evaluation of the safety of the three dams in the project area was carried out in November 2012 and its findings are summarized below (Sources: Independent evaluation of dam safety carried out in November 2012, field visits, review of pre-monsoon and post-monsoon inspection reports, meetings with survey and design consultants and UPID officials).

Overall, there are minimal risks in relation to dam safety. Over the past five years, no serious damages were observed during pre-monsoon and post-monsoon inspections. The findings of the Survey & Design consultants indicate seepage appearing on the downstream face of the masonry dam, which could be a problem of concern. Looking at the present good shape of the earth and masonry sections of the three dams, and in absence of indication of any serious distress, the dams as of today, appear to be structurally safe.

The three dams are hydraulically safe since they are designed to cater to higher "estimated maximum flood" in comparison to "maximum flood" observed during last 25 to 28 years. No serious damage to the three dams has been reported.

Presently no existing dam safety deficiencies are recognized for normal loading conditions.

Major recommendations

- UPID should review the design floods for these reservoirs using latest guidelines of the Central Water Commission (CWC) and reevaluate the adequacy of the spillways provided in these three dams and take remedial measures if required. This assessment and rehabilitation measures should be undertaken during project implementation.

- The safe performance of the three dams should be evaluated by the design consultant under all anticipated loading conditions, including such events as the MCE (maximum credible earthquake) and the revised / reviewed estimated peak flood and suitable modifications as required should be carried out as part of the rehabilitation/modernization under UPWSRP II.

- Activities of State DSO have to address shortcomings in maintenance and provide for improvements in operation of dams which would allow safe operation of these dams under varied hydraulic and hydrologic conditions.

- The dams require need based O & M plans operationalized. For this, detailed operation and maintenance manuals, regular inspections and development of information technology and analysis tools to generate, collect, evaluate, monitor and disseminate data of dam safety and operations are required.

- It is necessary to set up modern instrumentation to monitor dam behavior as well as hydrologic and hydraulic features such as inflows, outflows, water levels in the reservoirs and canals. These data would be transmitted on a real-time basis to central control and field offices.

- Emergency preparedness plans, disaster management / mitigation plans are to be prepared and kept ready for implementation to meet the eventualities.

Current dam safety organization at UPID can be further strengthened. A description of the organization structure for dam safety is given in section 3 of Annexure 6.3. The environmental and social cell can also contribute to this.

6.6 Analysis of Alternatives

Since the second phase is effectively an on-going modernization and rehabilitation of existing irrigation and drainage infrastructure in the State, there is a limited scope for considering alternatives to achieve intended development objectives. One alternative considered, but rejected was to create new irrigation infrastructure in the targeted areas. This would lead to major social and environmental impacts considering the baseline situation in the project areas. Instead, interventions focused on rehabilitation and modernization of existing irrigation infrastructure would have limited impacts only. Besides, learnings from the first phase are applied under Phase II to improve the interventions. A No Project scenario was also considered but rejected, as there is a dire need to improve irrigation service delivery and increase farm productivity to ensure food security, as well as reform the water resources management to meet the demands of a fast growing population. Another alternative considered and adopted is to invest in groundwater management to pilot real time conjunctive use of the two

irrigation approaches. Conjunctive use is a potential management option in areas where both surface water and groundwater are amply available. A dual roster for groundwater and surface irrigation water may be an effective option for improving water resource sustainability in irrigation commands. This has been incorporated as its own project sub-component.

Analysis of the no project versus with project scenario is presented in **Table 6.4.**

Table 6.4: Analysis of No Project versus With Project Scenario

No Project Scenario	With Project Scenario
– Existing inefficient system will continue with environmental & social problems. – Lower agriculture productivity – Poor Participatory Irrigation Management – No new technologies use – Inefficient & unsustainable Water Resource Management – Unsafe irrigation structures – Limited knowledgebase – Poor Pest Management – Poor Nutrient Management Plan – Poor Soil Quality – Poor Water Quality – Unbalance Fertilizer use	– Improved, sustainable & efficient water delivery system – Participatory Irrigation Management – Improved agriculture productivity – Improved drainage system – Improved knowledgebase for implementing efficient water resource management system – Possible increase in fertilizers and pesticides use, but mitigated through Farmer Water Schools approach – Short term environmental impact during construction may take place but risk factor will reduce and better water management system will emerge – Safer dam operation and irrigation operation can be achieved. –

6.7 Implementation of the Environmental and Social Management Framework

The ESMF will be used by the project authorities for incorporation of environmental and social safeguards in the planning, execution and operation stages of each sub-project activity. A step-by-step methodology is provided along with engineering and institutional interventions required for the project activities.

6.7.1 Implementation mechanism

A schematic diagram for implementation of the ESMF is provided in figure 6.1 and the procedure to follow is described below. An environmental and social cell headed by an environmental expert equivalent to the rank of executive engineer is proposed to be established in PACT supported by a social expert. The cell will assist in implementation of ESMF at each stage described below. Proposed organization structure & the roles & responsibility of the staff is described in Annexure 6.3.

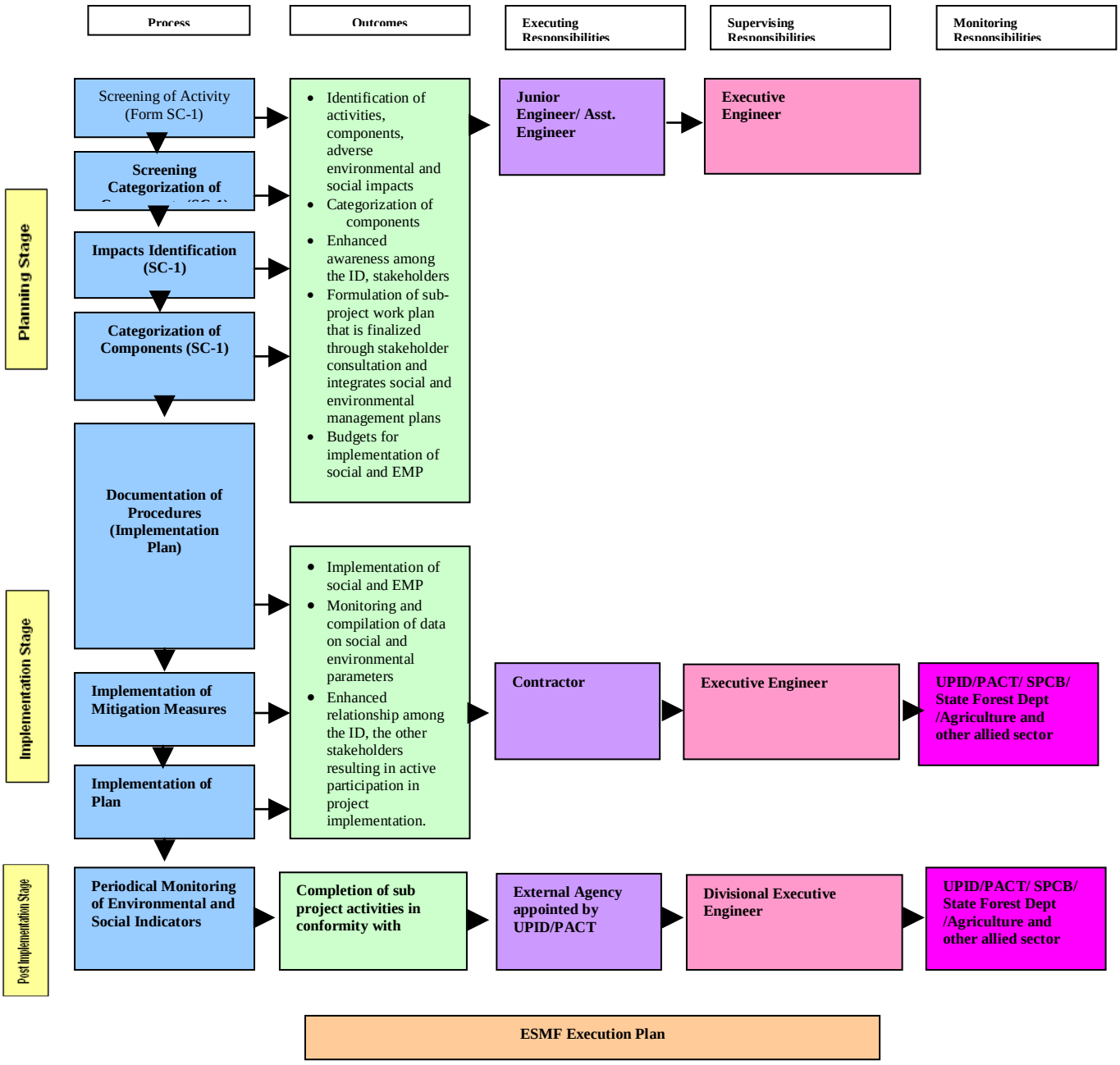


Figure 6.1: ESMF Execution Mechanism

Planning Stage

For each activity, the concerned State/Circle level PMUs will use a template (Form SC-1) during the investigation and preliminary design stage to provide detailed information on technical, environmental, social, and all implementation-related aspects of the activity. The State/Circle level PMU will incorporate in this template the essential elements from the environmental and social screening templates prepared. Based on the review of the templates, a final categorization of each of the sub-project activity will be made. The activities that have no major environmental or social issues can have the designs finalized and be tendered. For the activities where there may be major

environmental or social issues, a site specific EA/EMP be prepared. In this rare case of application of EIA notification 2006, the EA/EMP proposed will require public hearing and disclosure as per this EA/EMPs notification. A copy of this notification is given in Annexure 2.1.These will be integrated in the bidding documents of contractors.

The social and environmental specialists, PACT, will review the Form SC-1.

The checklist below shows the steps to be undertaken and responsibilities in the planning stage.

Checklist for Screening and Mitigation

Sr. No.	ESMP activities	Who will be Involved	Coordinator	Review
1	Screening of sub-project Activities through Screening Format (Form SC-1)	Irrigation Department (ID) and Other Line Department	Executive Engineer	Social and environmental specialists, PACT
2	Screening of components associated with each activity through Table 6.5			
3	Identification of adverse environmental impacts associated with execution of each component (Table 6.5)			
4	Categorization of components through table 6.5			
5	Identification of suitable mitigation measures for each adverse impact on natural and social environment caused by each component with the help of Table 6.5			
6	Integration of Form SC-1 and relevant EMPs in the bidding documents.			

The outcome of the planning stage is the following:

- Identification of activities
- Identification of components
- Identification adverse environmental and social impacts
- Identification and categorization of components to be undertaken in each sub-project
- Enhanced awareness among the ID, stakeholders resulting in active participation
- Formulation of sub-project work plan that is finalized through stakeholder consultation and integration social and environmental management plans
- Budgets for implementation of social and environmental management plans
- Integration of Form SC-1 and EMPs in the bidding documents

Implementation Stage

The primary tasks in this stage are implementation of proposed social and environmental management plans for sub-project following the checklist shown in **Table 6.5.**

Table 6.5: Checklist for ESMP Activities – Implementation

activities	Who will be Involved	Co-ordinator	Overall monitoring
Procurement of documents, procedures followed and contracts awarded & equipment procured	Contractor, Implementation agency	Engineers from Irrigation Department/ other Implementing agencies	Social and environmental specialists, PACT, assisted by Third Party Quality Supervision Consultant and Monitoring and Evaluation Consultant
Implementation of the social and environmental management plans as Proposed in the Mitigation measures and EMP.	Contractor, Implementation agency, Authorized consultants	Engineers from Irrigation Department/ other implementing agencies	
Monitoring and evaluation of social and environmental parameters as identified in the Mitigation measures and EMP. Special attention will be paid to ensure that no child labor (as per the GoI) is involved in the construction activities The dam site officials may monitor contract works or authorize the consultants to monitor processes and impacts at sub project level. However the consolidated monitoring and learning (M & L) report will be furnished by EE, In charge of Project to designated project authority i.e. CE, In-charge, and finally to Division	Contractor, Implementation agency, Authorized Consultants	Engineers from Irrigation Department/ other implementing agencies	

Outcomes of Implementation Stage:

- Implementation of social and environmental management plans
- Monitoring and compilation of data on social and environmental parameters
- Enhanced relationship among the ID, the other stakeholders resulting in active participation in project implementation.

Post-Implementation Stage

The primary tasks in this stage are to monitor and assess the long-term impacts of the project (through Impact Indicators) and draw lessons from the success and failures, for improvement of subsequent sub-project interventions. Compliance of ESMP provisions has to be ensured through third party monitoring for verification of the sub-project completion report. The Formats for monitoring the above parameters would be developed by PACT. Validation should be carried out before finalizing.

Outcome of Post Implementation Stage:

- Verification of completion of sub project activities in conformity with ESMP.

It should be noted that the ESMP is a live document which has been developed considering all common major activities associated with sample sub-projects. It can be improved, upgraded or modified at sub-project level as per the site specific requirement and their mitigation measures.

6.7.2 Template for screening activities at the planning stage

Form SC-1 helps identify the specific activities concerned for development of the ESMP and screen out the other activities. The Form lists the potential impacts from the activity, identifies mitigation measures, and entities responsible for execution, supervision and monitoring of the mitigation measures.

Form SC 1: Screening of Environmental and Social Impacts & Mitigation Measures

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 6.5 & write Impacts	If Yes please refer column 4 of table 6.5 & write mitigation measures	Execution, Supervision, Monitoring responsibility (Refer Table 6.5, columns 5, 6, 7 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category A					
➢ Rehabilitation and Modernization of Canal System.			Row 1 to 58	Row 1 to 58	Row 1 to 58
➢ Dainage Rehabilitation			Row 1 to 58	Row 1 to 58	Row 1 to 58
➢ Lining of Canal			Row 1 to 58	Row 1 to 58	Row 1 to 58
➢ Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.			Row 59 to 67	Row 59 to 67	Row 59 to 67
➢ Construction of office for WUAs in phase I area (If envisaged in Project)			Row 68 to 77	Row 68 to 77	Row 68 to 77
➢ Construction of office for WUAs in Phase II area (If envisaged in Project)			Row 68 to 77	Row 68 to 77	Row 68 to 77
Category B					
➢ Construction of field channel.			Row 79 to 100	Row 79 to 100	Row 79 to 100
➢ Rehabilitation of surface drainage system, including field drainage.			Row 79 to 100	Row 79 to 100	Row 79 to 100
➢ Agriculture development and allied activities through training & capacity building & demonstration projects. (Refer to World Bank Project Appraisal Document for specific activities)..			Row 101 to 103	Row 101 to 103	Row 101 to 103

Submitted	Checked	Reviewed	Approved
Signature……..	**…….**	**……..**	**…….**
Name……	**…….**	**……..**	**……..**
Designation……..	**……..**	**……**	**……..**
Contractor	**Assistant Engineer**	**Social and environmental Specialists, PACT**	**Executive Engineer**

Chapter 7: IEC Strategy, Capacity Building & Training & Monitoring & Evaluation

7.0 Introduction

As part of social & environmental management plan, information, education & communication strategies (IEC), training & capacity building and monitoring & evaluation plans have been prepared. Each of these items is described in following sections.

7.1 Need for Information, Education and Communication Strategy

In order to ensure effective participation of various stakeholders and for achieving the desired project objectives, there is a need to ensure effective two way knowledge – between the project and project communities. Sharing of information is required at various levels and on different aspects of the project. As part of SEMF, an attempt was made to assess the existing communication among stakeholders and the type of information shared based on which Information, Education and Communication (IEC) strategy has been prepared with clear timelines and roles and responsibilities of concerned stakeholders. Broad objectives of IEC include: awareness generation and motivation, technology dissemination, developing the information system, improving access to project information, and educating the stakeholders. The task of educating and communicating the target people, especially beneficiary farmers, is quite challenging due to their literacy/educational level and access to and use of modern communication sources. There is lack of reasonable ability to read and understand printed material with narration among the farmers and other people of rural areas even though mobile phone penetration is increasing exponentially. Moreover, people's access to electronic media is also limited in the rural areas. Thus, there is a need for the project to evolve suitable IEC strategy and make available required information, in the form and time, which could help project stakeholders. The IEC strategy discussed here intends to cover mainly environmental and social aspects of the project implementation.

7.2 Generation of information and knowledge base

In addition to the information that is required to be made available to seeking it under National Right to Information Act, the foremost task in the IEC is to generate an information and knowledge base on the basis of which environmental & social education and communication could be undertaken. In this regard, the suggested strategy is presented in **Table 7.1.**

Table 7.1: Suggested strategy and framework for IEC

Thematic area	Target audience	Contents	Form of knowledge material
Information on social aspects	(i) Vulnerable groups (VG) (ii) Members of **PRIs**, WUA, SHGs, **NGOs** and other groups. (**to also focus on religious leaders, person of eminence and respect in the community)**.	- Extent of loss **arising out of the proposed intervention.** - Project benefits particularly for the VG (for eg: **landless, small and marginal farmers, BPL etc.)** - Project information.	- Printed documents along with pictographs. - Pamphlets and booklets. - **CDs, DVDs etc.** - Public display of affected families and their entitlements.
Social conflict resolution mechanisms	(i) Headquarter level officers of UPID/PACT and line departments. (ii) Division /District level officers of the project and line departments **including the police.** (iii) Field staff of the project and line departments. (iv) Functionaries & representatives of PRIs, NGO and others. (**to also focus on religious leaders, person of eminence and respect in the community)**. (v) Members of WUA, SHG and marketing groups. (vi) **Judges, Lawyers and other members of the legal fraternity.**	- Description of social conflicts arising in rural areas including economic, institutional and legal. - Description of existing resolution system in different socio-economic settings **(for eg: any mechanism developed by the Dept. of Social Welfare, other concerned departments, NGOs, individuals etc.)** - Applicability of such resolution system in other socio-economic settings. - Information on project implementation – activities and beneficiaries. - **Analysis of legal vis-à-vis traditional resolution systems for better understanding.**	- Printed documents along with pictographs. - Pamphlets and booklets. - Sharing of information in the meetings of various institutions. - **Print media especially local newspaper, electronic media like local TV channels, mobile applications like sms, 24 hour helplines etc.** - Availability if wage employment announced in village meetings and in groups. - **Organizing '*goshtis*', workshops, melas etc. for information dissemination and awareness on a mass scale.**
Social risks	(i) Headquarter level officers of UPID/PACT and line departments. (ii) Divisional/District level officers of the project and line departments **including the police.** (iii) Field staff of the project and line departments. (iv) Village institutions – PRIs, WUA and other groups. (v) Project beneficiaries.	- Description of various social risks to implementation of the project activities. - Ways and means to reduce/mitigate such risks **(especially if any of them have been tried and tested previously by any Govt. dept. or NGOs, individuals etc.)** - Suggested precautions - **Description of social risks that are likely to happen post project implementation.**	- Printed document. - Pamphlets and booklets. - List of beneficiaries and their benefits are publicly displayed in villages. - Making available information in various meetings. - **Print and electronic media such as local newspaper, short documentary films etc.**

Thematic area	Target audience	Contents	Form of knowledge material
	(vi) Judges, Lawyers and other members of the legal fraternity.	**- Possible ways and means to resolve such crises.** - Dates **(and standard agenda if possible)** of the meetings of various institutions. - List of beneficiaries and the type of benefits.	
Participatory decision making	(i) Headquarter level officers of UPID/PACT and line departments. (ii) Divisional /District level officers of the project and line departments **including the police.** (iii) Field staff of the project and line departments. (iv) Functionaries/ representatives of Gram Panchayat, NGO and others (**to also focus on religious leaders, person of eminence and respect in the community)**. (v) General villagers especially **women, the landless, small and marginal farmers, SCs, OBCs,** the farming community.	- Preparation of work breakdown structure for the project components along with delineation of roles and responsibilities of each level of project management. - Delineation of primary and secondary implementing responsibilities along with schedule and quality standards. **- Clarification in case work breakdown structure under the project are in conflict or in duplication with the conventional administrative structure.** - Delineation of activities with **clear cut mention of the roles of beneficiaries, WUAs, Gram Sabha etc. seeking there** proactive involvement in planning, implementation and monitoring and evaluation. - Description of participation process for the concerned activities **with focus on the integrated village planning process to avoid duplication of planning exercises.**	- Descriptive documents along with matrix of roles and responsibilities. - Schematic exhibition of participatory process and participatory structure especially for the illiterate. - Pamphlets, booklets and handouts in the local dialects. **- Extensive use of print and electronic media such as local newspaper, cable TV channels etc.** **- Organizing '*goshtis*', workshops, melas etc. for information dissemination and awareness on a mass scale.** **- Wall paintings.**
Environmental awareness	(i) Headquarter level officers of UPID/PACT and line departments. (ii) Divisional/District level officers of the project and line departments. (iii) Field staff of the project and line departments. (iv) Functionaries/ representatives of Gram Panchayat, NGO and others. (v) General villagers with **focus on religious leaders, person of eminence and respect in the community, women, landless, small and marginal farmers,**	- Interaction between project activities and the environment including air, water and soil. **- An account of previous / past positive and negative impacts of similar interventions.** - **Probable** positive and negative impacts of the project activities on the environment - Proposed measures for enhancing the positive impacts **and reducing the negative affects** along with primary, supervisory and policy-making	- Printed material in descriptive form. - Project activity wise positive and negative impacts along with proposed measures, implementation responsibility and expectations from stakeholders in form of matrix for easy understanding of the information. - Expectations from farmers and general villagers should be

Thematic area	Target audience	Contents	Form of knowledge material
	SCs, OBCs and the farming community. **(vi) Judges, Lawyers and other members of the legal fraternity.**	responsibilities for these measures. - Proposed mechanism for monitoring and evaluation of various impacts and measures **at various levels of policy making and implementation.** - Expectations from / responsibilities of each and every stakeholder.	straight forward in language and form. - **Use of electronic and print media, mobile applications etc.** - **Organizing '*goshtis*', workshops, melas etc. for information dissemination and awareness on a mass scale.** **- Wall paintings.**
Monitoring and Evaluation	(i) Headquarters level officers of UPID/PACT and line departments. (ii) Divisional/District level officers of the project and line departments. (iii) Field staff of the project and line departments. (iv) Functionaries/ representatives of Gram Panchayat, NGO, WUA and others. (v) General villagers and farming community including women	- Documentation of project activities, targets, timelines, primary and secondary responsibilities for implementation of various measures to improve environmental and social performance of the project and expected output, outcome and impacts. - Timelines for monitoring and evaluation Compliance review mechanism	- Printed material in matrix form. - **Clear pictorization / elaboration in local dialect about the outcomes of the project and community monitoring tools like social audit.** **- Display of such information on the Gram Panchayat building and other prominent places like community centres, choupals etc.**
Inter-departmental coordination / convergence	(i) Headquarters level officers of UPID/PACT and line departments. (ii) Divisional/District level officers of the project and line departments. (iii) Field staff of the project and line departments. (iv) Functionaries/representatives of Gram Panchayat, NGO, WUA and others. (v) General villagers and farming community including women		

Entire information base suggested above should be preferably generated in a single document so that officers and functionaries of UPID, PACT and line departments could access it easily. This should also be made available in the website of UPID/project. However, a separate document in form of booklet should be designed and developed for the rural farming community especially keeping in mind the illiterate and semi-literate population. While the knowledge material for officers and functionaries could be in English and Hindi, the material for farmers must be in Hindi language preferably in the local dialect.

Since the project envisages inter-departmental coordination and convergence between various schemes, funds could be easily leveraged for village information centres either at each Gram Panchayat level or at a cluster of Gram Panchayats depending on accessibility, population etc. Such an information centre can also be an extension of the Gram Panchayat building which can also house events such as WUA meetings, stakeholder consultations etc. The Backward Regions Grant Fund can be used utilized for construction of Block Resource Centres / Panchayat Resource Centres / Rajiv Gandhi Sewa Kendras which can be the store house of all IEC materials and other relevant information. The Bharat Nirmaan Volunteers (BNV) – a scheme promoted by the Ministry of Rural Development can be used for activities like awareness generation, people's participation, social audit, grievance redressal, vigilance and monitoring etc. Similarly, provisions under other flagship programmes should be explored and where possible should be brought on board under this project to avoid duplication of resources and effective utilization of the existing resources.

7.3 Strategic Communication

The policymakers and government officials would be a primary audience for the purpose of building support for the project, especially in terms of continued financing after implementation is complete. To fulfill above objectives, the strategy would include regular briefing and updating them through meetings, a newsletter, Brochures, Fact Files and communication materials which they can distribute to the visitors at their respective offices. Beyond policy makers, scientist, technocrats, NGOs and opinion leaders will also be informed, educated and communicated through various tools. Some important modes and tools are as follows:

- *Face to Face meetings***.** State level expert meetings will be periodically organized to maintain ties with policymakers to build a positive sense of ownership. In addition, regular meetings of Circle Officers, Divisional Officers, and line department officials will also be held for strategic communication and effective implementation and review of the project.
- *Brochures*. Concise, understandable and attractive brochures will be prepared to provide an overview of the project, summarize project progress, tell the success stories and also not so successful instances of the project, beneficiaries and explain various issues relevant to water sector.
- *Fact File***.** A glossy fact file containing data of water projects will be prepared and circulated to politicians, policymakers and visitors to the project area.
- *Newspaper Articles and Editorials***.** A wide spread newspaper coverage of project can raise public awareness of water sector issue and plight of poor farmers. Editorials,

explaining to the urban population the plight of those who grow food for them, will also be published.

- *Case Studies***.** The case study based on MIS data will be an effective way to communicate non-specialist audience.
- *Technical manuals*. All technical guidelines and procedures will be prepared for LGC / PLGC areas in form of technical manuals for the benefits of NGOs, universities scholars, developmental staff etc.
- *District Level multi-stakeholder workshops* – These could be formal workshops where state level policy makers interact directly with field level implementation staff and select community members. There can also be public hearings at suitable locations wherein policy makers get a first hand experience of the situation and are able to take corrective actions or explore participatory ways of conflict resolution. These workshops can be on a quarterly / half yearly basis depending upon the pace of implementation of the project.

Some specific suggestions for improving communication on environmental and social aspects are given below:

- Each communication material (mainly printed) should have a separate section on environmental and social aspects.
- Field staff, PRI members, WUA's and NGO workers should be particularly oriented on environmental and social issues. They should be provided adequate literature for further distribution among the general farmers and beneficiaries as well as display them at prominent locations for the information of all.
- As the experience of Water conservation campaign (Amrit Jaldhara) in Aurangabad district of Maharashtra under the National Agriculture Technology Project shows wall paintings can prove quite effective in sensitizing farmers on environmental aspects.
- Capacity building of Gram Panchayat especially the standing committees (through trainings, providing untied funds and personnel) and their subsequent involvement in creating awareness on environmental and social issues will be very effective as they will be able to reach out to the entire population.
- Subsequent capacity building and orientation of the Zilla Panchayat and Block Panchayat representatives on social and environmental issues can help strengthen such initiatives.
- The current system of *Sinchai Bandu* at the district wherein the ZP President presides over a monthly meeting of line department officials of irrigation, agriculture and allied departments should be regularized across al the districts and participation of GP, WUA representatives and beneficiaries should be ensured.
- Project should also promote Kisan Mitra and Mahila Kisan Mitra as environmental and social messengers. They should be adequately trained and sensitized on these issues so that could further communicate with other farmers.
- Special-purpose cultural troupe should be mobilized to organize cultural programs on environmental and social aspects. This media is likely to be more effective in sensitizing people.
- Krishi Vigyan Kendras to be supported with innovative means of communication and updated with information from irrigation, agriculture and allied departments so that they are able to communicate the same to the beneficiaries and extension workers.

- The communication system for the project including environmental and social aspects should be dynamic in nature. It should be continuously improved and updated with additional knowledge resources and tools and techniques on the basis of implementation experience and feedback from implementation partners.
- The communication strategy itself should be reviewed periodically – atleast once in 6 months to ascertain its efficacy and suggestions from all stakeholders like line departments, media groups, NGOs, PRIs, Community members should be elicited to improve the same.

A summary of communication tools which can be used is presented below in **Table 7.2**.

Table 7.2: Summary of communication tools

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
Beneficiaries	Operational	• Project rules, roles, responsibilities. • Benefits of participation. • Clarity of roles of PRI, WUAs and other CBOs. • Guide to conflict resolution. • Right to information • Technical knowledge on land management (agriculture) • Opportunities for income generation (livelihoods) • Other programs that can meet their needs (dovetailing)	• Traditional theater • Posters • Village meetings • Newspaper • Radio ads/shows • TV ads • SMS technology (for extension messages) • Wall paintings • Citizen's charter in the Gram Panchayat Bhavan.
Policymakers	Strategic	• Project progress • To maintain Tie and build ownership • To show project impacts • To flag deviations, risks and concerns for timely action. • Oppurtunities of convergence between departments / schemes / programmes for maximum results.	• Meetings • Brochures • Fact File • Documentaries • TV/radio • Case studies – highlighting good practices and failures. • Technical manuals.
Opinion Leaders, Academia	Strategic	• Project progress • To maintain Tie and build opinion • To show project impacts • Influencing policy	• Meetings • Brochures • Fact File • Documentaries • TV/radio • Case studies
Government officials (practitioners)	Operational	• Project rules, roles, responsibilities • Benefits of participation • Right to information • Technical knowledge on land management related issues • To flag deviations, risks and concerns for timely action. • Oppurtunities of convergence between departments / schemes / programmes for maximum results.	• Meetings • Circulars • Brochures • Community interactions like *Goshtis*, public hearings etc. • Print and Electronic media •

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
NGOs	Operational	• Project rules, roles, responsibilities • Benefits of participation • Right to information • Technical knowledge on land management related issues • Awareness' campaign • Legal issues	• Meeting • Extension Literature • Audio/Video • Wall paintings • Social audit and public hearings • Policy and legal documents
Legal fraternity	Operational	• Project rules, roles and responsibilities. • Legal framework. • Stakeholders. • Right to Information. • Technical knowledge on land and water management. • Rights issues. • Legal interventions in other states.	• Workshops and seminars • Project related literature • Print and electronic media (for suo- moto cognizance) • Meeting circulars, brochures etc.

7.4 Conflict Resolutions

As part of the SEA, an attempt was made on assessing the type of conflicts in the area and existing conflict resolution systems. The major findings are presented below in **Table 7.3**. Some of the conflicts mentioned by the stakeholders are not relevant to the project activities (such as access to community grazing land/ pasture, community toilets, community handpumps, etc).

Table 7.3: Conflicts and existing resolution system

S. No.	Conflict areas/risks	Existing resolution system
1.	In absence of **irrigation channel** network attached to private boring, sometimes farmers whose field is located away from boring face problem in irrigating their crop because other farmers do not allow conveyance of boring water through fields. Such objections are attributed to personal reasons or anticipated loss of crop or indifferent attitude of concerned farmer. **The social status in terms of caste/class issues also play an important role in such cases.**	▪ Conflict/objection due to personal reasons (between two farmers) is sorted out through mutual discussion or through intervention from influential people of the village or through peer pressure. Sometimes, it is never resolved. ▪ Conflict/objection due to anticipated loss of crop is addressed through synchronization of sowing and irrigation schedule by the concerned farmers. ▪ Conflict/objection due to indifferent attitude is resolved through peer/social pressure.
2.	**Pond water** is better accessible to those farmers whose field is located adjacent/closer to the pond. Such farmers develop a sense of first right to use pond water. When owner of distantly-located plot uses pond water, conflict arises. Many a time, this leads to intense conflicts.	▪ Final resolution of conflict depends on relative socio-economic power of the concerned parties. Sometime, decision is taken in favor of stronger party. ▪ In majority cases, adjacent farmer is convinced about equal rights of all farmers of the village to use pond water. ▪ Members of Gram Panchayat, not the Gram Panchayat as an institution, play crucial role in resolution of such conflicts.
3.	Conflict arises also in use of **canal water** for crop irrigation. When quantum of water in canal is low and some intermittent farmer puts on bunds in order to ensure higher quantity of water for his	▪ Such conflicts are resolved generally through mutual negotiation. In many cases, the problem is referred to the Irrigation Department which intervenes to resolve the issue. ▪ **Sometimes FIRs are lodged against the erring farmers but**

S. No.	Conflict areas/risks	Existing resolution system
	field tail users have smaller quantity of water, conflict among farmers arises.	**no action is taken against them because of political patronage.**
4.	**Community grazing land/pasture** should be theoretically accessible to all farmers of the village. However, influential people have better access to such lands/pastures. Many a time, animals belonging to powerful people get privilege. Thus, poor and weaker farmers have lower access.	▪ Such conflicts, when arise, are never resolved. Poor farmers adjust their timing.
5.	Absence of proper **field/link drain** network connecting agricultural fields also leads to conflict among farmers, especially during heavy rains.	▪ Generally, such conflicts are not resolved. ▪ However, sometimes, farmers will arrive at mutual consensus to drain out the entire area.
6.	Sowing and harvesting time is generally the same for all farmers. Hence, their **labor** requirement is also simultaneous. In majority of cases, a group of labor engaged by a farmer is hired by another farmer through allurement of little higher wages or other mechanisms. Thus, conflict of interest arises between the two parties.	▪ Such conflicts are resolved through mutual discussions. ▪ When conflict becomes intense other people and even members of Gram Panchayat intervene.
7.	Some **general** conflict of interest arises in the villages. These conflicts may relate to property, division of assets between brothers, etc.	▪ These conflicts are generally resolved through informal Panchayat under which elderly and influential people are invited to decide the case. Such elderly people provide an opportunity of hearing to both the parties and take decision on the basis of merit. If the parties are not satisfied with the decision, they approach the court for legal remedy.
8.	**Community hand pumps** have been installed under different government schemes (National Drinking Water Mission). These hand pumps are supposed to be located at easily accessible location to all users. However, such hand pumps are located at private places/premises of individuals who tend to prohibit others from these hand pumps. Such situation leads to quarrel between two parties.	▪ In majority cases, Gram Panchayat intervenes and resolves the conflict.
9.	**Community toilets under** Total Sanitation Campaign have also been constructed in many villages which are meant for the use of all those who wish to use it. But neighboring families have better physical access to such toilets. When distantly-located families use these toilets, conflict arises because neighboring families raise objections.	▪ In such cases, Gram Panchayat intervenes and resolves the conflict.
10.	**Field bunds** are prepared by two adjacent farmers. Both of them are required to contribute equal area towards field bund. If an individual farmer tends to reduce the area bund area from his side, conflict arises.	▪ Such types of conflicts are resolved through social pressure or mutual understanding.
11.	Absence of common **drain outlets** in residential area also leads to conflicts among people, especially during rains. Downstream households object to flow of water from up-land through their premises.	▪ Community pressure resolves the issue. ▪ Sometimes, Gram Panchayat also intervenes to resolve the issue.

As shown above, the majority of the conflicts are resolved through mutual discussions/negotiations, community pressure, intervention of Gram Panchayat or other influential people of the village. In a few cases, the affected parties also resort to legal remedies. The major reasons for such conflicts as have been expressed by the communities are illiteracy and ego related problems coupled with caste and class based politics. Given such conditions, any conflict resolution mechanism (internally or externally) is not likely to be full proof. Also, the importance of Gram Panchayats has been greatly undermined owing to issues like caste based reservations, poor capacity building and insufficient support for the Panchayats to be effective institutions of governance, poor occurrence of Gram Sabha and standing committee meetings etc.

7.5 Conflict resolution systems for new assets and opportunities to be created under the project

According to the community, it is anticipated that the existing conflict resolution systems will prove equally effective for the assets and opportunities to be created under the project.
The other major conflict resolution mechanisms under the project will be:

- Through WUAs. The intent is, through WUAs establishment and capacity-building, to build mechanisms for farmers to handle water related conflicts in a more organized and transparent manner.
- Through UPID complaint and grievance redressal system, which is already functional.
- Moreover, the overall governance system within UPID will be enhanced by making more transparent the performance of the system. This includes greater introduction of monitoring and dissemination of this information through public websites. The strengthening of the existing management information system (MIS) will also contribute to overall greater transparency in the UPID.

Conflicts and their resolution will be monitored through the overall Monitoring and Evaluation of the project by PACT assisted by the external M&E agency.

Some of the specific provisions for conflict resolution under the **PIM Act** are given below.

Settlement of Disputes: The dispute or difference relating to constitution, management, powers and functions of a WUA shall be resolved as follows:

1. Any dispute or difference arising between its members shall be resolved by the managing committee of the water users' association.
2. Any dispute or difference arising between a member of water users' association and a members of its managing committee shall be resolved by the immediate upper level water users' association or the competent canal officer, as the case may be.
3. Any dispute or difference arising between users' associations shall be resolved by the immediate upper level water users' association or the competent canal officer, as the case may be;
4. Every dispute or difference shall be disposed of within thirty days from the date of reference of the dispute in such manner as may be prescribed.

Appeals: Relevant provisions are given below.

Any party aggrieved by the decision made or orders passed by a water users' association may prefer an appeal to the immediate upper level water users' association or the corresponding competent canal officer, if such upper level water users' association does not exist.

Appeal under shall be made within thirty days from the date of the decision or the orders and shall be disposed of within thirty days from the date of filing thereof.

Any party aggrieved by the decision or order of the competent canal officer may appeal to appellate officer within 30 days from the date of such decision or order. The decision taken by the appellate authority shall be final and binding. The organization structure for complaint redressal is given below in table 7.4.

Table 7.4: Organization Structure for Complaint Redressal under PIM Act

Sr. No.	Committee	Canal Officer	Registrar	Appellate Officer
1.	Kulaba Committee	Junior Engineer	Executive Engineer	Executive Engineer
2.	Alpika Committee	Assistant Engineer	Executive Engineer	Executive Engineer
3.	Rajbaha Committee	Executive Engineer	Superintending Engineer	Superintending Engineer
4.	Branch Committee	Superintending Engineer / Chief Engineer level - 2	Chief Engineer level - 2	Chief Engineer level – 1
5.	Project Committee	Chief Engineer level - 2	Chief Engineer level - 1	Chief Engineer Design

Source: Training Manual WUA, PACT / UPID

The implementation of the PIM Act includes mechanism for lodging complaint at every level. At the base level, the following provisions will be implemented.

1. A complaint register will be maintained by every Alpika/ Rajbaha Committee of WUA.
2. Any member/ farmer of WUA can lodge a complaint in this complaint book.
3. Management committee of the WUA will resolve the complaint within fifteen days.

In case of non resolution, conflict resolution mechanism will exist through PIM cell to be established at division, circle and zonal level, where monthly meetings provide opportunities for such conflict resolution.

7.6 Institutional Arrangement, Training and Capacity Building Plan

The project is anticipated to have various environmental and social impacts which may be positive or negative. There will be a need for combination of strategies to address such impacts. While one of the strategies should aim at maximization of minimum possible positive outcomes from each activity, the other strategy should target to minimize the maximum probable undesirable outcomes. Willingness and capacity of different stakeholders will be the most important determinant of the success. Thus, capacity-building of farmers and functionaries of

UPID and line departments will be necessary to improve environmental and social performance of the project. The following section describes each of these items.

7.6.1 Mechanisms of environmental and social performance improvement of project

Environmental and social performance of the project will depend, on clarity of objectives and goals, meticulous planning, implementation, and rigorous monitoring and evaluation along with compliance review and action mechanism. The aim is to reduce adverse environmental and social impacts and to enhance the positive outcomes. Chapter 5 and Chapter 6 have described the impacts and Environmental and Social Management Framework, respectively. Environmental issues are mainly technical in nature and need to be handled technically. However, adequate sensitization of various stakeholders, especially implementation partners such as UPID (the agency mainly responsible for implementation of the ESMF), and Agriculture Department (responsible for organization of FWS, crop demonstrations, etc). Though these departments are aware of both positive and negative impacts of their activities they need additional sensitization so that all possible precautions are taken to avoid negative outcomes and enhance the positive outcomes. Farmers need to be sensitized and cautioned against negative environmental impacts and the steps which they could adopt for the same.

Social issues such as probable conflicts, caste and other socio-economic dynamics should be kept in mind while planning and implementing the project activities. Project functionaries including the line department staff should be apprised of these inherent conflicts and socio-economic dynamics which exist in the rural areas so that they take preemptive measures against these negative forces.

7.6.2 Skill and capacity-building requirements

Summary of skill & capacity building requirements at various stakeholder levels is given in **Table 7.5**.

Table 7.5: Summary of capacity-building requirements at various stakeholder levels

Stakeholder level	Skill and capacity-building requirement
Individual	▪ Individual level measures to avoid adverse environmental impacts ▪ Sensitization to covariate factors affecting the environment ▪ Trade-off between short term and long term gains from various activities ▪ Socio-economic heterogeneity existing the villages and measures to overcome for common cause
Farm/household	▪ Individual level measures to avoid adverse environmental impacts ▪ Sensitization to covariate factors affecting the environment ▪ Trade-off between short term and long term gains from various activities ▪ Socio-economic heterogeneity existing the villages and measures to overcome for common cause ▪ Orientation and sensitization of women and if possible children about all the above issues
Water Users Associations	▪ Necessity of group approach in planning and execution of irrigation system development including irrigation channel network, field drain network, construction and maintenance of link drains through watershed approach ▪ Water sharing among group members

Stakeholder level	Skill and capacity-building requirement
	▪ Preparation of water roster on consensus basis to enhance transparency and to avoid disputes and conflicts in water sharing ▪ Planning of crop rotation and crop mix ▪ Collective management of agricultural inputs ▪ Ways to overcome socio-economic heterogeneity for the common cause
Community	▪ Mass awareness in order to develop a community for environmental and social aspects ▪ Sensitization of community towards environmental and social issues so that individual efforts of farmers het support from the community ▪ Developing community ownership of various concerns affecting the entire community
Institutional	▪ UPID/PACT and other line departments need to prepare separate action plan to address environmental and social issues concerned with their respective activities ▪ Awareness among all the functionaries of implementing agencies ▪ Officers and functionaries of UPID/PACT and line departments are technically sound. However, they are generally driven by targets set by the project or higher authorities. As a result, they neglect environmental and social aspects of their activities. They need to be alerted against negative outcomes of their activities and probable measures to reduce the same.
Division/District	▪ Since Division/district level officers and functionaries of the project and line departments will be entrusted with the direct responsibility of implementation, they need adequate orientation to environmental and social issues. ▪ They need to be trained on environmental and social settings in which they will function for which location-specific knowledge base should be created and communicated to these officers and functionaries.
State	▪ State level officers should be oriented about the environmental and social settings of all the project districts and the state as a whole. ▪ Sense of ownership needs to be developed at the top management level

UP irrigation department will be a major stakeholder in both planning & implementation of UPWSRP phase II. Therefore, an effort has been made to identify, develop & implement training & capacity building plan as described below.

7.6.3 Capacity Building and Training Needs of UPID on Environment and Social Issues

In order to streamline social and environmental issues in planning and implementation of project based on stakeholders' needs, the institutional capacity of Uttar Pradesh Irrigation Department has been assessed and described in chapter 2. Training needs assessment, design of training programs and implementation mechanism is described below based on this assessment.

Training Needs Assessment

In the absence of a well designed training program covering environment and social issues at the grass root level, an effort was made to assess the efficacy of existing training programs being imparted to NGOs, WUAs and UPID in order to identify the gaps. This gap analysis has been carried out by comparing the contents and duration of the existing training program being

imparted to NGOs, WUAs and UPID at the grass root level and the response elicited from the target groups as described below.

Contents of training at L3 level

NGOs, UPID officials and WUAs should be trained by WALMI, PACT and NGOs.

Subjects covered by *NGOs*- NGO's can play a important role in training programme for grass root level (Farmers) workers with the help of WALMI, PACT and other institutions. The subjects should be covered in the training programs:

i. Maintenance of Minor,
ii. Water management
iii. Maintenance of records.
iv. Participatory Irrigation Management,
v. Evaluation of work of WUAs.
vi. Budgeting,
vii. Bio-fertilizer and
viii. Horticulture.

UPID officials- Objective of training programs should to provide an understanding about the role of officials in strengthening the concept of PIM and the activities of WUAs. These should be included:

i. Generate awareness among farmers about the importance of PIM and WUAs;
ii. Provide help to WUAs in cleaning of Minors;
iii. Timely and equal distribution of Water through Warabandi and Osrabandi;
iv. Provide knowledge to farmers about new crops and use of fertilizers; and
v. Effective water management/ prevent wastage of water.

Executive Engineers and Assistant Engineers (AEs) should also imparted training with respect to ways for strengthening of WUAs. The Seenchpals should also train in the maintenance of irrigation record and their responsibilities towards WUA's.

WUA- Training should be imparted through NGOs and WALMI and the duration of their training ranged between 1 and 5 days. The contents of the training program at WALMI included:

Maintenance of minor including de-silting:

i. Benefits of PIM and the role and responsibilities of WUAs;
ii. Need of communication among all stakeholders;
iii. Use of high yielding variety (HYV) and new seeds;
iv. Maintenance of records;
v. Proper use of water and equity in its distribution through Warabandi/Osrabandi;
vi. Prevention of water wastage and

vii. Maintenance of drainage system.

Design of Training Program

Design of training program should carried be out based on major training needs as summarized below.

i. Water resources sector needs both augmentation of knowledgebase as well as organizational strengthening with respect to mainstreaming of environment and social issues.
ii. At L1 level, there is a need for transforming environmental and social issues related policies both at national and state level into intervention planning, implementation and monitoring for effective mainstreaming from time to time.
iii. L2 and L3 levels need training covering all aspects of social and environmental issues identification, intervention planning, implementation and monitoring. The existing formats of training program at L3/WUA/ NGO level needs to be strengthened in the light of identified gaps.

The above inferences define type of training programs required to be implemented at different levels. These training programs are summarized below in **Table 7.6**.

Table 7.6: Target Groups and Type of Training Programs

Type of Training Program	Target Group				
	L1	L2	L3	NGOs	WUAs
Environmental & Social Awareness	√	√	√	√	√
Design of Social & Environmental Interventions	√	√			
Implementation of Social & Environmental Interventions	√	√	√	√	√
Monitoring & Evaluation	√	√	√	√	√

Source: Compiled by IRG, BSEA Phase I

These training programs have been designed in terms of target group, frequency of conducting training programs, duration of training programs and format of training programs. The source for developing training material has been identified and is part of social and environmental assessment study outputs, which will be institutionalized in a time bound manner. Each of these training programs can be implemented in terms of seven sub training modules. These modules have been described in **Table 7.7** and **Table 7.8**. These sub training modules can be implemented either independently or in combination with others.

7.6.4 Implementation Mechanism

It is proposed to institutionalize the environmental and social capacity building and training activity at UPID/PACT. The rationale for institutionalizing it at UPID/PACT is given below.

i. Repository of social and environmental knowledgebase
ii. Existence of environmental and social expertise

iii. Existence of infrastructure/ facilities in terms of operating hardware and software e.g. modeling/ DSS/ GIS/ Auto CAD etc.

It is proposed to develop the capacity of UPID/PACT in carrying out environmental and social due diligence so that they can act as trainers to other stakeholders. Further, PACT can act as independent / autonomous agency for monitoring the capacity building effort. The entire implementation mechanism is shown in **Figure 2.2**. The proposed training areas and faculty for these modules are described in **Table 7.9.** It is proposed to augment the capacity of faculty at UPID/PACT by conducting training programs under the social and environmental assessment.

Table 7.7: Training Programs for Awareness Raising

Target Group									
Awareness	**L1**	**L2**	**L3**	**NGO**	**WUA**	**Frequency**	**Duration**	**Content/ Format**	**Source**
Module 1: Policy & Regulations	√	√				Twice Every Year	One Day	Policy (Social/water resources/ Environment) Regulations related to water resources. Regulations related to environment assessment. Regulations related to social assessment.	SEA-Environmental & Social Regulatory Framework / UPWSRP Phase II ESMF Report
Module 2: Baseline Environment & social Status	√	√				Twice Every Year	One Day	Environmental & Social regulatory framework. Status based on baseline Environmental Indicators. Status base on Baseline Social Assessment Indicators. Description of hotspots.	Baseline Environmental Social database compendium / GIS database / UPWSRP Phase II ESMF Report
Module 3: Area specific baseline Environment & Social Status		√	√	√	√	Twice Every Year	One Day	Area specific environmental issues Area specific social issues. - Description of hotspots.	Baseline environmental & Social database comparative / maps / UPWSRP Phase II ESMF Report

Source: Compiled by IRG, BSEA, Phase I

Table 7.8: Training Programs for Social & Environmental Due Diligence

Target Groups									
Design / Implementation and monitoring of Social & Environmental Intervention	**L1**	**L2**	**L3**	**NGO**	**WUA**	**Frequency**	**Duration**	**Content/ Format**	**Source**
Module 4: Preplanning Stage (E.A./SA scoping)	√	√				Twice Every Year	Half day	1- Environmental & Social Screening. 2- Identification of hotspots. 3-Evaluation of engineering interventions. 4-Regulatory Framework.	1- Guidelines for usage of environmental knowledgebase at district & block level (BSEA, UPWSRP Phase I). 2- SEA- environmental & Social regulatory framework. (BSEA, UPWSRP Phase I) 3. ESMF UPWSRP Phase II
Module 5: Planning Stage (EIA/SA Study)	√	√					One day	1- Baseline assessment using primary & secondary data. 2- Impact identification & quantification and formulation of mitigation measures. 3- Preparation of BOQ.	1- Guidelines for prioritizing the environmental uses (BSEA, UPWSRP Phase I). 2- Guidelines for impact identification & prioritizing (BSEA, UPWSRP Phase I). 3- Guidelines for recommendation of mitigation measures (BSEA, UPWSRP Phase I). 4- Guidelines for investment scenarios & alternatives (BSEA, UPWSRP Phase I). 5. ESMF UPWSRP Phase II
Module 6: Implementation Stage (Implementation of SEMF)	√	√	√	√	√		Half day	1- Monitoring & Management Plan. 2- Implementation of mitigation measures. 3- Overall evaluation of environment & social safeguard	1. Guidelines for monitoring & evaluation (BSEA, UPWSRP Phase I). 2. ESMF UPWSRP Phase II

Target Groups									
Design / Implementation and monitoring of Social & Environmental Intervention	**L1**	**L2**	**L3**	**NGO**	**WUA**	**Frequency**	**Duration**	**Content/ Format**	**Source**
Module 7: Post Implementation Stage (Monitoring & Evaluation)	√	√	√	√	√	Twice Every Year	Half day	framework. 4- Institutional Framework roles & responsibility.	

Source: Compiled by IRG

Table 7.9: Training Areas & Faculty

Awareness	Areas	Roles/Responsibility / Faculty
Policy & Regulatories	EIA/ SA scoping : Regulatory review using existing regulatory guide to identify applicable regulations	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E consultant / Forest Department / UPPCB
Baseline Environment & Social Status	EIA/ SA scoping : Environmental and social screening of sub project using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT using the screening formats in attached guidelines	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Area and Specific Social Status	EIA/ SA scoping: Identification of hotspots using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Pre Planning Stage	EIA/ SA scoping : Environmental and social screening of sub project using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT using the screening formats in attached guidelines	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA scoping: Identification of hotspots using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT.	Environmental/ Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA scoping: Evaluation of proposed engineering intervention and their alternatives followed by public consultation.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA scoping: Regulatory review using existing regulatory guide to identify applicable regulations	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Planning and Design Stage	EIA/ SA study: Baseline assessment using secondary data e.g. GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT using the formats in attached guidelines	Environmental / R&R/ Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department

Awareness	Areas	Roles/Responsibility / Faculty
		/ UPRSAC
	EIA/ SA study: Baseline assessment using primary data by referring to guidelines as per the procedures and formats/ questionnaires in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA study: Impact identification based on project interventions both during construction and operation by referring to guidelines as per the procedures and formats/ questionnaires in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA study: Formulation of impact mitigation measures both during construction and operation by referring to soil management framework, water conservation plan, water pollution control plan/ resource use efficiency plan/ green cover improvement plan/ silt disposal plan/ pesticide management plan/ waste management plan/ disaster management plan/ R&R plan and guidelines and as per the procedures and formats in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA study: Preparation of bills of quantities (BOQ) and EIA and SA management plan considering mitigation measures both during construction and operation by referring to guidelines and as per the procedures and formats in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT
	EIA/ SA study: Identification of environmental and social parameters to be monitored and time bound monitoring plan both during project implementation and post implementation by referring to guidelines and as per the procedures and formats in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Implementation stage	Implementation of EIA/ SA mitigation measures by the contractor/ implementing agency.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	Third party evaluation of the project implementation & safeguard measures undertaken during construction	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	Third party evaluation of the success of project implementation & safeguard measures undertaken during construction.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department

Awareness	Areas	Roles/Responsibility / Faculty
		of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Post Implementation stage	Third party evaluation of the post project monitoring parameters/ indicators	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	Third party evaluation of the post project success & safeguard measures undertaken and follow up activities based on lessons learnt.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC

Source: Compiled by IRG, BSEA, UPWSRP Phase I

7.6.5 Convergence with overall capacity-building plan

UPID has already prepared a Project Implementation plan for project functionaries and farmers. Environmental and social aspects could be built into this plan in order to ensure efficiency and effectiveness of these programmes. Various training material planned to be developed for overall training and awareness generation should include a separate section on environmental and social aspects. New sets of pamphlets, flip charts, booklets should be designed, printed and distributed to the concerned stakeholders. At farmers' field school, some specific-purpose Master Trainers should be identified and trained. These master trainers would impart training to farmers on environmental and social issues. Similarly, environmental and social issues should be included in the training programmes for officers and functionaries of UPID and line departments as described above.

Institutional arrangement

There should/will be a separate Training Cell at UPID headquarters which will plan, coordinate and implement the training and capacity building activities. The Training Cell at UPID headquarters will coordinate with the identified institutes/agencies for sending batches of trainees there. The Cell will function in close coordination with the Environment Cell and Participatory Management Cell at PACT so that environmental and social issues are adequately addressed in training programmes. At the division/district level, a dedicated staff should/would be posted who will coordinate all training activities in the division/district. At sub-district level, field staff including NGO workers will/should be entrusted the responsibility of coordinating the training and capacity building activities. Farmers' Field School can play an important role in capacity building on environmental and social aspects of the project intervention. These schools should be adequately strengthened through literature, infrastructure and financial support to organize training programmes at the local level. This arrangement will also improve attendance in training sessions.

Timeline

Schedule of capacity building should be drawn in such a manner that it caters to both orientation and refresher requirement of a given audience. Thus, training programmes should be organized for different project functionaries immediately after their induction and at regular intervals for reminder/refresher purposes. The suggested timelines of the capacity building of project officers/functionaries and farmers are described below in **Table 7.10**.

Table 7.10: Timeline of capacity-building initiatives for functionaries and farmers

Target group	Year-1	Year-2	Year-3	Year-4	Year-5
Individual					
Farm/household					
WUG					
Community					
Institutional					
Division/District					
State					

Notes:

	Continuous		Orientation		Refresher

7.7 Monitoring & Evaluation

Monitoring of social and environmental issues forms a key element of ESMF. Actions need to be planned by the project to integrate the monitoring within the project monitoring and evaluation system. The monitoring will involve not only the progress on activities and inputs but generating learning on results and outcomes of project interventions on social and environmental issues. The project will have both internal and external monitoring along with participatory monitoring by beneficiaries.

Internal monitoring

This is done at three levels. At the WUA level, as a part of participatory monitoring, the Representative of MIC, WUAs, NGO and representatives local communities would be monitoring the progress of the implementation and report to MIC and PMU. At the division level, UPID-Division Project Unit (UPIDDPU) will monitor the implementation of social management plans. The UPIDDPU will submit quarterly progress reports to PMU. At the state level, the PMU will monitor implementation of the project and ESMF activities. Both at DPU

and PMU levels the respective Social Environmental Units will be overall responsible for monitoring of implementing of the ESMF.

External Monitoring

The monitoring of ESMP should be made an integral part of the overall M&E system. The external M&E agency will be responsible for monitoringcompliance with safeguard policies, on the basis of the Environmental and Social Management Framework and dam safety measures. Annual audits should be conducted by the M&E agency in this regard. The third party quality supervision consultant will also conduct social and environmental checks of construction works.

Monitoring and evaluation is primarily required to ensure proper and timely implementation of environmental and social mitigation measures identified in the planning stage, based on the ESMP. Monitoring at regular intervals during implementation and for a specified period in the post implementation stages is necessary to identify and implement any change / improvement needed in the execution of the activity or in the mitigation measures. Monitoring of the ESMF implementation is needed to verify impacts, ensure adherence to approved plans, environmental standards and general compliance.

Impact Evaluation

Proposed environmental & social impacts monitoring indicators have been identified based on: (i) expected activities in the Project Area, (ii) identified environmental issues and (iii) expected environmental and socio-economic impacts. It is anticipated that future activities in the Bundelkhand will lead to emergence of environmental issues on account of both short and long term environmental impacts. The indicators to monitor these impacts and their frequency of measurement are summarized in **Table 7.11**. The frequency of measurement has been fixed for annual and five year monitoring period. These have been fixed considering short and long term implementation perspective. The ESMP developed for UPWSRP Phase II can be implemented effectively by integrating it with UPWSRP Project Management Systems and Procedures (to be procured and managed by PACT).

Table 7.11: Indicators for Monitoring

Parameter	Indicator	Frequency	Agency
Environmental parameters			
Soil	Fertility through soil testing Extent of waste land through survey	Annual	UPIDDPU, WUA –after training, Agriculture Department Impact evaluation by M&E agency
Water and Quality	Surface and sub surface Water quality through testing for Standard parameters Pesticide residues (both in water and sediment)	Pre monsoon Post Monsoon	UPIDDPU, WUA –after training, Jal Nigam Impact evaluation by M&E agency
Agri chemicals	Consumption of Fertilizers, pesticides through Survey	Crop-season	UPIDDPU, WUA –after training, Agriculture Department Impact evaluation by M&E agency
Biodiversity	Changes in diversity and	Pre monsoon	UPIDDPU, WUA –after

Parameter	Indicator	Frequency	Agency
	density of avians, natural predators, weeds in water bodies, fields Fish growth	Post Monsoon	training, Forest Department Impact evaluation by M&E agency
Social parameters			
Resettlement	– No. of RAP with concerned population – Extent of land acquired/appropriated – No. of affected families eligible for and receiving R&R entitlements	Before initiating sub-project plan implementation	UPIDDPU, M& E agency
Access to Project benefits	– % of beneficiaries from vulnerable groups – No. of days of employment generated and availed by vulnerable groups – % of vulnerable groups accessing agriculture support	Annually	UPIDDPU, WUA –after training, DoA, M& E agency
Participation	– No. of WUAs formed – % of WUA membership from vulnerable sections – Participation of vulnerable groups in WUA and UPID meetings	Annually	UPIDDPU, WUA –after training, M& E agency
Conflicts	– No. and nature of conflicts reported – No. of conflicts resolved	Annually	UPIDDPU, WUA –after training, M& E agency

7.8 Implementation Schedule & Costing

The implementation schedule has been detailed in environmental and social impact mitigation / enhancement matrix. Budget for implementation for each of the proposed component of ESMF which includes training and capacity building, special studies Biodiversity offset & Monitoring & Evaluation and any investment for mitigation measures (to be included in project bid documents) is recommended to be prepared and included in the project cost once all the activities are finalized. At EIA level, the detailed scheduling and cost estimates for implementing E&S mitigation measures, training and capacity building and other aspects will be prepared and presented as part of the sub-project proposal document to PACT. An estimated budget (inclusive of Bundelkhand, LGC, and Haidergarh Branch sub-project areas) to implement the ESMF is provided in **Table 7.12** and expenditures will be monitored under the project M&E system:

Table 7.12: Estimated Budget for ESMF Implementation

Item	Costs (7 years)	Comments
Staff costs	**$1.5 M**	**(Inclusive of travel budget and other peripherals) Environment Specialist & Support staff**
Training Program	**$0.5M**	**Some of this would be supported under the envisioned Project training program for UPID e.g. training on IPM & IPNM, GIS etc.**
Special Studies on environment and social (if required)	**$0.25M**	**This would be to support special investigations as required by PACT (e.g. wetlands)**
Biodiversity offset	**$4.0M**	**These funds have been allocated for implementation of offset measures along canals.**
M&E	**$ 100,000**	**Some of this would be supported under M&E component**
Total	**$6.85M**	

7.9 Information Disclosure

Preparation of the Social and Environmental Assessment was widely advertised through district administration during stakeholders consultations carried out in 2012 (see Chapter 5). Draft Final reports for ESMF Bundelkhand, LGC & Haidergarh Branch and their subsequent revised versions were uploaded on the UPID website (http://irrigation.up.nic.in/project.htm**)** on 03.10.2012 for inviting comments and suggestions from public and other stakeholders and were also uploaded on the World Bank InfoShop website. Further, hard and soft copies of these reports were circulated to offices of concerned UPID Chief Engineers (Betwa, Sharda Sahayak and Kanpur) as well as Superintending Engineers (Lalitpur, Aligarh, Kanpur, Etawah, Lucknow) to receive comments & suggestions from all the stakeholders.

Once finalized, the report will be made available to the stakeholders through UPID website and through the World Bank InfoShop. The executive summary has been translated in Hindi and will be made available to the communities in the project areas.

At the planning stage of each project sub-activities, in case there are major environmental or social issues as described in Table 6.3, a site specific EA/EMP will be prepared. In this rare case of application of EIA notification 2006 in any of the sub-activity, the EA/EMP of this activity will require public hearing and disclosure as per this notification. A copy of this notification is given in Volume II for reference.

6.1.1 Construction Camps Plan

The terms and conditions of this EMP pertain to the siting, development, management and restoration of construction camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of labourers employed and the extent of machinery deployed. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Pre-Construction Stage			
1	Identify the site for construction camp in consultation with the individual owners in case of private lands and the Gram Panchayat in case of government lands (**Use Format-1**).	Contractor	The suitable sites shall be selected and finalized in consultation with the EE or his appointed representative not below the rank of AE
2	Work out arrangements for setting up his facilities during the duration of construction with the land owner/Gram Panchayat.	Contractor	Arrangements will be verified by the EE or his appointed representative not below the rank of AE / Gram Panchayat (GP) to enable redressal of grievances at a later stage of the project.
3	The arrangements will include the restoration of the site after the completion of construction	Contractor	
4	Submit a detailed layout plan for development of the construction camp, indicating the various structures to be constructed including the temporary structures to be put up, site roads, drainage, lighting and other facilities	Contractor	The plan shall be finalized or approved by the EE or his appointed representative not below the rank of AE
5	The plan will include the redevelopment of sites to pre-construction stage. The campsite should cover an area of about 3000 sq. m for 60 Nos. of workers.	Contractor	
6	Submit following documents for arrangement with landowners:- – Written No-objection certificate of the owner/cultivator – Extent of land required and duration of the agreement – Photograph of the site in original condition – Details of site redevelopment after completion	Contractor	The documents shall be checked or approved by the EE or his appointed representative not below the rank of AE
7	Provide, free of cost in the camp site, temporary living accommodation to all the workers employed by contractor for such a period as the construction maintenance work is in progress	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
8	Provide for a sufficient supply of potable water in the construction camps, in earthen pots	Contractor	
9	Identify suitable community water sources as hand pumps and ponds for procuring drinking water, in consultation with the Gram Panchayat.	Contractor	
10	Event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source, after the testing for its potability	Contractor	
11	– Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. – Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project		
12	Every site adequate and suitable facilities for washing clothes and utensils shall be provided	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
13	Separate and adequate bathing facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.	Contractor	
14	Sanitary arrangements, latrines and urinals shall be provided in every work place on the following scale:	Contractor	Monitoring by the EE or his appointed representative not below the rank of

	• Where female workers are employed, there shall be at least one latrine for every 25 females or part thereof. • Where males are employed, there shall be at least one latrine for every 25 males or part thereof. • Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings. • Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men Only" or "For Women Only" as the case may be. • The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times and • Water shall be provided in or near the latrines and urinals by storage in drums.		AE
15	**Arrangements for Waste Disposal** • Disposal of sanitary wastes and excreta shall be into septic tanks. • Kitchen wastes shall be disposed into soak pits. Wastewater from campsites will be discharged and disposed in a kitchen sump located at least 15 meters from any body of water. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit. • Solid wastes generated in the construction site shall be reused if recyclable or disposed off in land fill sites	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
16	**First Aid Facilities** • First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours of the work place. It will be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to make motor transport available to carry injured person or person suddenly taken ill to the nearest hospital.	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
17	**Storage Site** • **Storage of Petrol/Oil/Lubricants:** Brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage. • **Storage of cement**: Damp-proof flooring, as per IS codes • **Storage of blasting materials:** Shall be as per the specific provisions of law.	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
18	**Fire fighting arrangements** • **As per HMSP plan (6.1.7)**	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
19	**Interactions with host communities** • Issue identity cards to labourers and residents of construction camps.	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
Construction Phase			
1	– Construction camps shall be maintained free from litter and in hygienic condition. – It should be kept free from spillage of oil, grease or bitumen. – Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies Following precautions need to be taken in construction camps.	Contractor	EE or his appointed representative not below the rank of AE will monitor the cleanliness of construction campsites and ensure that the sites are properly maintained throughout the period of the contract.

	– Measures to ensure that no teaching of oil and grease into water bodies or underground water takes place – Wastewater should not be disposed into water bodies – Regular collection of solid wastes should be undertaken and should be disposed off safely – All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately		
Post Construction Phase			
1	– At the completion of construction, all construction camp facilities shall be dismantled and removed from the site – The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works (**Use Format 2**) Various activities to be carried out for site restoration are: – Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas. – Construction campsite shall be grassed and trees cut replaced with saplings of similar tree species. – Saplings planted shall be handed over to the community or the land owner for further maintenance and watering – Soak pits and septic tanks shall be covered and effectively sealed off.	Contractor	The restored site shall be inspected by the EE and will issue "Restoration Certificate". The same shall be submitted to EE before final payment is claimed.

Selection or construction camp/site locations

Avoid the following ……	Prefer the following
• Lands within 500m of habitations • Irrigated agricultural lands • Lands belonging to small farmers • Lands under village forests • Lands within 100 m of community water bodies and water sources as rivers • Lands within 100 m of watercourses • Low lying lands, marshy areas and bheels • Lands supporting dense vegetation • Grazing lands and lands with tenure rights • Lands where there is no willingness of the landowner to permit its use	• Waste lands • Lands belonging to owners who look upon the temporary use as a source of income • Community lands or government land not used for beneficial purposes • Private non-irrigated lands where the owner is willing and • Lands with an existing access road

Include in the bid document, as a special condition clause stating that all provisions of guideline shall be applicable to the locations of construction camps.

Format 1: Setting-up Construction Camp and Storage Area

(To be filled by Contractor)

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement…….**
3. **Location of Camp……**

Sr. No.	Item	Unit	Detail	Remarks by UPID (If any)
1.	**Detail of Construction Camp**			
a.	Area of Camp			
b.	Distance from Nearest Habitation			
c.	Distance from nearest water source			
d.	Details of storage area			
e.	Availability of separate waste disposal from storage area			
2.	**Details of Workforce**			
a.	Total No. of Workers			
b.	Total No. of Male workers			
c.	Total No. of Female workers			
d.	No. of Children			
3.	**Details of dwellings units**			
a.	No. of dwellings units			
b.	Source of Drinking Water			
c.	Total No. of bathrooms			
3.	**Details of Facilities**			
a.	Details of First Aid facility			
b.	Availability of Dustbins			

Remarks:……

……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Assistant Engineer UPID**	**Executive Engineer, UPID**

Format 2: Restoration of Construction Site
(To be filled by the Contractor)

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement……**
3. **Date of Submission…….**

S. No.	Contract Package	Labor Camp		Construction Camp		Plant Site		Borrow Areas		Disposal Location		Top Soil	
		O	R	O	R	O	R	O	R	O	R	Preserved	Restored

Remarks:……
……
……

Submitted	Checked	Approved
Signature……..	**…….**	**……..**
Name…… ……..	**…….**	
Designation…….. ……	**……..**	
Contractor	**Assistant Engineer UPID**	**Executive Engineer, UPID**

6.1.2 Waste Management Plan

The procedures for this EMP are for handling, reuse and disposal of waste materials during construction. The waste materials generated can be classified into (i) Construction Waste and (iii) Domestic waste. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Carry out the following activities as part of DPR : • Finalize design to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal. • Identify the type of wastes as well as sources of waste during construction and suggest options for possible reuse • Provide guidelines to the contractor for locating waste disposal sites for non-toxic wastes • Identify existing landfill sites if available for disposal of toxic materials. • In case no existing landfill sites are available, identification of landfill site as well as decommissioning of these site should be undertaken. Towards this, identify the clearance requirements. • Include in the bid document a special condition clause stating that all provisions shall be applicable to the locations of disposal of wastes	UPID-Division	EE or his appointed representative not below the rank of AE •
Pre Construction Stage			
1	Identify the activities during construction, that have the potential to generate waste and work out measures for the same in the construction schedule to be submitted to the EE or his appointed representative not below the rank of AE.	Contractor	Arrangements will be verified by the EE or his appointed representative not below the rank of AE / Gram Panchayat (GP) to enable redressal of grievances at a later stage of the project.
2	For the disposal of excess cut and unsuitable (non-toxic) materials, the contractor shall identify the location for disposal in consultation with the community / Gram Sabha (**Use Format-3**)	Contractor	
3	Any toxic materials shall be disposed in existing landfill sites that comply with legislative requirements	Contractor	The documents shall be checked or approved by the EE or his appointed representative not below the rank of AE
4	Prior to disposal of wastes onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community.	Contractor	
6	Educate his workforce on issues related to disposal of waste, the location of disposal site as well as the specific requirement for the management of these sites.	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
Construction & Post Construction Phase			
1	– Either reuse or dispose the waste generated during construction depending upon the nature of waste, as specified in **Table 1.** – The reuse of waste shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the waste materials used, and getting the same approved by the EE. The contractor shall adopt the following precautions while reusing wastes for construction: • In case of bituminous wastes, dumping will be carried out over a 60 mm thick layer of rammed clay so as to eliminate any chances of leaching. • In case of filling of low-lying areas with wastes, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken	Contractor	The waste management practices adopted by the Contractor, including the management of wastes at construction camps, etc. The work shall be reviewed by the EE on random sampling basis during the progress of construction.

	that these low lying areas are not used for rainwater storage • In case oil and grease are trapped for reuse in a lined pit, care shall be taken to ensure that the pit should be located at the lowest end of the site.		
Post Construction Phase			
1	– Hand over the site after clearing the site of all debris/wastes to the EE or his appointed representative not below the rank of AE – In case of disposal of wastes on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction" (**Use Format 2**).	Contractor	– Inspected by the EE or his appointed representative not below the rank of AE. – The same is to be submitted to the EE before final payment is claimed.

Table 1: Type of wastes and scope for reuse

S. No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
I	**CONSTRUCTION WASTES**			
	Site Clearance	Vegetative cover and top soil	Vegetating embankment slopes	
		Unsuitable material in embankment foundation	Embankment Fill	Low lying areas Land till sites
2	Earthworks			
	Overburden of borrow areas	Vegetative cover and soil	Vegetating embankment slopes	
	Overburden of quarries	Vgetative cover and soil	Vegetating embankment slopes	
		Granular material	Embankment Fill, Pitching	
	Accidental spillages during handling	Dust		
	Embankment construction	Soil and Granular Material	Embankment Fill	
	Construction of earthen drains	Soil	Embankment Fill	
3	Concrete structures			
	Storage of materials	Dust, Cement, Sand,	Constructing temporary structure, embankment till	
		Metal Scrap		Scrap Yard
	Handling of materials	Dust		
	Residual wastes	Organic matter	Manure, Revegetation	
		Cement, sand	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail	
4	Reconstruction works			
	Dismantling of existing pavement	Bitumen Mix, granular material	Sub-base	
		Concrete	Road sub-base, reuse in concrete, fill material and as rip rap on roads	
		Guard rail sign post, guard stone	Reuse for same	
	Dismantling of cross drainage structures	Granular material & bricks	Constructing temporary structure, embankment till	
		Metal scrap	Diversion sign, Guard Rail	
		Pipes	Culvert	
	Decommissioning of sites			
	Dismantling ot temporary structures	Granular material and bricks	Constructing temporary structure, embankment till	

II	**OIL AND FLUIDS**			
	Construction machinery maintenance and refueling	Oil and Grease	Incineration, Cooking, Illumination	
2	Bituminous works			
	Storage	Bitumen	Low Grade Bitumen Mix	
	Mixing and handling	Bitumen	Low Grade Bitumen Mix	
		Bitumen Mix	Sub-base, Paving access & cross roads	
	Rejected bituminous mix	Bitumen Mix	Sub-base, Paving access & cross roads	
III	**DOMESTIC WASTES**			
	Construction camps	Organic waste,	Manure	
		Plastic and metal scrap		Scrap Yard
		Domestic effluent	Irrigation	

Practices to avoid - waste disposal
Tipping of waste into stream channels, water location of disposal site as well as the bodies, forests and vegetated slopes Non-cleaning of wastes after day's work Leaching of wastes Littering in construction camps / sites Storing wastes on private land

Format 3: Identification of Waste Disposal Site
(To be filled by Contractor)

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement……**

Sr. No.	Criteria on which information for each site is to be collected	Site 1	Site 2	Site 3	Site 4
1.	Existing Land use				
2.	Area				
3.	Total material than can be dumped within the site (m^3)				
4.	Distance from Nearest Watercourse				
5.	Nearest Settlement (m)				
6.	Whether the community is agreeable to siting of dumping site (Y/N)				

Remarks:……
……
……
……
……
……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

6.1.3 Construction Plants & Equipment Management Plan

During execution of the project, construction equipments, machinery and plants always have impact on the environment. The impact can be due to the emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. The EMP describes the activities during the project stages where pollution control measures are required. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Selection criteria for setting up a plant area and parking lot for equipments and vehicles shall be done as per siting criteria for construction camp.	Contractor	Arrangements will be verified by the EE or his appointed representative not below the rank of AE to enable redressal of grievances at a later stage of the project.
Pre Construction Stage			
1	• The Contractor must educate the workers to undertake safety precaution while working at the plant / site as well as around heavy equipments (**Use Format 6 & 7**). • The Contractor shall ensure all vehicles must possess Pollution Under Control (PUC) Certificate, which and shall be renewed regularly. • The Contractor must ensure that all machinery, equipments, and vehicles shall comply with the existing Central Pollution Control Board (CPCB) noise and emission norms (**Use Format 8**). • The Contractor shall design the service road with protection measures as black topping at vulnerable points as in low lying areas.	Contractor	• The EE or his appointed representative not below the rank of AE must ensure that the Contractor shall submit a copy of the NOC and PUC Certificates before the start of work. • Monitoring of all activities by the EE or his appointed representative not below the rank of AE (**Format 9**).
Construction Phase			
1	• The Contractor shall undertake measures as per **Table 1** to minimize -the dust generation, emissions, noise, oil spills, residual waste and accidents at the plant site as well as during transportation of material to construction site. • A detailed of Machinery Operation should be provided (**Use Format 4**). • During site clearance, all cut and grubbed materials shall be kept at a secured location so that it does not raise any safety concerns. • During *excavation, water* sprinkling shall be done to *minimize* dust generation • Frequent water sprinkling shall be done on the haul roads to minimize dust generation. • Incase of loose soils, compaction shall be done prior to water sprinkling. • Cautionary and informatory sign shall be provided at all locations specifying the type of operation in progress. • The construction waste generated shall be disposed as per guidelines for "Waste Management Plan". • The equipments, which are required to move forward and backward, shall be equipped with alarm for backward movement. It shall be ensure that the workers shall remain away from the working areas at such times. • **Safety measures during bitumen construction work...** - Ensure that bitumen storing, handling as well as	Contractor	The EE or *his* appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

	mixing shall be done at hot-mix plant or designated areas to prevent contamination of soil and ground water (**Use Format 5**). - Skilled labour shall be used while hand placing the pre- mixed bitumen material. - The hand placing of pre-mixed bituminous material shall be done only in following circumstances: • For laying profile corrective courses of irregular shape and varying thickness • In confined spaces where it is impracticable for a paver to operate and • For filling potholes - Provide safety equipments i.e. gumboots and gloves to the workers while handling bitumen - While applying Tack Coat, spraying of bitumen shall be done in the wind direction. The labour shall wear jacket while spraying the bitumen - All the bituminous work shall be done as per IRC's Manual for Construction and Supervision of Bituminous Works.		
Post Construction Phase			
1	– Ensure that all the haul roads are restored to their original state. – Incase any inner village road is damaged while transporting the procured material; the contractor shall restore the road to its original condition – ensure that the decommissioning of plant shall be done in environmentally sound fashion and the area to brought to its original state.	Contractor	– Inspected by the EE or his appointed representative not below the rank of AE. – The same is to be submitted to the EE before final payment is claimed.

Table 1: Measures at Plant Site

Concern	Causes	Measures
Dust Generation	Vehicle Movement	• Water sprinkling • Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation • Tail board shall be properly closed and sealed
	Crushers	• Water Sprinkling
	Concrete-Mix Plant	• Educate the workers for following good practices while material handling
Emissions	Hot-Mix Plant	• Site Selection as per IRC's Manual for Construction & Supervision of Bitumen Work • Regular maintenance of Dust Collector as per manufacture's recommendations
	Vehicles	• Regular maintenance as per manufacture's recommendation
	Generators	• Exhaust vent of long length
	Heavy Load Vehicles	• Exhaust silencer, Regular maintenance as per manufacture schedule
	Crushers	• Siting
	Generators	Shall be kept in closed room and regular maintenance as per Good practice
Oil Spills	Storage and Handling	• manufacture's recommendation
Residual waste	Dust Collector and	• Guidelines for Waste Management
Concrete waste	Concrete-Mix plant	• Guidelines for Waste Management
Bitumen and bitumen mix		• Guidelines for Waste Management
Stone chips	Crushers	• Guidelines for Waste Management
	Trajectory of	• No worker shall be present in the vicinity of the equipments
	Movable Parts of	• Caution Sign, awareness among workers
	Plant Area / Site	• Caution Sign, Safety Equipments
	Accidents / Health	• First Aid Box, Periodic Medical Check up
	Break down of	• Arrangement for towing and bringing it to the workshop

Format 4: Details of Machinery Operation

(To be filled by the Contractor)

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement……**
3. **Monthly Report for Each Borrow Area under use…….**
4. **Date of Submission…….**

1. **Details of Machinery Operation**

1.1	Total machinery in operation (Nos.)	
1.2	Number of pavers	
1.3	Number of rollers	
1.4	Number of excavators	
1.5	Number of dumpers	
1.6	Number of vehicles in repair at each location	
1.7	Details of waste disposal. (Whether Sold/ Disposed)	

Remarks:……
……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

Format 5: Details of Hot Mix Plant (HMP)

(To be filled by the Contractor)

1. **Name of Canal……**
2. **Name of Nearest Human Settlement……**
3. **Monthly Report for Each Borrow Area under use……**
4. **Date of Submission……**

1. **Environment Features of the surrounding area**

1.1	Name and location of Hot Mix Plant	
1.2	Wind Direction	
1.3	Name (s), distance population and type of settlements in a 1.5 km radius of site.	

2. **Details of HMP and Mitigation Measures taken**

2.1	Installed Capacity	
2.2	Average Utilization	
2.3	Model	
2.4	Last Serviced	

3. **Explain Air Pollution Control Measures taken at the HMP site**

4. Explain Noise Pollution Control Measures taken at the HMP site

Remarks:……

……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**…….**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

Format 6: Safety Check list

(To be filled by the Contractor)

1. **Name of Canal……**
2. **Name of Nearest Human Settlement……..**
3. **Name of Contractor……..**
4. **Name of Safety Officer (if any)**
5. **Date of Submission……**

1. **Location 1, 2 ,3**

– **Adequate at time of Inspection (Y/N)** – **Needs Improvement** – **Needs Immediate Attention**	**Location 1**			**Location 2**			**Remarks**
General	A	B	C	A	B	C	
Stacking of Material							
Lighting							
Fire Prevention							
Fire Fighting Appliance							
Dust Control							
Noise Control							
First Aid Equipment							
Washing Facility							
Latrine							
Safety Shoes							
Others							

Remarks:……

……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

Format 7: Accident Report

(To be filled by the Contractor)

1. **Name of Canal……..**
2. **Name of Nearest Human Settlement……**
3. **Date of Submission……..**

1. Type of Accident

1.1	Struck by moving objects	
1.2	Handling without machinery	
1.3	Crushing / burying	
1.4	Fire	
1.5	Contact with poisonous gas or toxic substances	
1.6	Vehicle / Mobile plant accident	
1.7	Machinery operation accident	
1.8	Any Other	

2. Agent Involved in Accident

2.1	Machinery	
2.2	Vehicle or associated equipment Machinery	
2.3	Material being handled, used or stored	
2.4	Gas, vapour, dust, fume or oxygen	
2.5	Hand tools	
2.6	Excavation / underground working	
2.7	Construction formwork, shuttering and falsework	
2.8	Any Other	

Part-II - To be completed Upon Finalization of Employee's Compensation Claim

- No permanent incapacity (Yes/No)
- Less than 5% incapacity
- More than 5% incapacity
- Fatal

Remarks:……
……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environment Health Officer Supervision Party**	**Executive Engineer, UPID**

Format 8: Pollution Monitoring

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement……**
3. **Monitoring measures suggested in last report compiled or not (if nor give reason)…….**

Sr. No	Changing (km)	Detail of Location	Duration of Monitoring	Instruments used	Completion			Results	Reason for exceeding results	Mitigation measures	Type of Area (Residential/ Commercial/Industrial	Remarks
1.	**Air Quality Monitoring**											
								PM_{10} **$PM_{2.5}$** **Sox** **NOx** **Others**				
2.	**Water Quality Monitoring**											
								pH, TSS, TDS, Turbidity, Hardness, BOD, Iron, Fluoride, Nitrate,				
3.	**Soil Quality Monitoring**											
								pH, Organic Carbon, Alkanity, P_2O_5,				

								Conductivity, Iron, Pesticide, Nitrate				
4.	**Noise Monitoring**											
								L-day equivalent, L-night equivalent				

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

Format 9: Checklist for Environment Inspection
(Points / Issues to be covered)

1. **Name of Canal……**
2. **Name of Nearest Human Settlement……**
3. **Date of Submission……..**

Sr. No.	ESMP Measures
1.	Provision of a personnel accountable for implementation of ESMP / Safety Measures with Contractor
2	Consent of UPPCB to Establish HMP (If applicable)
3	Consent of UP PCB to operate HMP (If applicable)
4	Compliance of PCB Conditions for HMP installation and operation
5	Whether compliance reported through monthly Progress report to Divisional Office of Executive Engineer
6	Precautions to prevent contamination of soil by emulsion, Bitumen, oil and lubricant taken while storing
7.	Providing cover to fine construction material & bituminous mix during transportation
8	Spoil and debris disposal
9	Safety equipment i.e helmet. gloves, gumboot, mask, earplugs etc. provided to workers
10	Provision of labour camp with sanitation & potable water
11	Fire precautions at Hot Mix Plant and site Office
12	Air and noise monitoring done in camp site
13	Status of drainage provision in camp area
14	Others

Remarks:……

……

Submitted	Checked	Approved
Signature……..	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

6.1.4 Fertilizer & Pesticide – Handling & Storage Plan

This EMP addresses issues arising from the improper handling and storage of fertilizers and pesticides. These precautionary measures shall be applicable to handling and storage by (i) the traders dealing in fertilizers and pesticides, (ii) individual beneficiaries of the project, and (iii) Department of Agriculture. In addition to these precautionary measures, DoA capacity to procure, distribute, and manage anticipated types of pesticides will be increased.

Building a storage facility

The trader shall store fertilizers in a dry and secure location, so that impact on groundwater does not result. The fertilizers shall be stored away from activities that might rip open a bag or allow rain to enter the container. An impermeable (waterproof) floor, such as properly treated concrete shall prevent fertilizer from seeping into the ground and leaching to groundwater. This Secondary containment provides impermeable floor and walls around a fertilizer or chemical storage area that minimize the amount of fertilizer or chemical seeping into the ground from a spill or leak.

When building and maintaining a fertilizer-storage facility, the following precautionary measures shall be considered:

- The size of the storage facility should be adequate for holding the peak fertilizer requirement.
- Locate the dry-storage building or liquid secondary containment down slope and at least 15m away from the water body.
- The building foundation and secondary-containment floor shall be constructed from impermeable material & well drained and above the water table.
- Rainwater shall be diverted away from the fertilizer storage area.
- Fertilizer storage warehouses should be constructed of materials that protect the fertilizer from the natural elements.
- Fertilizer shall be stored in a manner to prevent contamination with other products. (i.e. seed, pesticides, grain, etc.) Store all dry fertilizer products under roof.
- The fertilizer bags shall not be stored on bare ground and shall be stored in dry place
- Display appropriate warning and hazard signs on storage facilities.

In addition, the siting of the storage facility, layout and construction of buildings shall be in conformance with building activities.

Modifying an existing storage facility

The following precautionary principles shall be followed during the modification /expansion of an existing storage facility:

- The building foundation and secondary-containment, floor shall be constructed of impermeable material & well drained and above the water table. Drainage should be provided around the building.
- Fertilizer shall be stored in a manner to prevent contamination with other products. (i.e. seed, pesticides, grain, etc.).
- If the storage facility is within 15m of a water body, the same shall be relocated.

Recommendation for Safe Loading & Unloading

Loading and unloading facilities shall be designed to (i) reduce the risk of dry fertilizer escaping to the environment, and (ii) permit easy cleanup of any spilled fertilizer. The following measures for safe loading and unloading shall be adopted:

- Surface of the loading and unloading areas shall be constructed of an impervious material (i.e. concrete or asphalt).
- The area shall be larger than the vehicles being loaded and/or unloaded. The perimeter area shall be sloped away from the loading or unloading area to permit rainwater to drain away (to prevent puddles). Spilled fertilizer shall be swept up and re-blended in a dry useable form.
- Loading and unloading techniques shall prevent unnecessary spillage of the fertilizer.
- Bagged fertilizer must be handled in a manner to prevent fertilizer from escaping to the environment. Torn bags should be re-packaged immediately.
- Spills should be cleaned up immediately or at the end of the day to avoid the potential for soil and groundwater contamination.
- All dry fertilizer should be reused and wet fertilizer should be properly reused and recycled

Handling and Storage of Pesticides

The following measures shall be complied with:

- Always Read the Label: Follow all safety precautions on the label. Wear protective clothing and use protective equipment according to instructions on the pesticide label.
- Be careful when handling pesticide spray materials to avoid spilling on skin or clothing. Should such an accident occur, wash immediately with soap and water.
- Avoid drift to non-target areas, which may endanger other plants or animals. Cover feed pans, troughs, and watering tanks in livestock areas.
- When selecting pesticides, keep in mind that the type of formulation and application equipment affects the potential for drift.
- Bathe or shower in hot, soapy water after applying pesticides.
- After applying pesticides, wash clothing, separate from other laundry, in hot, soapy water. Contaminated clothing must be handled with the same precautions as the pesticide itself.
- The washing of the containers of pesticides should not disposed off into any flowing water body or a water body used for drinking purpose.

Safety Measures for Personnel Handling Fertilizers and Pesticides

Towards ensuring adequate safety, personnel handling fertilizers / pesticides should use personal protective equipment, e.g. face shields or goggles, rubber aprons, long-sleeved shirts, rubber gloves and boots. In addition, the trader shall

- Adequately train all employees in the use of appropriate protective gear and equipment for handling products.
- Proper use of safety equipment and protective clothing for workers involved in handling and storage of fertilizers
- Use closed mixing/transfer systems for pesticide handling safety.
- Do not mix pesticide-contaminated clothing with family clothing.
- Hang clothing outside in direct sunlight and wind to dry when possible.
- Use strong detergents and hot water for washing. Run empty washer with detergent and hot water cycle to clean after washing contaminated clothing.
- Provide and use appropriate personal protection device when loading and mixing pesticides.
- Provide office or non-storage areas with separate exit doors from pesticide storage rooms.
- Properly ventilate and lighted storage areas.
- Provide Information of first aid and antidote to personnel handling fertilizer or pesticides.

Measures for users of small quantities of pesticides and for Department of Agriculture

Avoiding pesticide dependence: Efforts shall be made by the Agriculture Department to reduce the dependence of farmers on chemical pesticides through training & demonstration programmes of IPM. Programmes that raise awareness of the hazards of pesticides encourage users to treat pesticides with care, minimize their use, and manage them and their waste products cautiously.

Buying pesticides: Through training and awareness programmes, the agriculture department shall ensure that only the appropriate pesticide is purchased to prevent accumulation of unwanted stocks. The farmers shall seek advice from agricultural extension officers, Agriculture Service Centres. The product selected should not only be effective against the pest but should also be of a formulation that is appropriate to the type of application equipment used by the buyer. Products should be bought only when they are in their original, sealed containers and not in repacked containers and complete product label attached. The label should be in a local language and be clearly legible. Buyers should resist pressure from pesticide vendors to buy larger quantities than are needed, even if cost reductions are offered. Pesticides intended for use in major crops should not be used on other crops such as vegetables, or for the control of domestic pests.

Storing pesticides: Owners and end users of pesticides have a responsibility to store them safely so that they do not cause harm. Badly stored pesticides are likely to deteriorate and become unusable or obsolete. The following conditions should be adhered to when pesticides are stored in homes or on farms:

- Pesticides should be kept in a secure place to which children, animals or unauthorized people do not have access.
- They should not be stored in living or sleeping quarters
- They should be kept separately from all food, including animal feed, and away from water and water supplies
- They should be kept dry and out of direct sunlight
- They should be kept away from naked flames, e.g. fires or lamps.
- Storage places should be well ventilated.
- Pesticides should never be transferred into containers other than those in which they were supplied.
- Older products held in store should always be used before newly purchased products. Use-by dates on products should be strictly observed

Empty containers: The containers should be cleaned out as completely as possible. For liquid (e.g. emulsifiable concentrate) or solid (e.g. wettable powder) formulations that are diluted before application, containers should be triple-rinsed and the washings used as part of the product dilutant. Containers for dry application products should be emptied as completely as possible. Empty containers should not be used for any purpose other than storage of the pesticides that they originally contained. To prevent such misuses, schemes to collect empty containers by the traders to be insisted by the Agriculture department. Containers should be punctured to prevent reuse. Empty containers should not be burned or buried.

Unwanted pesticides: Unidentified or unusable pesticides should not be kept or used for any purpose. Neither should pesticides that are out of date or stored in damaged containers. Advice should be sought from pesticide suppliers/distributors. The department shall encourage pesticide suppliers/distributors to establish schemes for disposal. A list of banned pesticides is given below:-

List of pesticides banned by Government of India

S. No.	Name of Pesticides
1.	Aluminium Phosphide
2.	DDT
3.	Lindane
4.	Methyl Bromide
5.	Methyl Parathion
6.	Sodium Cyanide
7.	Methoxy Ethyl Mercuric Chloride (MEMC)
8.	Monocrotophos
9.	Endosulfan
10.	Fenitrothion
11.	Diazinon
12.	Fenthion
13.	Dazomet

List of pesticides not permissible (WHO classes Ia, Ib and II)

1. Extremely hazardous (Class Ia):

Common name	
Aldicarb	Ethoprophos
Brodifacoum	Flocoumafen
Bromadiolone	Hexachlorobenzene
Bromethalin	Mercuric chloride
Calcium cyanide	Mevinphos
Captafol	Parathion
Chlorethoxyfos	Parathion-methyl
Chlormephos	Phenylmercury acetate
Chlorophacinone	Phorate
Difenacoum	Phosphamidon
Difethialone	Sodium fluoroacetate
Diphacinone	Sulfotep
Disulfoton	Tebupirimfos
EPN	Terbufos

2. Highly hazardous (Class Ib):

Common name	
Acrolein	Oxydemeton-methyl
Allyl alcohol	Paris green
Azinphos-ethyl	Pentachlorophenol
Azinphos-methyl	Propetamphos
Blasticidin-S	Sodium arsenite
Butocarboxim	Sodium cyanide
Butoxycarboxim	Strychnine
Cadusafos	Tefluthrin
Calcium arsenate	Thallium sulfate
Carbofuran	Thiofanox
Chlorfenvinphos	Thiometon
3-Chloro-1,2-propanediol	Triazophos
Coumaphos	Vamidothion
Coumatetralyl	Warfarin
Zeta-cypermethrin	Zinc phosphide
Demeton-S-methyl	Famphur
Dichlorvos	Fenamiphos
Dicrotophos	Flucythrinate
Dinoterb	Fluoroacetamide

DNOC	Formetanate
Edifenphos	Furathiocarb
Ethiofencarb	Heptenophos
Isoxathion	Methiocarb
Lead arsenate	Methomyl
Mecarbam	Monocrotophos
Mercuric oxide	Nicotine
Methamidophos	Omethoate
Methidathion	Oxamyl

3. Moderately hazardous (Class II):

Common name	
Alanycarb	Endosulfan
Anilofos	Endothal-sodium
Azaconazole	EPTC
Azocyclotin	Esfenvalerate
Bendiocarb	Ethion
Benfuracarb	Fenazaquin
Bensulide	Fenitrothion
Bifenthrin	Fenobucarb
Bilanafos	Fenpropidin
Bioallethrin	Fenpropathrin
Bromoxynil	Fenthion
Bromuconazole	Fentin acetate
Bronopol	Fentin hydroxide
Butamifos	Fenvalerate
Butylamine	Fipronil
Carbaryl	Fluxofenim
Carbosulfan	Fuberidazole
Cartap	Gamma-HCH , Lindane
Chloralose	Guazatine
Chlorfenapyr	Haloxyfop
Chlordane	HCH
Chlorphonium chloride	Imazalil
Chlorpyrifos	Imidacloprid
Clomazone	Iminoctadine
Copper sulfate	Ioxynil

Cuprous oxide	Ioxynil octanoate
Cyanazine	Isoprocarb
Cyanophos	Lambda-cyhalothrin
Cyfluthrin	Mercurous chloride
Beta-cyfluthrin	Metaldehyde
Cyhalothrin	Metam-sodium
Cypermethrin	Methacrifos
Alpha-cypermethrin	Methasulfocarb
Cyphenothrin [(1R)-isomers]	Methyl isothiocyanate
2,4-D	Metolcarb
DDT	Metribuzin
Deltamethrin	Molinate
Diazinon	Nabam
Difenzoquat	Naled
Dimethoate	Paraquat
Dinobuton	Pebulate
Diquat	Permethrin
Phenthoate	Quizalofop-p-tefuryl
Phosalone	Rotenone
Phosmet	Spiroxamine
Phoxim	TCA [ISO] (acid)
Piperophos	Terbumeton
Pirimicarb	Tetraconazole
Prallethrin	Thiacloprid
Profenofos	Thiobencarb
Propiconazole	Thiocyclam
Propoxur	Thiodicarb
Prosulfocarb	Tralomethrin
Prothiofos	Triazamate
Pyraclofos	Trichlorfon
Pyrazophos	Tricyclazole
Pyrethrins	Tridemorph
Pyroquilon	Xylylcarb
Quinalphos	

6.1.5 Pest Management Plan

Objectives of Pest Management Plan (PMP)

The purpose of this document is to describe a Plan by which the project can promote and support safe, effective, and environmentally sound pest management in agricultural interventions undertaken under UPWSRP. The plan further presents components to strengthen such capacity. The Plan promotes the use of biological and environmental control methods and the reduction in reliance on synthetic chemical pesticides. Integrated Pest Management, including biological, botanical, chemical, and other approaches will be the preferred approach for the PMP.

Integrated Pest Management

Integrated Pest Management is the approach now being adopted worldwide to address the issue of excessive use of chemical pesticides in agriculture. The World Bank's Operational Policy 4.09 defines integrated pest management as a mix of farmer-driven, ecologically based pest control practices that seeks to reduce reliance on synthetic chemical pesticides. It involves

a) managing pests (keeping them below economically damaging levels) rather than seeking to eradicate them;

b) relying, to the extent possible, on non-chemical measures to keep pest populations low; and

c) selecting and applying pesticides, when they have to be used, in a way that minimizes adverse effects on beneficial organisms, humans, and the environment.

Tools of IPM

The main tools of IPM are:

Monitoring: Crop monitoring, that keeps track of the pests and their potential damage, is the foundation of IPM. This provides knowledge about the current pests and crop situation and is helpful in selecting the best possible combinations of the pest management methods. Pheromone traps have an advantage over other monitoring tools such as light and sticky traps. Being selective to specific pests, they have proven their usefulness in large scale IPM validations in cotton, basmati rice, chickpea and pigeon pea.

Pest resistant varieties: Breeding for pest resistance is a continuous process. At the same time the pests also, particularly the plant pathogens, co-evolve with their hosts. Thus, gene transfer technology is useful in developing cultivars resistant to insects, plant pathogens and herbicides. An example of this is the incorporation of genetic material from *Bacillus thuringensis* (Bt), a naturally occurring bacterium, in cotton, corn, and potatoes, which makes the plant tissues toxic to the insect pests. Scientific community is impressed by its huge potential in managing the pests, but is also concerned about the possibility of increased selection pressure for resistance against it and its effects on non-target natural fauna. However, due to ethical, scientific and social considerations, this potential technology has been surrounded by controversies.

Key Components of IPM

Given here below is an outline of a typical IPM plan:

- Identification of major pests & diseases for the crop in the area
- Identification of the minor pests & diseases for the crop in the area
- Assessment of ETL for major pests /diseases
- Pest monitoring based on Agro Ecosystem Analysis (AESA) and conjunctive use of pheromone traps, sticky traps, etc.
- IPM in action
    - Identification of pest & disease tolerant /resistant varieties
    - Cultural methods
    - Physical / mechanical methods
    - Biological methods
    - Bio-pesticides
    - Chemical methods (preferably use chemicals that are less toxic and have a shorter life after application

Cultural pest control: It includes crop production practices that make crop environment less susceptible to pests. Crop rotation, fallowing, manipulation of planting and harvesting dates, manipulation of plant and row spacing, and destruction of old crop debris are a few examples of cultural methods that are used to manage the pests. Planting of cover crops, nectar- producing plants and inter-planting of different crops to provide habitat diversity to beneficial insects are important management techniques. Cover crops, often legume or grass species, prevent soil erosion and suppress weeds. A cover crop can also be used as a green manure, which is incorporated in the soil to provide nitrogen and organic matter to the subsequent crop. When incorporated in the soil, some cover crops of the *Brassica* family have the ability to suppress nematode pests and wilt diseases. Left in the field as residues, rye and wheat provide more than 90 percent weed suppression. Cultural controls are selected based on knowledge of pest biology and development.

Physical or mechanical controls: These are based on the knowledge of pest behaviour. Placing plastic-lined trenches in potato fields to trap migrating Colorado potato beetles is one example of the physical control. Shaking of the pigeon pea plant to remove *Helicoverpa* larvae is a common practice in pigeon pea growing areas. Hand picking of insect pests is perhaps the simplest pest control method. Installation of dead as well as live bird perches in cotton and chickpea fields has proved effective in checking the bollworm infestation. Using mulches to smother weeds and providing row covers to protect plants from insects are other examples.

Biological controls: These include augmentation and conservation of natural enemies of pests such as insect predators, parasitoids, parasitic nematodes, fungi and bacteria. In IPM programmes, native natural enemy populations are conserved, and non-native agents may be released with utmost caution. *Trichogramma* spp. is the most popular parasitoids being

applied on a number of host crops. A number of microorganisms such as *Trichoderma* spp., *Verticillium* spp., *Aspergillus* spp., *Bacillus* spp. and *Pseudomonas* spp. that attack and suppress the plant pathogens have been exploited as biological control agents.

Chemical controls: Pesticides are used to keep the pest populations below economically damaging levels when the pests cannot be controlled by other means. Pesticides include both the synthetic pesticides and plant-derived pesticides. Synthetic pesticides include a wide range of man-made chemicals. These are easy to use, fast-acting and relatively inexpensive. Ideally, pesticides should be used as a last resort in IPM programmes because of their potential negative effect on the environment. Pesticides with the least negative impacts on non-target organisms and the environment are most useful. Fortunately, new generation pesticides with novel modes of action and low environmental effects are being developed and registered for use. Pesticides that are short-lived or act on one or a few specific organisms fall in this class.

Assessment of Economic Threshold Level: This is based on the concept that most plants can tolerate at least some pest damage. In an IPM programme where the economic threshold is known, chemical controls are applied only when the pest's damaging capacity is approaching the threshold, despite application of other alternative management practices.

Use of Botanical Pesticides: These can be prepared in various ways. They can be as simple as raw crushed plant leaves, extracts of plant parts or as complex as chemicals purified from the plants. Pyrethrum, neem, tobacco, garlic, and pongamia formulations are some examples of botanicals. Some botanicals are broad- spectrum pesticides. Botanicals are generally less harmful to the environment, because of their quick degrading property. They are less hazardous to transport. The major advantage is that these can be formulated on-farm by the farmers themselves.

Implementing PMP

The main crops grown in the targeted clusters could be maize, chickpea, green gram (moong), green pea, groundnut, moth bean, cluster bean, soybean, cumin, coriander, and fruits and vegetables like, pomegranate, guava and tomato, brinjal, cauliflower, cabbage etc. Example of biocontrol measures for some of the pests and diseases are given below:

- Use of Trichogramma cards @ 8 cards per ha at 15 days interval four times for management of stem rot in maize;
- seed treatment with Trichoderma @ 6 gm per kg seed for seed rot and fungal diseases in field in soybean; IPM package including proper spacing of 30 cm, seed rate of 80 kg/ha, use of sex pheromones @ 5 traps/ha for Spodoptera litura, and application of need based safer bio-pesticides for disease and pests in soybean are recommended.
- For girdle beetle, trap crop of dhaincha around field and at 20-20 meter distance in field, and for control of vector for tobacco mosaic virus, pheromone traps (5 per ha) and light trap (one in 5 ha) are recommended.
- For disease and insect pest management in groundnut, the IPM strategy includes soil and seed treatment followed by spray on the crop. Soil amendment with neem cake @ 250 kg/ha preferably 15 days before sowing, and soil application of Trichoderma

harzianum @ 4.00 kg/ha incubated in 50 kg FYM for 15 days and applied before sowing; seed treatment with imidacloprid @ 2 ml/kg seed and T. harzianum @ 10 gm/kg seed; followed by foliar spray of mancozeb @ 2 gm/l at the time of 1st appearance of leaf spot disease are recommended.

- For management of fruit borer in tomato and brinjal, use of 2.5 Trichogramma cards per ha at 45 days crop stage, 5-6 times at 7 days interval has shown good management. Also, in tomato, trap crop of marigold after every eight rows of tomato is beneficial.
- The PMP package for cauliflower and cabbage includes soil application of T. harzianum through FYM (250 kg/ha), neem cake @ 50 g/m2 in nursery, soil solariztion, seed treatment with T. harzianum @ 4g/kg seed, sowing on raised beds, seedling dip in T. harzianum @ 4g/lt., monitoring population of S. litura and Plutella xylostella through pheromone traps, hand picking of larvae and egg masses of S. litura, application of biopesticides such as NPV and NSKE and need based application of low risk insecticides like novaluron, cartap hydrochloride, spinosad, emamectin benzoate and mancozeb/ridomil.

UPWSRP (with support from various SAU's and ICAR research centres) has the capability in terms of sourcing inputs and knowledge to implement IPM in the project. Under UPWSRP, the following steps are being proposed.

Awareness creation: A multimedia approach that includes Kiosks, Print and e-media, Manuals, pamphlets, brochure, SMS over Mobile phones and Farmers fairs/group discussions would be used to create awareness about PMP in study area in UPWSRP.

Input management: Inputs for IPM start with selection of the right varieties and seeds. In addition, PMP is more effective when coupled with NMP and appropriate irrigation management. Therefore, UPWSRP would provide support through the Farmer Water Schools to source required inputs such as seeds of pest resistant varieties, biofertilizers, biocontrol agents, biopesticides, etc.

Capacity building: In order to train a large no. of farmers, a Farmer Water Schools program will be implemented, based on the Farmer Field School approach. Master Trainers would be trained at the District Level. They in turn would train FWS facilitators, who would support establishment of FWS in the minors. The FWS is specifically designed to target the area below the outlet as a mechanism to introduce improved agronomic and water management practices, and also to develop the institutional capacity of those farmers for water management and operation and maintenance of their own systems. The FWS will run for the entirety of a cropping cycle (i.e. kharif, rabi and zaid) to give farmers a better understanding of crop and water management in the different seasons (under varying water availability conditions) and the impact of good management on one season to the next. The FWS will consist of a group of 20 – 30 farmers serving about 15 – 20 ha of a single outlet. The FWS is made up of core activities, including integrated pest management. The farmers will have a degree of autonomy over decisions such as the specific crop technology they would like to test, the fixing of training sessions, etc.
In addition to the emphasis on FWS, the agricultural component under the project will also support (i) a limited number of demonstrations/adaptive research trails, (ii) field level physical works related to improved water use efficiency, (iii) field days (block level), (iv)

exposure visits, (v) staff capacity development, and (vi) purchase of equipment (such as tensiometers and leaf color charts).

Mainstreaming PMP in UPWSRP

Training, demonstrations, FWS, input incentives, etc., for implementing IPM in UPWSRP has been provided in the mainstream budget since the activity has been adopted as a mainstream activity. In addition, PMP should be included as a specific Toolkit and use the following monitoring indicators to be assessed periodically as part of internal monitoring, external audit as well supervision missions from the World Bank:

- % of farmers who have adopted all components of PMP
- % reduction in use of chemical pesticides over baseline in l/Ha.
- % increase in friendly pest population over baseline situation

As can be noted, the monitoring indicators cover both adoption as well as knowledge of IPM among UPWSRP farmers.

6.1.6 Nutrient Management Plan

Nutrient Management Plan (NMP)

The most appropriate strategy for increasing fertilizer use efficiency is to practice NMP. The basic principle of NMP is the maintenance of soil fertility, sustaining agricultural productivity and improving farmers' profitability through the judicious and efficient use of mineral fertilizers, organic manures and bio-fertilizers. The NMP package has area-specific implications depending upon the availability and performance of the various components.

BOX 1: Benefits of Plant Nutrient Management

- Helps achieve highest production per unit of investment by way of reducing unavoidable losses due to leaching and volatilization.
- Helps reduce toxicity, which happens due to excessive use of single nutrients.
- Helps in quality production besides enhancement of Benefit Cost (B/C) ratio.
- Provides natural safeguard against biotic and abiotic stresses.
- Soils using only chemical fertilizer exhibit declining productivity per unit of plant nutrient used.
    - Using only major nutrients (NPK) results in deficiencies of micro and secondary nutrients.
    - Helps maintain soil health through organic matter and results in better fertilizer use efficiency.
    - Organic manures and plant residues are available locally and thus if managed properly are cost effective.

The interventions underlying NMP shall include:

- Adoption of soil-test based optimum nutrient use levels, ensuring adequacy of P level to meet the competitive demands of crops and P-fixation capacity of soils
- Working model for integration of organic manures and NPK fertilizers for sustainable high yields/farmers' resource - based target yields.
- Inoculation of soybean and other legume seeds.
- Inclusion of legumes in rotation.
- Adoption of improved (modern) crop management practices to ensure cultivation of HYV, timely sowing and adequate crop stand establishment, timely weed control and plant protection, and proper water management.
- Technical training courses at village level for improving farmers knowledge base. The training shall focus on concept and contents of NMP, integration of organic and inorganic resources in consideration of farmers' resource base for mobilizing various nutrient sources, improvement of quality and quantity of FYM, making use of NADEP compost system, including vermiculture and use of bio-fertilizers. (Extension agencies and NGOs shall be involved in organizing training courses).
- Working in close collaboration with NGOs, on orienting farmers to organic and biodynamic farming approach involving the use of FYM, green manures, crop residues, vermin-compost, bio-fertilizers and bio-pesticides while understanding their resources and targeted yields.

- Facilitating certification and marketing of certified organic produces with appropriate price premiums through Department of Agriculture.
- Facilitating the adoption of NMP in general and organic farming in particular, and for monitoring of practices adopted in producing organic products, keeping full track of production processes and products from field to sale point as well as for arranging organic certification and marketing.

Procedures for Preparation of NMP

The proposed activities related to NM are to be taken up by an external agency including monitoring and evaluation (facilitated by the ID/ PACT and Agriculture Specialist). This team would evaluate the NMP component for effectiveness and scaling-up implications. Procedures for Preparation of NMP are presented below:-

Procedures & Indicators for NMP

Sub-Projects Stages	Procedures	Agency	Process, Outcomes & Impact Indicators (Monitoring Agency)
Pre-Planning Stage	Preparation of Thematic Maps on Agriculture, Soil, Geology, Water Resources, Fertilizer use, Pesticide use, etc. of sub-projects areas	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of agriculture related features (Agricultural Expert)
	Sensitization through joint walk through and consultations to identify cropping patterns, survey, types of fertilizer, pesticide use etc.	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of all sensitive issues and banned agrochemicals (Environmental & Agricultural Experts)
	Identification of environmental and social impacts inclusion of the concerns into ESMP	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of all likely impacts of agricultural practices related to agriculture & requirements of IPM plan (Environmental, Social & Agricultural Experts)
Planning and design stage	Joint walk through, consultations and PRA techniques to disclose concerns related to existing agricultural practices	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of Spatial and Non spatial issues (Agriculture expert)
	Training on IPM along with projects benefits to the farming community & alleviate apprehension related to productivity due to change in water regime in the catchment and command area	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of safe guard measures (Agriculture expert)
Implementation and post-implementation stage	Setting up information Kiosks, Organic Certification of Agricultural products,	Department of Agriculture helped by UPID/PACT &	Number of Kiosks, Certified Products, Demonstration Projects, Levels and types of pesticide in soil & water

Sub-Projects Stages	Procedures	Agency	Process, Outcomes & Impact Indicators (Monitoring Agency)
	Demonstration	Agriculture Expert	(Environmental & Agriculture Expert)
	Projects with approved agro-chemicals only, Training material restricted to mention of approved agro-chemicals only, pesticide etc.	Department of Agriculture helped by UPID/PACT & Agriculture Expert	

The following components can be considered as parts of the NMP, and can be adopted as per need, resource and local conditions:

- Nitrogen Fixing Plants
- Bio-fertilizers
- Organic Manure
- Vermiculture

It is recommended that FAO/ UN Sponsored concept of Farmer Field School (FFS) approach should be followed to promote a comprehensive programme towards the use of farm waste and low chemical input for soil fertilization, as well as NMP as means to promote sustainable agriculture with low cost of production and high profitability. State Agriculture Universities, Krishi Kendra (KK), NGOs and other support agencies could be tapped for technical support.

Conclusion

The issues, challenges and the proposed plan for sustainable agriculture development in the irrigated areas under UPWSRP-2 have been elaborated in the proceeding sections. A summary of these is presented below:-

Issues, Suggested Reforms and Responsible Agencies for Sustainable Agriculture in Project Area

Issues	Suggested Reforms	Agency Responsible
Intensity of land use as reflected by the cropping intensity is low in general and even lower in irrigated areas	Identification and introduction of short duration, low water duty crops for different project areas for second season	Agriculture Department, PACT, NGOs.
Large gap in gross culturable area and actual irrigated area in the state and in different project areas	Introduction of crops planning and water budgeting for farmers failing under the project area	Agriculture Department, PACT
There is environmental degradation of cultivable lands in the project area which is adversely affecting sustainability of crop production	Effective steps of soil conservation and soil reclamation need to be taken up	Soil Conservation Division of the Agriculture Department, PACT
Imbalance use of fertilizers, Higher application in certain crops like sugarcane and much below optimal application in others like coarse cereals, oil	Integrate INM with balance use of inorganic and organic manure	Agriculture Department, PACT

seeds, pulses. This has resulted in inefficient use of chemical fertilizers resulting in lower crop productivity		
Major crops in irrigated area are paddy, wheat, bajra, gram, sugarcane and fruits and vegetables which account major percent of the irrigated area.	Diverse cropping system should be made available to the farmers to irrigate different crops	Agriculture Department, PACT
Guidance for use of modern techniques for agriculture production is missing	Need to provide extension services for transfer of technology along with the efficient use of water by the ID	Agriculture Department, PACT
Lack of crop planning among the farmers since the availability of the irrigation water is not certain	Proper development of the information system and maintenance of the roster schedule	Agriculture Department, PACT

6.1.7 Health and Safety Management Plan (HSMP)

The safety and health concerns of the workers and the general public are impacted due to the hazards created during the construction of road. The detailed HSMP describes the hazards and measures that need to be taken to mitigate the impacts and is shown below.

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	To address health and safety concerns, the DPR shall contain selection criteria for setting up: – Construction – Borrow Areas	Contractor	Executive Engineer
2	To address the safety concerns to road user during operational phase, the DPR shall contain the following: – Selection and location of regulatory as well as informatory signs as per IRC: 67-2001, depending upon the geometry of the road. – Provision of passing places and parapet wall shall be included in road design		Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
Pre Construction Stage			
1	In order to incorporate public health and safety concerns, Contractor shall disseminate the following information to the community: • Location of construction camps, borrow areas and new quarry areas. • Extent of work • Time of construction • Diversions, if any • Precaution measures in sensitive areas • Involvement of local labours in the road construction • Health issues —water stagnation, exposure to dust, communicable disease • Mechanism for grievances	Contractor	Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
2	The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding: – Personal safety measures and location of safety devices. – Interaction with the host community – Protection of environment with respect to: 1. Trampling of vegetation and cutting of trees for cooking 2. Restriction of activities in forest areas and also on hunting 3. Water bodies protection 4. Storage and handling of materials 5. Disposal of construction waste	Contractor	Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
Construction Phase			
1	During the progress of work, following are the safety requirements that need to be undertaken by the contractor at the construction site: - Personal safety equipments (such as footwear and gloves) for the workers - All measures as per bidding document shall be strictly followed - Additional provisions need to be undertaken for safety at site: o Adequate lighting arrangement o Adequate drainage system to avoid any stagnation of water o Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the storage and	Contractor	The EE or *his* appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
	handling area of bitumen and oil, as well as at the location of generator (grease trap). o Facilities for administering first aid		
2	The following measures need to be adopted by the contractor to address public safety concerns: – The Contractor shall schedule the construction activities taking into consideration factors such as: 1. Sowing of crops 2. Harvesting 3. Local hindrances such as festivals etc 4. Availability of labour during particular periods – All the cautionary signs as per IRC: 67-2001 and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed. – Following case specific measures need to be followed during the progress of the activity: 1. Incase of blasting, the Contractor must follow The Explosives Rules, 1983.	Contractor	
Post Construction Phase			
1	During this stage a major concern is on road user *safety*. Following are the measures that need to be undertaken by the EE or his appointed representative not below the rank of AE to ensure safer roads: – Inspection and maintenance of installed regulatory and informatory signs – Ensure that the location of signage does not obstruct the visibility – Incase of hill roads, maintenance of parapet wall as well as of overtaking zone	UPID	The EE or his appointed representative not below the rank of AE must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users. The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users.

Environmental Health and Safety Management Plan

S. No.		Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility
1.	Occupational Health and Safety (OHS)	– Fire Fighting – Adequate Water Supply – Medical Facility – Road Access	– Fire Hazards – Health Problems – Stress on workers – Accident/Casualty	– Fire suppression and control includes all automatic and manual such as Automatic sprinkler systems and Manual portable extinguishers – Alarm system should be installed – Provision of Potable Water Supply at site – Provision of Clean Eating Area – Provision of Lighting – Provision of Safe Access – Provision of First Aid Box	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		– Communication & Training		– Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees. – Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation and natural disaster – Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		– Rotating & Moving Equipment – Heavy Machinery Handling and Haulage of Machinery - Material Handling & Storage - Transport of Materials – Debris Disposal	– Vibration - Air/Noise Pollution - Water Pollution - Soil Pollution - Workers and local people exposure - Impact on Human health – Water Delivery Reduction Interruption	– Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions – Turning off, disconnecting, isolating, and de-energizing machinery – Provide safety measures (mask, gloves, hat etc) – Organize health camps – Follow proper operation and handling measures to minimize exposure – Head phones, ear plugs to be provided to the workers at construction site.	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		– Labor Camp	– Workers and local people exposure – Impact on Human health –	- Provide safety measures (mask, gloves, hat etc) to minimize exposure - Provide sirens in vehicles to avoid any collision with human/animals - Organise awareness programs on environmental resource management - Organise Health camps	Contractor/EHS officer	Executive Engineer	Third Party / PACT

S. No.		Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility
				- Child labour must be strictly prohibited - Provide signages near work sites - Locate handling sites away from populated areas - Follow proper operation and handling measures to minimize exposure - Routine medical check up of Field staff and labours - Provision of potable drinking water at site - Provision of proper sewage and waste disposal system. Sanitation facilities have to be provided at the camp sites.. - First aid facilities to be provided at the construction camps. Any case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellant to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. - Head phones, ear plugs to be provided to the workers at construction site. - All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective eye shields - Adequate precaution must be taken to prevent danger from electrical equipments			
2.	Community Health and Safety	- Water Quality & Availability	- Health Problem - Stress on workers -	- Drinking water sources should be protected from air emissions, wastewater effluents, oil and hazardous materials, and wastes. - Drinking water sources, whether public or private, should provide (135 liters per person per day) at all times through Tankers - Drinking water quality provided should meet National Drinking Water Standards (IS:10500)	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		– Waste water & Sanitation	– Unhygienic Condition – Health Problems – Air Pollution – Water Pollution – Soil Pollution	- Provide mobile toilet at site - Consider provision of systematic, regular collection of fecal sludge - Use appropriate collection vehicles - Wastewater and fecal sludge should not be disposed off in or near any water bodies -	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		– Solid Waste/Hazardous	– Health Problems – Air Pollution	– Dump solid waste in specified place to minimize contamination of water	Contractor/EHS officer	Executive Engineer	Third Party / PACT

S. No.		Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility
		waste	– Water Pollution – Soil Pollution	– Discharge wastewater at authorized locations and after treatment – Proper labeling of containers, including the identify and quantity of the contents, hazards, and shipper contact information – Implement a training program for workers – Continuously monitor air quality in work areas for hazardous conditions – Hazardous/solid waste should be managed as per MSW Rule-2000, and Hazardous waste – Providing the necessary means for emergency response on call 24 hours/day			
		– Diseases Prevention	– Communicable Diseases – Vector-Borne Diseases	– Providing surveillance and active screening and treatment of workers – Preventing illness among workers in local communities by: **1.** Undertaking health awareness and education initiatives **2.** Training health workers in disease treatment **3.** Conducting immunization programs for workers in local communities to improve health and guard against infection – Elimination of unusable impounded water – Increase in water velocity in natural and artificial channels – Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites – Monitoring communities during high-risk seasons to detect and treat cases	Contractor/EHS officer	Executive Engineer	Third Party / PACT/PHC
		– Structural safety of project infrastructure	– Physical trauma associated with failure of building structures – Burns and smoke inhalation from fires – Injuries suffered as a consequence of falls or contact with heavy equipment – Respiratory	– The following issues should be considered and incorporated as appropriate into the planning, siting, and design phases of the project: – Inclusion of buffer strips or other methods of physical separation around project sites – Incorporation of siting and safety engineering criteria to prevent failures due to natural risks posed by earthquakes, wind, flooding, landslides and fire – Application of locally regulated or internationally recognized building codes – Engineers and architects responsible for designing and constructing facilities, building, plants and other structures should certify the applicability and appropriateness of the	Contractor/EHS officer	Executive Engineer	Third Party / PACT

S. No.		Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility
			distress from dust, fumes, or noxious odors – Exposure to hazardous materials	structural criteria employed			
		– Life and fire safety for new buildings or rehabilitated buildings accessible to the public	– Injuries	– Project sponsors' architects and professional consulting engineers should demonstrate that affected buildings meet the life and fire safety objectives – Life and fire safety systems and equipment should be designed and installed using appropriate prescriptive standards and/or performance based design, and sound engineering practices – Life and fire safety design criteria for all buildings should incorporate all local building codes and fire department regulations	Contractor/EHS officer	Executive Engineer	Third Party / PACT
3.	Traffic Management	– Vehicle Movement	– Health Problems – Injuries – Air Pollution – Water Pollution – Soil Pollution	– Emphasizing safety aspects among drivers – Improving driving skills and requiring licensing of drivers – Adopting limits for trip duration and arranging driver rosters to avoid overtiredness – Avoiding dangerous routes and times of day to reduce the risk of accidents – Providing the necessary means for emergency response on call 24 hours/day – Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure – Where the project may contribute to a significant increase in traffic along existing roads: collaboration with local communities to improve signage, visibility and overall safety of roads, employing safe traffic control measures such as road signs and flag persons	Contractor	Executive Engineer	Third Party / PACT

Format 10: Safety Check list

(To be filled by the Contractor)

6. **Name of Canal…….**
7. **Name of Nearest Human Settlement……**
8. **Name of Contractor……..**
9. **Name of Safety Officer (if any)**
10. **Date of Submission…….**

1. **Location 1, 2 ,3**

– **Adequate at time of Inspection (Y/N)** – **Needs Improvement** – **Needs Immediate Attention**	**Location 1**			**Location 2**			**Remarks**
General	A	B	C	A	B	C	
Stacking of Material							
Lighting							
Fire Prevention							
Fire Fighting Appliance							
Dust Control							
Noise Control							
First Aid Equipment							
Washing Facility							
Latrine							
Safety Shoes							
others							

Remarks:……

……

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

6.1.8 Cultural Properties Plan

Cultural properties can be located close to the service road and might be impacted by construction activities. Most of the properties are avoided in general during implementation of interventions. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) which are given below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Measures for mitigation of impacts on cultural properties during project preparation shall be as per the following steps: – Identification of locally significant cultural properties should be done – Assessment of likely impacts on each cultural property due to project implementation – The extent of impact on the identified culture property should be assessed and possible measures for avoidance should be devised based on the site investigation	Contractor	Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
2	– Incase impact is not avoidable, identification of alternative routes or possibility of relocation of the culture property shall be assessed in consultation with the local public, based on the economic feasibility – Incase of relocation, relocated site should be suggested by the local people and the size of relocated structure should at least be equal to the original structure. – A detailed design of the relocated structure and its site plan along with the necessary BOQ are to be presented in DPR. The relocation and other avoidance measures should be carried out before the start of the road work.		– Monitoring of all activities by the EE or his appointed representative not below the rank of AE. – It must be ensured by the EE or his appointed representative not below the rank of AE that the BOQ and rates are incorporated into the contract document.
Construction Phase			
1	Following are precautionary measures that need to be undertaken by the contractor while working near these structures: – Provision of temporary barricades to isolate the precincts of the cultural property from the construction site shall be devised by the Engineer to avoid impacts. – Restrict movement of heavy machinery near the structure – Avoid disposal or tipping of earth near the structure – Access to these properties shall be kept clear from dirt and grit	Contractor	The EE or *his* appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.
2	Information to be collected:- – Location – Direction (North/South/East/West) With Respect to Road – Distance of the structure from existing centerline of the road – Type of Property eg: temple/mosque/shrine/dargah etc – Plan of the structure – Importance ofthe structure historical/social/archeological – Ownership of the property – Probable loss to the property – Specific periods/durations in which large congregations as festivals/mela take place causing hindrance to vehicular movement – Choice of community, issue of relocation	Contractor	
2	– During earth excavation, if any property is unearthed and seems to be culturally significant or likely to have archeological significance, the same shall be intimated to the Engineer (**Use Format**	Contractor	

	10) – The State Archeological Department shall be intimated of the chance find and the Engineer shall carry out a joint inspection with the department. Actions as appropriate shall be intimated to the Contractor along with the probable date for resuming the work		
Post Construction Phase			
1	– Immediately after completion of construction, the Contractor will affect clearance of the precincts of cultural properties. – Incase access to any of the cultural properties is severed during construction; it needs to be restored at the Contractor's cost.	UPID	The EE or his appointed representative not below the rank of AE shall certify restoration of all road links as well as relocated properties before final payment is made

Format 11: Details of Earthwork

(To be filled by the Contractor)

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement……**
3. **Monthly Report for Each Borrow Area under use……..**
4. **Date of Submission……..**

	Name of Village	Drainage (km)	Haul road length (m)
I			
II			

Details of Borrow Areas

1	Capacity of the Borrow Area	
2	Total quality of the Earth Excavated (in cum)	
3	Quantity of Top Soil removed from the Borrow Areas	
4	Location of Top Soil stored removed	
5	Quantity of Top Soil utilized at the end of the month	
6	Total quantity of earthwork reused in cum. (5%)	
7	Location disposal (if other than sites) (Specify clearly on a location plan)	
8	Outline a rehabilitation plan for each of the exhausted borrow areas with special reference to Erosion Protection Measures. Also, submit at separate detailed rehabilitation plan for exhausted borrow areas for approval supported adequately with layouts, plans and drawings.	

Remarks:……

……

Submitted	**Checked**	**Approved**
Signature…….	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Assistant Engineer UPID**	**Executive Engineer, UPID**

6.1.9 Tree Plantation Plan

This EMP elaborates on the approach towards planting trees on service roads. Emphasis is laid on a greater involvement of communities and Gram Panchayats in planting and maintenance of roadside trees. Planting of fruit bearing and other suitable trees along the roads improve aesthetics and ecology of the area besides, the trees provide fuel wood, act as noise barriers, provide visual screen for sensitive areas and also generate revenue by sale of its produce.

However, certain precautions must be taken in design of avenue or cluster plantation so that the trees do not have an adverse impact on road maintenance and/or on safety of the road users at Project Planning and Design Stage.

Due consideration shall be given to minimise the loss of existing tree cover, encroachment of forest areas / protected areas etc, "Project Preparation". Tree felling, if unavoidable, shall be done only after requisite permission have been obtained. Tree plantation shall be carried out by the Volunteers identified by EE of the district or his appointed representative not below the rank of AE under the supervision of Nodal NGO.

Plant trees along roads here there is…
– Availability of land for planting
– Availability of water
– Willingness of PRI to nurture the saplings

A roadside landscape plan shall be prepared by the JE as part of the DPR, and shall be finalised by EE or his appointed representative not below the rank of AE in consultation with the State Forest Department and PRI. The plantations shall be in accordance with the IRC:SP:2l-1979 Manual on Landscaping and IRC :66-1976. The plan may be in the form of avenue trees or cluster plantation.

The species shall be identified in consultation with officials of forest department, giving due importance to local flora, It is recommended to plant mixed species in case of both avenue or cluster plantation.

Consultations for the identification of volunteers for tree plantation and maintenance shall be conducted with the PRI. The identified volunteers will be entitled of any revenue generated out of these planted trees. It shall be the responsibility of the EE or his appointed representative not below the rank AE to work out institutional mechanisms for disbursing the cost, managing the plantation and upkeep of trees.

Do not plant tress…
– Within the line of sight around junctions
– On the inside of curves
– Within 5 m of the proposed centre line

The plantation strategy shall suggest the planting of fruit bearing trees and other suitable trees. Development of cluster plantations will be encouraged in the Gram Sabha lands, at locations desired by the community. The choice of species will be based on the preference of the community.

Fruit bearing indigenous species requiring less maintenance shall be chosen to ensure a higher survival rate. Necessary budgetary provisions shall be made in the cost estimates prepared the roads to include tree plantation and their maintenance.

Post-construction stage

Planting of saplings from the nurseries as per the landscape plan and the subsequent maintenance of the trees planted shall be carried out by the identified volunteers. Planting shall be undertaken immediately after rainy season or initial weeks of spring.

Watering of trees during the initial period of two to three years shall be the responsibility of the identified volunteers. For the protection of planted tress against the animals, Bamboo tree guard shall be provided. The payment to volunteers shall be made based on the number of survival trees after evaluation by EE and the Nodal NGO.

The activities to be taken up as part of maintenance shall include: (i) cutting/lopping branches up to a height of 2.5m above ground level to ensure visibility (ii) Removal of dead wood from the roadway and storing away from roads, and (iii) Weed cutting from shoulders and keeping the shoulders free from any growth of vegetation. In addition, the volunteers are to ensure a healthy survival rate by planting replacement saplings in cases where the survival rate is less than 80%.

It shall be the responsibility of the Nodal NGO to make community aware for fruit and timber harvesting rights and responsibilities of the planted trees in conformance with Forest Management Rule.

The Executive Engineer or his appointed representative not below the rank of AE shall ensure that the shoulders of the road shall be kept clear of weeds or any undesirable undergrowth, which may hinder free flow of traffic. It also be ensured that the branches of the trees do not obstruct clear view of the informatory and caution signs. Deciduous trees shed leaves every season. It is necessary to keep the roadway clear of such debris. Some gaps should be Left in avenue plantation to ensure that the carriageway dries up early after an occasional shower.

6.1.10 Silt Disposal Plan

This plan is required for handling, reuse and disposal of silt during construction. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Carry out the following measures for DPR: – Finalize design to minimize silt generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal. – Identify the type of silt suggest options for possible reuse – Provide instructions to the contractor for locating silt disposal sites including landfill site. – Include in the bid document, as a special condition clause stating that all provisions of guideline shall be applicable to the locations of disposal of silt.	UPID	– Executive Engineer (EE) or his appointed representative not below the rank of AE
Pre Construction Phase			
1	– Identify the activities during construction, that have the potential to generate silt and work out measures for the same in the construction schedule to be submitted to the EE or his appointed representative not below the rank of Assistant Engineer – For the disposal of excess cut and unsuitable, the contractor shall identify the location for disposal in consultation with the community / Gram Sabha. Prior to disposal of silt onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community.	Contractor	The EE or *his* appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.
Construction Phase			
1	– Either reuse or dispose the silt generated during construction depending upon the nature of silt – These could be embankment fill or usage as soil conditions if its characteristics support soil rejuvenation. The reuse of silt shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the silt materials, and getting the same approved by the EE. – In case of filling of low-lying areas with silt, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken that these low lying areas are not used for rainwater storage	Contractor	The EE or *his* appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.
Post Construction Phase			
1	– After decommissioning of construction sites, the Contractor shall hand over the site after clearing the site of all silt to the EE or his appointed representative not below the rank of AE (**Use Format 3**) – In case of disposal of silt on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction"**.** The same is to be submitted to the EE before final payment is claimed (**Use Format 2**).	Contractor	The EE or his appointed representative not below the rank of AE shall certify restoration of all road links as well as relocated properties before final payment is made

Practices to avoid - silt disposal
Tipping of silt into stream channels, water location of disposal site as well as the bodies, forests and vegetated slopes Non-cleaning of silt after day's work Littering in construction camps / sites Storing silt on private land

Format 12: Identification of Disposal Site Locations
(To be filled by Contractor)

3. **Name of Canal…….**
4. **Name of Nearest Human Settlement……**

Sr. No.	Criteria on which information for each site is to be collected	Site 1	Site 2	Site 3	Site 4
1.	Existing Land use				
2.	Area				
3.	Total material than can be dumped within the site (m^3)				
4.	Distance from Nearest Watercourse				
5.	Nearest Settlement (m)				
6.	Whether the community is agreeable to siting of dumping site (Y/N)				

Remarks:……
……
……
……
……

Submitted	Checked	Approved
Signature……..	**…….**	**……..**
Name……	**……**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

6.1.11 Biodiversity Offsets Plan

Identified Impact: Canal rehabilitation would improve irrigation service delivery and reduce seepage and water loss. This could adversely impact formation of seasonal small and nondescript wetlands that provide localized habitats for amphibians and birds (waders, kingfishers and bee eaters).

Suggested Mitigation: The project would set aside US$ 4 million for improving the management of wetlands of significance that are present in some of the project districts to offset any loss of biodiversity due to project investments at least to the level that biodiversity is likely to be lost so that no net loss of biodiversity happens.

S. No.	Process Step	Specific Action	Responsible Agency
1.	**Sets aside US$ 4 million as Biodiversity Offset**	Create a separate line item in cost table under Environment and Social Safeguards	PACT
2.	Undertake extensive mapping of canal bank wetlands to identify impacts on specific species (measuring anticipated loss)	Contract a reputed experienced agency that has scientific and policy experience in wetlands management and research	PACT
3.	Preparation of wetlands management plans (including updating of any existing plans) for wetlands if significance	Contract a reputed experienced agency that has scientific and policy experience in wetlands management and research	PACT in consultation with State Biodiversity Board and State Forest Department
4.	Provide financial support from the Biodiversity Offset fund to implement the wetlands management plans	**Option 1:** Contract a reputed experienced agency that has scientific and policy experience in wetlands management and research to help provide technical support in implementation of the wetlands management plans **Option 2:** Transfer funds directly to the State Forest Department for implementing the wetlands management plan **Option 3:** Transfer funds to the State Biodiversity Board for providing technical support for implementing the wetlands	PACT in consultation with State Biodiversity Board and State Forest Department

S. No.	Process Step	Specific Action	Responsible Agency
		management plan ***Note: In exercising any of the options 1,2 or 3, PACT would be responsible for monitoring the implementation of the wetlands management plan milestones, outputs and outcomes. This will be part of overall project reporting arrangements to the World Bank.***	
5.	Monitor, document, record and publish the implementation of the wetlands management plan	Prepare annual reports and **disclose publically**	Any of the agency as per Option 1, 2 or 3 under b/4 above

The Biodiversity Offset fund would also be used for any other loss of biodiversity observed/identified during implementation of the project.

6.1.12 Canal Rehabilitation Plan

Component B of the project will rehabilitate and modernize irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. For parts of the system, rehabilitation and modernization will be taken up to the outlet level. For other parts of the system, only branches will be taken up.

To mitigate potential environmental and social impacts on account of canal rehabilitation, the following EMPs should be implemented:

Sr. No. of EMP	Name of EMP
6.1.1	Construction Labor Camp
6.1.3	Construction Plants & Equipment Management Plan
6.1.10	Silt Disposal Plan
6.1.7	Environmental Health and Safety Plan
6.1.2	Waste Management Plan
6.2	Rehabilitation and Resettlement Policy Framework

Format-13

Monitoring of culvert opening and longitudinal drains
(To be filled by the Contractor)

1. **Name of Canal…….**
2. **Name of Nearest Human Settlement……..**
3. **Date of Submission……..**

Sr. No.	Structural No.	Pre monsoon	Date	Post monsoon	Date
Name of the Canal System					
1.					
2					
3					
4					
5					
6					
7.					
8					
9					
10					
11					
12					
13					

Remarks:……

……

Submitted	Checked	Approved
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

Format-14
Enhancement Measures
(To be filled by the Contractor)

1. **Name of Canal……**
2. **Name of Nearest Human Settlement……**
3. **Date of Submission……**

Sr. No.	Drainage System Name	Name of the Site	Canal	Consent Taken (Y/N)	Total Budget		Date start of work	Remarks
					Total	Utilized		

Remarks:……

……

Submitted	Checked	Approved
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**……**
Contractor	**Environmental Engineer Supervision Party**	**Executive Engineer, UPID**

Resettlement Policy Framework 6.2

A **Resettlement Policy Framework (RPF)** is required when the extent of resettlement cannot be known at appraisal stage. This framework provides for any situation that may arise where need for temporary or permanent land acquisition or resettlement and rehabilitation is inevitable. Resettlement and compensation activities should be conceived and executed in a sustainable manner. The RPF is intended for use as a practical tool, to guide the preparation of the Resettlement Action Plan (RAP) or the Abbreviated Resettlement Plan (ARP), depending upon the scale and severity of impacts.

The objective of the RPF is to ensure that the Project Affected Persons (PAPs) get compensation for their loss, are offered resettlement measures, and are supported in improving or at least restoring their levels of living and income after the project impact to pre-project levels. The RPF is intended to safeguard the interests of the population impacted by the project, especially the poor and vulnerable. The RPF is based on applicable Policies.

1. Potential Impact of Project Activities

UPWSRP Phase II component having potential land impact is the rehabilitation and modernization of irrigation and drainage systems. The activities under this component are unlikely to involve any need for land acquisition or resettlement and rehabilitation, as the infrastructure already exists. In the rare event that this would be the case, the RPF will be applied and implemented.

Possible impacts can be categorized in three broad groups:

- Loss of immovable assets i.e. agricultural land, homestead, cattle sheds, wells, ponds, trees, commercial establishments, community infrastructure etc.;
- Loss of livelihood or income opportunity on account of loss of agricultural land.
- Impact on the community in terms of loss of common property resources such as grazing land, other common land, village commons or forests or access to it.

The impacts can be either temporary (for the duration of construction activities) or permanent.

2. Legal Framework

The RPF is prepared in accordance with:

- Land Acquisition Act, 1894.
- World Bank guidelines as set out in the Operational Policy OP 4.12 on Involuntary Resettlement.
- Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997
- National Rehabilitation and Resettlement Policy, 2007
- Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001.
- Government Oder No. 1252/1-13-10-20 (29)/ 2004, 17 August 2010 laying out Uttar Pradesh Rehabilitation and Resettlement Policy

- Government Oder No. 1307/1-13-10- (29)/ 2004, 03 September 2010 regarding Uttar Pradesh Rehabilitation and Resettlement of families affected in Land Acquisition Matters
- Government Order No. 1666/1-13-2010-18-1(95)/10, 01 December, 2010 regarding quick procedure for land acquisition and Government Order No. 71-1/13-11-7-3(1)/90-59T.C.-1, 04 February, 2011
- Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011 laying out Uttar Pradesh Land Acquisition Policy
- Government Order No. 2386/12-27 –I-3-28L/12, 08 October, 2012 regarding land to be taken for various irrigation projects by mutual agreement and determine compensation

These Government Policies and Orders are presented in Volume II – Annexcure 6.2 A.

2.1 World Bank guidelines

World Bank guidelines seek to ensure that, throughout its life, the project fully complies with the principle that any involuntary loss of assets or relocation of economic activities or residence, are minimized and fully compensated, and that adequate procedures exist for prior consultation of all affected persons, assessment of losses and entitlements, handling complaints and disputes, and monitoring the outcomes. In particular it provides that the outcomes conform to the principles of full and prior compensation for any lost assets and full restoration of standards of living of those that are directly and adversely affected. The guidelines also applies to those who lack legal or formal ownership of affected assets and they are entitled to fair compensation and all other forms of assistance (housing, social services etc.).

2.2 National Rehabilitation and Resettlement Policy, 2007

Key features of the National Rehabilitation and Resettlement Policy, 2007, are the following:

- Policy covers all cases of involuntary displacement;
- Social Impact Assessment (SIA) introduced for displacement of 400/200 or more families in plain/tribal, hilly, Scheduled Areas, etc;
- Tribal Development Plan in case of displacement of 200+ ST families;
- Consultations with Gram Sabha or public hearings made compulsory;
- Principle of rehabilitation before displacement;
- If possible, land for land as compensation;
- Skill development support and preference in project jobs (one person per nuclear family);
- Rehabilitation Grant in lieu of land/job;
- Option for shares in companies implementing projects to affected families;
- Housing benefits to all affected families including the landless;
- Monthly pension to the vulnerable, such as disabled, destitute, orphans, widows, unmarried girls, etc;

- Monetary benefits linked to the Consumer Price Index; also to be revised suitably at periodic intervals;
- Necessary infrastructural facilities and amenities at resettlement areas;
- Periphery development by project authorities;
- R&R Committee for each Project, to be headed by Administrator for R&R;
- Ombudsman for grievance redressal; and
- A National Rehabilitation Commission.

2.3 Government Oder No. 1252/1-13-10-20 (29)/ 2004, 17 August 2010

The major features of 2010 Uttar Pradesh Rehabilitation and Resettlement Policy relevant to the project are given below:

- Each of the project affected family whose entire land has been acquired for the project is entitled for one time compensation equivalent to five years of minimum agriculture wages for loss of livelihood.

- Each of the project affected family whose land has been acquired partially and who has become marginal farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 500 days of minimum agriculture wages for loss of livelihood.

- Each of the project affected family whose land has been acquired partially and who has become small farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 375 days of minimum agriculture wages for loss of livelihood.

- Agriculture and non agriculture farmers whose land has been acquired partially due to acquisition of land in the project area are entitled for one time compensation equivalent to 625 days of minimum agriculture wages for loss of livelihood.

- In addition to the above compensation, each of the project affected family which has been displaced will be given one time compensation equivalent to 250 days of minimum agriculture wages for loss of livelihood.

- Each of the project affected family will be given housing facility in case of emergency acquisition of land under section 17 of Land Acquisition Act, 1894 till such time that the RAP is prepared & implemented.

- PAF will provide adequate facilities for capacity building & skill development for self employment under to start for self employment.

- The policy further prescribes the organizational structure for land acquisition, and related conflict resolution and its implementation.

2.4 Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011

The Government Order lays out Uttar Pradesh Land Acquisition Policy. The general policy for taking land for all purpose will be that the land be purchased directly from the land owners on the basis of mutual understanding/agreement arrived at between the land owners & the acquisition bodies by following the relevant rules/orders relating to the purchase of land. For implementation of infrastructure projects in public sector, the process of land acquisition would be initiated by following the Rules & Regulations as provided in the Land Acquisition Act 1894, but the compensation of land would be fixed by mutual consent as per the provisions of The Uttar Pradesh Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997 and the land owners would be given all the benefits of the Rehabilitation &Resettlement Policy 2010.

In addition to these benefits, the following benefits shall also be available to land owners:

- **Annuity**

(a) Every land owner, whose land has been acquired shall be given annuity @ Rs. 23000/= per acre per year in addition to compensation amount.
(b) The amount of annuity of Rs. 23000/= shall be increased by Rs. 800/= per acre every year in the month of July.
(c) The land owner, who does not want to take annuity, shall be given Rs. 2,76,000/= per acre in lump sum as rehabilitation subsidy.

- A Kisan Bhawan (Farmer Resource Centre) would be constructed by the developer agency of the project at its own cost in every village affected by land acquisition so that the land owners can have a building for their community requirements.

- A scheme of at least one model school (up to class 8) with play ground would be started in the project area & the building for it would be constructed by the developer of the project at its cost for providing education below poverty line, who are affected by the land acquisition.

- The developed land given to the land owners as compensation shall be exempted from stamp duty and registration fee payable on registration.

- If the affected land owners purchase any agricultural land in the State within a period of one year from the date of receiving the compensation, then in that case, they shall be exempted from paying the stamp duty and registration fee on its registration up to the value of compensation received.

2.5 Government Order No. 71-1/13-11-7-3(1)/90-59T.C.-1, 04 February, 2011 and Government Order No. 1666/1-13-2010-18-1(95)/10, 01 December, 2010

These Government Orders apply to the quick procedure for land acquisition. Government Order of 01 December, 2010, states that the basis for invoking this quick procedure should be supported by appropriate data and permissions. Government Order of 04 February, 2011, states that the quick procedure should be evoked under extreme emergency conditions only.

2.6 Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001

The Policy is based on the following principles:

- Avoid or minimize acquisition of land and other assets and reduce negative social and environmental impacts. In an effort to minimize the losses, where ever possible explore all viable alternative project design. Efforts should be made towards the enhancement of the positive impact of the projects, especially for the PAPs;
- Wherever negative impacts are unavoidable, efforts should be made either to improve the standard of living of the affected persons or at least assist them in restoring their previous standard of living at no cost to them;
- Lack of ownership or title to the acquired project does not deprive the affected persons to get support in their resettlement and rehabilitation;
- People's participation in planning their own resettlement and rehabilitation enabling them opportunities to share development benefits is central to resettlement and rehabilitation. The affected population should be involved throughout the process of planning and implementation of resettlement programs;
- Integration of the resettling population with the host community should be ensured, enabling them to share the development benefits and also blend within the planning framework, the requirement of necessary infrastructure on account of the added population pressure and the possible future population growth;
- In planning for the resettlement and rehabilitation, care should be taken to preserve the interest of women, youth and other interest groups and particularly the traditional land rights and customs. In case of tribals, specific Indigenous People's Development Plans need to be prepared to address their issues;
- Support will be extended under the policy to meet the replacement cost of the assets;
- If after acquisition, the remaining asset becomes operationally non-viable the remaining portion will be acquired and compensated at replacement cost;
- No construction activities will be initiated unless the land and properties are compensated and support extended for R & R;
- While planning for developing resettlement sites for displaced community from the project it should be ensured that there are no adverse social, economic and environmental effects of displacement on the host communities through consultation during the process planning and implementation. Wherever required specific measures will be taken to meet the additional demand for resources.

The Policy describes the procedures to follow, the process for land acquisition and payment of compensation, assistance provided, and guidelines for planning and implementing Rehabilitation and Resettlement, as well as the organizational structure and monitoring and post-project evaluation.

2.7 Summary table

A summary of the various Government Policies and Orders is given below:-

Act/Policy/Guidelines	Summary	National/ State
Land Acquisition Act, 1894	It is applicable whenever it appears to the [appropriate Government] the land in any locality [is needed or] is likely to be needed for any public purpose [or for a company]. **Taking Possession** **Power to take possession. -** When the Collector has made an award under section 11, he may take possession of the land, which shall thereupon [vest absolutely in the [Government], free from all encumbrances. **Special powers in case of urgency**. – **(1)** In cases of urgency whenever the [appropriate Government], so directs, the Collector, though no such award has been made, may, on the expiration of fifteen days from the publication of the notice mentioned in section 9, sub-section 1). [take possession of any land needed for a public purpose]. Such land shall thereupon [vest absolutely in the [Government], free from all encumbrances. **(2)** Whenever, owing to any sudden change in the channel of any navigable river or other unforeseen emergency, it becomes necessary for any Railway Administration to acquire the immediate possession of any land for the maintenance of their traffic or for the purpose of making thereon a river-side or ghat station, or of providing convenient connection with or accesses to any such station, [or the appropriate Government considers it necessary to acquire the immediate possession of any land for the purpose of maintaining any structure or system pertaining to irrigation, water supply, drainage, road communication or electricity,] the Collector may immediately after the publication of the notice mentioned in sub-section (1) and with the previous sanction of the [appropriate Government], enter upon and take possession of such land, which shall thereupon [vest absolutely in the [Government]] free from all encumbrances. **(3)** In every case under either of the preceding sub-sections the Collector shall at that time of taking possession offer to the persons interested compensation for the standing crops and trees (if any) on such land and from any other damage sustained by them caused by such sudden dispossession and not excepted in section 24; and, in case such offer is not accepted, the value of such crops and trees and the amount of such other damage shall be allowed for in awarding compensation for the land under the provisions herein contained. **Temporary Occupation of Land** **Temporary occupation of waste or arable land**. Procedure when difference as to compensation exists. - **(1)** Subject to the provisions of Part VII of this Act, whenever it appears to the [appropriate Government] that the temporary occupation and use of any waste or arable land are needed for any public purpose, or for a Company, the [appropriate Government] may direct the Collector to procure the occupation and use of the same for such term as it shall think fit, not exceeding three years from the	National

	commencement of such occupation. **(2)** The Collector shall thereupon give notice in writing to the person interested in such land of the purpose for which the same is needed, and shall, for the occupation and use thereof for such term as aforesaid, and for the materials (if any) to be taken there from, pay to them such compensation, either in a gross sum of money, or by monthly or other periodical payments, as shall be agreed upon in writing between him and such persons respectively. **(3)** In case the Collector and the persons interested differ as to the sufficiency of the compensation or apportionment thereof, the Collector shall refer such difference to the decision of the Court. **Power to enter and take possession and compensation on restoration.** - **(1)** On payment of such compensation, or on executing such agreement, or on making a reference under section 35, the collector may enter upon and take possession of the land, and use or permit the use thereof in accordance with the terms of the said notice. **(2)** On the expiration of the term, the Collector shall make or tender to the persons interested compensation for the damage (if any) done to the land and not provided for by the agreement, and shall restore the land to the persons interested therein: Provided that, if the land has become permanently unfit to be used for the purpose for which it was used immediately before the commencement of such term, and if the persons interested shall so require, the [appropriate Government] shall proceed under this Act to acquire the land as if it was needed permanently for a public purpose or for a Company. **A copy of this Act is attached in Annexure 6.2A.**	
World Bank OP 4.12	The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). In the rare event that this is needed, the provisions of Bank OP4.12 shall be invoked in consonance with the UP State R&R Policy. A Resettlement Policy Framework has been prepared under this project. This OP is applicable to the project. **A copy of this policy is attached in Annexure 6.2A**.	World Bank
Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997	The body or Department for which the land if being acquired may, at any stage of the proceedings settle down the terms and conditions and rates of the land under acquisition, with the land owners and appear before the Collectors and make an application indicating the terms and conditions so settled down and its readiness and willingness for determination of compensation and declaration of award in accordance with agreement. The Collector shall, if satisfied, issue notice to the persons interested in the land under acquisition to express their readiness and willingness to execute the agreement in writing, on the matters to be included in the award. **A copy of this rule is attached in Annexure 6.2A**.	State
National Rehabilitation and Resettlement Policy, 2007	The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). In the rare event that this is needed, the provisions of UP State R& R Policy shall be invoked. A Resettlement Policy Framework has been prepared under this project. This National Policy is not applicable to the project. **A copy of this policy is attached in Annexure 6.2A**.	National
Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001	The Policy describes the procedures to follow, the process for land acquisition and payment of compensation, assistance provided, and guidelines for planning and implementing Rehabilitation and Resettlement, as well as the organizational structure and monitoring and post-project evaluation. **A copy of this policy is attached in Annexure 6.2A**.	
Government Oder No. 1252/1-13-10-20 (29)/ 2004, 17 August 2010 laying out Uttar Pradesh Rehabilitation and	The major features of 2010 Uttar Pradesh Rehabilitation and Resettlement Policy relevant to the project are • Each of the project affected family whose entire land has been acquired for the project is entitled for one time compensation equivalent to five years of minimum agriculture wages for loss of	State

Resettlement Policy	livelihood. • Each of the project affected family whose land has been acquired partially and who has become marginal farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 500 days of minimum agriculture wages for loss of livelihood. • Each of the project affected family whose land has been acquired partially and who has become small farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 375 days of minimum agriculture wages for loss of livelihood. • Agriculture and non agriculture farmers whose land has been acquired partially due to acquisition of land in the project area are entitled for one time compensation equivalent to 625 days of minimum agriculture wages for loss of livelihood. • In addition to the above compensation, each of the project affected family which has been displaced will be given one time compensation equivalent to 250 days of minimum agriculture wages for loss of livelihood. • Each of the project affected family will be given housing facility in case of emergency acquisition of land under section 17 of Land Acquisition Act, 1894 till such time that the RAP is prepared & implemented. • PAF will provide adequate facilities for capacity building & skill development for self employment under to start for self employment. • The policy further prescribes the organizational structure for land acquisition, and related conflict resolution and its implementation. **A copy of this policy is attached in Annexure 6.2A**.	
Government Order No. 71-1/13-11-7-3(1)/90-59T.C.-1, 04 February, 2011 and Government Order No. 1666/1-13-2010-18-1(95)/10, 01 December, 2010	These Government Orders apply to the quick procedure for land acquisition. Government Order of 01 December, 2010, states that the basis for invoking this quick procedure should be supported by appropriate data and permissions. Government Order of 04 February, 2011, states that the quick procedure should be evoked under extreme emergency conditions only. **A copy of this policy is attached in Annexure 6.2A**.	State
Government Oder No. 1307/1-13-10- (29)/ 2004, 03 September 2010	The Government Orders apply to Uttar Pradesh Rehabilitation and Resettlement of families affected in Land Acquisition Matters. **A copy of this policy is attached in Annexure 6.2A**.	State
Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011 laying out Uttar Pradesh Land Acquisition Policy	The Government Order lays out Uttar Pradesh Land Acquisition Policy. The general policy for taking land for all purpose will be that the land be purchased directly from the land owners on the basis of mutual understanding/agreement arrived at between the land owners & the acquisition bodies by following the relevant rules/orders relating to the purchase of land. For implementation of infrastructure projects in public sector, the process of land acquisition would be initiated by following the Rules & Regulations as provided in the Land Acquisition Act 1894, but the compensation of land would be fixed by mutual consent as per the provisions of The Uttar Pradesh Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997 and the land owners would be given all the benefits of the Rehabilitation &Resettlement Policy 2010. **A copy of this policy is attached in Annexure 6.2A**.	State
Government Order No. 2386/12-27 –I-3-28L/12, 08 October, 2012	The Government Orders apply to land taken for various irrigation projects by mutual agreement and determine compensation. **A copy of this policy is attached in Annexure 6.2A**.	State

3. Definitions

As per Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001:

Project-Affected Person (PAP): a person who is affected on account of the land acquisition or appropriation of land home stead land and structures thereon and loss of trade and occupation and livelihood due to construction of the project.

Project Displaced Persons: the persons who have lost total livelihood derived from the assets affected by the project and/or have become homeless.

Project Affected Family:

- Affected person and his/her spouse and minor children;
- Every son irrespective of his marital status above the age of 18 years;
- Every unmarried daughter above the age of 18 years;
- Divorced, widowed, abandoned, separated or single unwed mother living separately;
- Disabled and orphans.

Encroacher: a person who has trespassed Government/ private/ community land to which he/ she is not entitled to.

Squatter: a person who has unauthorisedly settled on the land or building for shelter or livelihood.

Land less/ agriculture labor: a person who does not hold any agricultural land and has been deriving his main income by working on the land of others on wage labor.

Vulnerable Persons include the following:

- The people living Below Poverty Line (BPL) as defined by the Government of India;
- Members of the Schedule Caste/ a Tribe community/ Other Backward Caste;
- Women headed households;
- Orphans and destitute;
- Disabled and aged;
- Landless persons.

Cut-Off Date:

- The date of issuing notice under section 4(1) of the Land Acquisition Act of 1984 and its amendments for titleholders.
- For the non-title holders the cut- off date is the date of Census Survey which should be completed 2 years prior to the section 4(1) notice under the L.A. Act.

4. Principles and objectives of RPF

The RPF is based on the following principles and objectives:

- Involuntary resettlement and land acquisition will be avoided where feasible, or minimized, by exploring all viable alternatives.

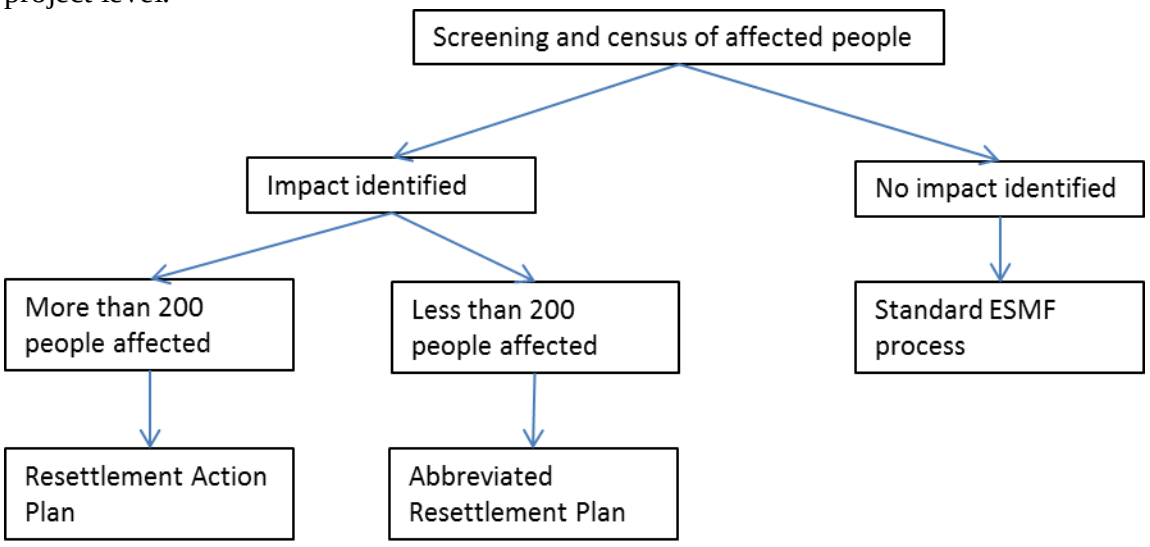
- Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities will be implemented. Project Affected Persons will be meaningfully consulted and will have opportunities to participate in planning and implementing resettlement and compensation programs.
- Project Affected Persons will be assisted to improve their livelihood and standards of living or at least to restore them prior to the beginning of the project.
- The transition period will be minimized in the resettlement process.
- Compensation shall be paid and efforts will be made to complete the R&R of PAPs/PDPs before taking possession of the land/properties.

The RPF describes the details of entitlements and type of assistance to be extended to the affected persons, which will become the basis for preparing the Resettlement Action Plan (RAP) or Abbreviated Resettlement Plan (ARP) depending on number of displaced persons as per OP 4.12.

5. Overview of the RPF process

5.1 Application of RPF

The following figure presents an overview of the identification/review process under this RPF to address specifically land impacts and displacement/resettlement needs at sub-project level.



5.2 Screening of sub-projects and census of affected assets and households

During the project preparation, alternative designs will be examined to minimize acquisition of land and other assets and to reduce negative socioeconomic impacts. All sub projects shall be screened for their likely adverse impacts in the Planning Stage. A sample screening format is given in Form – 1. Where land acquisition must take place, and whatever the

extent of the land acquisition, a census will be carried out to inventory affected assets and affected households.

If the issues related to resettlement are triggered, the RAP/ ARP will have to be prepared for the concerned sub project. Such a plan shall be prepared at the Planning and Design Stage of the project preparation. The RAP and ARP contain the implementation details on how to ensure that principles and provisions of this policy can be implemented. The plan is based on up-to-date and reliable information about (a) the proposed resettlement and its impacts on the displaced persons or adversely affected groups, and (b) the legal issues involved in resettlement.

5.3 Resettlement Action Plan (RAP)

The Resettlement Action Plan will be used where more than 200 individuals are displaced. All RAPs need World Bank approval prior to commencing resettlement activities. The outline of RAP as per Uttar Pradesh Water Sector Rehabilitation and Resettlement Policy is given below.

A socio-economic base line survey should be conducted within two years of the publication of the section 4(I) notification of Land Acquisition Act and should include:

- Identification of the affected area through maps and consultations with the local communities. This will form the basis for issuing of identity cards to the eligible families.
- Baseline survey - census verification of 100% of the affected population and the loss of properties.
- A detailed sample socio-economic survey including consultation, focus group discussions, etc.
- A survey among the host community to identify issues relating to the relocation of displaced population.
- Identification and analysis of social structures, norms, customs, cultural centers, traditional rights including those related to common properties and practices, leadership pattern, social networking.

The entire plan for resettlement should be prepared by the project authorities in consultation with all stakeholders including local representatives, NGOs/CBOs and PAPs. The RAP will include:

- Description of the sub-project and its potential land impacts
- Main objectives of the resettlement program
- Legal and institutional framework
- Baseline census of affected people and their losses, including:
    - Results of the census survey covering current occupants of the affected area to establish a basis for the design of the resettlement program and to exclude subsequent inflows of people from eligibility for compensation and resettlement assistance;

- Standard characteristics of displaced households, including a description of production systems, labor, and household organization; and baseline information on livelihoods (including, as relevant, production levels and income derived from both formal and informal economic activities) and standards of living (including health status) of the displaced population;
- Magnitude of the expected loss-total or partial-of assets, and the extent of displacement, physical or economic;
- Information on vulnerable groups or persons, for whom special provisions may have to be made; and
- Provisions to update information on the displaced people's livelihoods and standards of living at regular intervals so that the latest information is available at the time of their displacement
- A description of land tenure and transfer systems, common property resources
- Patterns of social interaction in the affected communities
- Public infrastructure and social services that will be affected
- Social and cultural characteristics of displaced communities

- Eligibility. Based on this RPF, definition of displaced persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates.
- Valuation of and compensation for losses, including the methodology to be used in valuing losses to determine their replacement cost as per applicable Policies; and a description of the proposed types and levels of compensation and such supplementary measures as are necessary to achieve replacement cost for lost assets.
- Resettlement measures and assistance, alternatives for economic rehabilitation
- Planning for relocation: identification of New Resettlement sites in consultation with the displaced and host population, identification of the necessary infrastructure and common properties to be developed at the new sites, arrangements during shifting and transition period, specific issues related to women, tribals and other vulnerable groups
- Planning for economic rehabilitation: identification of livelihood alternative feasible in the area in consultation with the affected community with emphasis on the needs of the vulnerable groups particularly women, tribal and others; the focus should be on land based activities and where such possibilities are not feasible, identification of alternate opportunities and provision of both backward and forward linkages for the success of restoration of livelihood.
- Participatory framework
- Mechanism for implementation, monitoring and grievance redress
- Implementation schedule
- Budget

The executive summary of RAP should be translated in the local language and widely communicated.

A sample Terms of Reference (ToR) for carrying out social assessment & preparing RAP as part of DPR is given in Form – 2.

5.4 Abbreviated Resettlement Plan (ARP)

The Abbreviated Resettlement Plan will be used where less than 200 individuals are displaced. The outline of an ARP is given below. The project must keep documentation and provide reports that detail what actions were taken in these areas. All ARPs need World Bank approval prior to commencing resettlement activities.

The abbreviated resettlement plans should briefly present:

- The project activity necessitating acquisition of land or any other assets, and the nature and extent of that acquisition, with justification and minimization, including sketch maps
- Census Survey of Affected Persons and Valuation of Assets:
  - Methodology
  - Affected Persons and Assets
  - Socio-Economic Features and Affected People's Livelihoods
- Description of compensation, entitlements, and other resettlement assistance according to the different categories of impacts and a corresponding table of compensation entitlements with the nature and bases of compensation rates as per applicable Policies
- Consultation with affected persons about acceptable choices and alternatives
- Mechanism for implementation, monitoring and grievance redress
- Implementation schedule
- Budget

The abbreviated plan (except for the amounts of monetary awards) shall be made publicly available in local language, and other media as appropriate, and in locations accessible to the affected people.

6. Affected assets, affected people, entitlements, and compensations

Together with land, other assets which could potentially be impacted by construction of a subproject include the following:

- Immovable assets: buildings, other structures (wells, channels, etc...), crops (perennial and annuals), trees.
- Right of way.
- Livelihoods.

Entitlements and compensations will be as per applicable Policies presented in section 2.

The compensation for the land and properties to be acquired shall be paid according to the provisions of the Land Acquisition Act, 1894 amended and Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011.

All affected assets and related affected people located within the footprint of a sub-project shall be inventoried. The R&R assistance will be extended to only those PAPs who are identified on or prior to the cut-off date. Only affected assets identified during the census will be eligible for compensation. All PAPs will be entitled to R&R assistance over and above the compensation received under the Land Acquisition Act. The non-titleholder PAPs are not entitled for compensation (encroachers and Squatters) but will get Rehabilitation and Resettlement (R&R) assistance.

Other key entitlements and compensations as per Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001 are the following:

- Wherever possible, land for land for agriculture purposes will be provided. The size of the alternate agricultural land provided will not be less than the average landholding in the district.
- In case of shops and houses, the size of the alternate plots will be:
  - (a) 100 sq. mt. for plots greater than 100 sq. mt.
  - (b) 50 sq. mt. for plots below 100 sq. mt.
  - (c) 25 sq. mt. for shops.
  - (d) these alternate plots will be free of cost for the vulnerable.
- Alternate agricultural lands/ houses/ shops will be in the joint name of husbands and wives. Cost of registration of the sale deed to that effect would be borne by the project authority
- If the residual land is less than the average land holding in the district (as determined by the Revenue department, GOUP), the owner of the land shall have the right to seek acquisition of his entire contiguous holding. Similarly if the residual part of the structure becomes unlivable/ unusable, the owner shall have the right to seek acquisition of the left over part.
- The Policy lays out provisions for the calculation of replacement costs.
- Compensation of trees will be based on their market value in case of timber bearing trees and in case of fruit bearing trees, as per the rates decided by the competent authority in consultation with the Department of Agriculture, Forest, Horticulture, Sericulture etc. as the case may be.
- The value of houses, buildings and other immovable properties of the Project Displaced Persons (PDPs) and Project Affected Persons (PAPs) shall be determined for the purpose of payment of compensation, without deducting the depreciation value.
- The PDPs and PAPs shall hand over the land and properties acquired to the Government free from all encumbrances such as mortgage, debt, etc., pertaining to the lands and properties acquired. However, in case of any loans on such acquired lands and properties given to the PAP by any Govt. agency remains unadjusted as per the information furnished by the PAPs or by the loaner agency, then such amounts shall be deducted out of total compensation.

- If compensation for structures is less than the cost of Weaker Section Housing scheme of the Government of India, then the difference will be paid as *ex-gratia.*
    - Fixing up the market value of homestead land will be as per the replacement cost considered for agricultural land.
    - The houseless displaced families will be 2tssisted to get shelter under Weaker Section Housing Scheme of the Government of India free of cost
- Additional economic rehabilitation grant calculated for one-year income level as determined by the Planning Commission, Government of India, for the below poverty-line (BPL) level will be provided for the affected vulnerable families.
- Allowances shall be provided for Project Displaced Persons; these allowances are listed in the Policy.
- The R&R activity in respect of the tribal people should be adapted to their needs and environment Customary rights and land tenure system of the tribal PDPs and PAPs should be protected.
- If the project impact leads to people being unable to continue, with the previous occupation, the project will provide support and assist through alternative employment strategies that are acceptable to the Project Displaced Persons. Long-Term earning opportunities will be provided through strategies such as vocational training, employment counseling, inclusion in income generating schemes, and access to credit, etc.
- Training for skill upgradation or those related to income generation will be provided as a part of rehabilitation assistance. Training for up-gradation of skills to enable the PDPs and PAPs to begin new livelihood, through income generation programs with the help of NGOs.
- Compensation for the properties belonging to the community or for common places of worship, which are acquired for the project shall be provided to enable construction of the same at the new place through the local self-governing bodies. The replacement will be in kind through community participation.
- New settlement sites with necessary infrastructure for relocating displaced families and will be close to the original place of habitation.
    - The resettlement site should be selected with the majority of the displaced persons agreeing for the site, with no secondary displacement involved.
    - Every effort will be made to ensure that the land is developed for the new housing site, the plots are drawn and allocated to the individual displaced families, as per their entitlements.
    - Wherever the PDPs do not opt for such site, and prefer cash, then assistance in lieu of the house site/shop will be given to them.
    - At the new resettlement centers, basic civic amenities as listed by the Government of India, viz drinking water, internal and link roads, medical facilities, schools, electricity etc. will be provided along with any other amenities which the PDPs enjoyed at their abandoned place.
    - Special attention will be given to ensure that alternative arrangements will be made for those people whose livelihoods were dependent on public lands.

UP Policy, 2001, also provides for other assistance:

- The affected population will be assisted in getting their names included in the voter's lists of the area of their resettlement.
- For the purpose of treating the divorces and widows having no source of livelihood as separate family, benefits like old age pension etc, availed off by them should not be taken into account.
- The project will ensure that PAPs get preference in job with the contractors during the construction phase.

7. Implementation Arrangements

For each sub-project, the Executive Engineer in charge, UPID, will be responsible for implementation of the RPF. He will be assisted as required by PACT and will coordinate with the revenue department for all Land Acquisition issues. The RAP and ARP will be approved by PACT.

Efforts will be made to ensure consultation, involving the people, Non-Government Organizations (NGOs) and stakeholders in planning, implementing and monitoring of the project. Separate consultations should be held with vulnerable people including tribals. All these consultations should lead to minimize risks involved and develop appropriate mitigation measures.

The transition period will be minimized in the resettlement process. Personal and individual attention will be paid towards assisting affected families during their resettlement.

Compensation shall be paid and efforts wil1 be made to complete the R&R of PAPs/PDPs before taking possession of the land properties. Also, sufficient time will be provided to harvest the standing crops.

Payment of compensation and other R&R monetary assistance through cheques should be carried out in a totally transparent manner, in village meetings in presence of Gram Pradhan (Village headman) and other villagers.

Funding for RPF Activities

All the cost of resettlement activities will be met from the sub-project cost. Detailed R&R cost estimates will be developed based on the proposed mitigation measures proposed and will be included in the project cost at the sub-project level.

Grievance Redress Mechanisms

Grievance Redress Mechanisms will be as per applicable Policies.

In particular, the National Resettlement Policy, 2007, states that in each concerned district, the State Government shall constitute a standing Rehabilitation and Resettlement Committee under the chairpersonship of the District Collector or, as the case may be

Deputy Commissioner of the district, to monitor and review the progress of rehabilitation and resettlement of the affected families in the district.

In accordance with UP Water Sector Rehabilitation and Resettlement Policy, 2001, the Committee shall include representation from the affected community.

The National Policy also states that an Ombudsman shall be appointed by the appropriate Government, in the manner as may be prescribed, for time-bound disposal of the grievances arising out of the matters covered by this policy. Any affected person, if aggrieved, for not being offered the admissible rehabilitation and resettlement benefits as provided under this policy, may move an appropriate petition for redressal of his or her grievances to the Ombudsman concerned.

The grievance redress mechanism should be in place at the time of initiating the implementation of RAP and civil construction activities in the area

8. Monitoring and Evaluation

Uttar Pradesh Water Sector Resettlement Policy, 2001, requires that, during and on completion of the R&R work, project authorities will monitor the progress of the resettlement and rehabilitation activities and its impact on the PAPs and the host population. The socio-economic survey undertaken during the project preparation will provide benchmarks for comparison on the socioeconomic status of the PAPs in the post-project period. Regular monitoring of physical and financial aspects of the project will be conducted by the project by UPID. Baseline, mid-term, and final impact evaluation of resettlement and rehabilitation implementation process will be carried out by the external M&E agency with the participation of the representative; of the PAPs/ PDPs themselves. Suggestions made in the evaluations report will be incorporated in the RAP/ revised RAP to make the R&R programs more effective.

Involuntary Resettlement Screening Form - 1

Screening Questions for Resettlement Categorization

Project Title:……..

Probable Involuntary Resettlement Effects*	Yes	No	Not Known	Possible	Remarks
Will the project include any physical construction work?					
Does the project include upgrading or rehabilitation of existing physical facilities?					
Are any project effects likely lead to loss of housing, other assets, resource use or incomes/livelihoods?					
Is land acquisition likely to be necessary?					
Is the site for land acquisition known?					
Is the ownership status and current usage of the land known?					
Will easements be utilized within an existing Right of Way?					
Are there any non-titled people who live or earn their livelihood at the site or within the Right of Way?					
Will there be loss of housing?					
Will there be loss of agricultural plots?					
Will there be losses of crops, trees, and fixed assets?					
Will there be loss of businesses or enterprises?					
Will there be loss of incomes and livelihoods?					
Will people lose access to facilities, services, or natural resources?					
Will any social or economic activities be affected by land use-related changes?					
If involuntary resettlement impacts are expected:					
1. Are local laws and regulations compatible with World Bank's Involuntary Resettlement policy?					
2. Will coordination between government agencies be required to deal with land acquisition?					
3. Are there sufficient skilled staff in the Executing Agency for resettlement planning and implementation?					
4. Are training and capacity-building interventions required prior to resettlement planning and implementation?					

*Whenever possible, consider also any future subprojects or investments.

Information on Affected Persons:

Any estimate of the likely number of households that will be affected by the Project?

[ ] No [ ] Yes If yes, approximately how many?

Are any of them poor, female-heads of households, or vulnerable to poverty risks?

[ ] No **[ ]** Yes If yes, please briefly describe their situation:

Are any Affected Persons from indigenous or ethnic minority groups? If yes, please explain:

Submitted	**Checked**	**Approved**
Signature……..	**…….**	**……..**
Name……	**…….**	**……..**
Designation……..	**……..**	**……**
Contractor Survey & Design	**Assistant Engineer**	**Executive Engineer**
Or **Assistant Engineer UPID**	**UPID**	**UPID**

Form – 2: Indicative Outline Terms of Reference for Social Assessment

This template provides the outline of terms of reference for conducting the socio-economic base line survey for rehabilitation and resettlement under a sub-project activity and preparing the required Resettlement Action Plan (RAP).
In case only an Abbreviated Resettlement Plan (ARP) is needed, the scope of work and description of tasks to be carried out should be adapted.

Background information

Include a brief presentation of the sub-projects considered, their intended objectives, a description of major activities, implementing agency(ies), current status and timetable, and describe any associated existing programs or schemes.
Describe the likely extent of rehabilitation and resettlement under the sub-project (estimate the number of people concerned and the corresponding land area).

Objectives

The objective of the consultancy is to conduct the social assessment for rehabilitation and resettlement under the sub-project considered, to carry out the required socio-economic baseline survey and to prepare the required RAP/ ARP.

Some of the key principles for the Consultancy are the following:

- The Consultancy will be guided by the Resettlement Policy Framework attached to this TOR.
- The consultant will assess the likely positive and negative social impacts, particularly on vulnerable groups, of the reconstruction activities planned and assess the level of awareness, concerns and attitudes of people towards these planned activities.
- The Consultant shall strive to ensure transparency, accountability, and stakeholders participation in the process.
- The feasibility and acceptability of the new relocation sites, the efficiency and equity of implementation mechanism, maintaining good relation with host population at new relocation sites and special needs of the vulnerable groups (women, widows, children, lower castes, physically challenged people, etc.) are some the important issues that will be examined during the social assessment process.

Scope of work

Summarize the scope of the social assessment and discuss its timing in relation to the sub-project preparation, design and implementation.

Tasks to be carried out

Describe in the final ToR the specific tasks expected from the agency conducting the assessment, for example:

Task 1: Description of the methodological framework and work-plan
Task 2: Description of the proposed sub-projects and their intended social outcomes
Task 3: Brief description of the socio-cultural, institutional, historical and political context; assess legislative and regulatory considerations and role of local government
Task 4: Data collection and analysis – quantitative surveys, focus group discussions, key informant interviews and triangulation of data, use of statistical techniques, use of consultative and participatory approaches
Task 5: Analysis of key social issues –for example, diversity and gender issues, institutional arrangements, information flows and rules for effective decision- making, participation of Stakeholders and potential social risks including, but not limited to, the feasibility and acceptability of the sub-project outcomes, efficiency and equity of implementation arrangements, relations between beneficiaries and non-beneficiaries, efficacy of site selection, conflict management or grievance-redress processes, and the maintenance of public assets created.
Task 6: Assess land tenure issues such as loss of ownership documents, physical boundaries of properties affected during Project and related issues with a view to propose suitable measures to restore the property documents and update the land records.
Task 7: Recommended strategy and prepare RAP/ARP (see section 5of the Resettlement Policy Framework) to achieve social development outcomes
Task 8: Analysis of alternatives, management and implementation arrangements
Task 9: Developing a plan and indicators for monitoring and evaluation of rehabilitation and resettlement, including participatory monitoring approaches

Expected outputs, schedule and reporting relationships

Within (*2 weeks*) the consultant will prepare an inception report including work plan and methodology with a detailed schedule of the tasks to be completed, as described in the terms of reference.
Within (*2 months*) the Consultant will provide a draft social assessment report which will identify stakeholders and their expectations, interests or concerns, assess the social risks of the sub-projects (both the risk of the sub- project's impacts on the vulnerable, as well as other social risks to the sub-project's feasibility or success), and recommend design changes or mitigation measures or action most suited to manage those risks during implementation.
The final report will be completed by (*month 4*) and will include:

- Socio economic baseline data, including relevant charts and graphs, statistical and qualitative analysis and, where relevant, raw data obtained during the social assessment.
- RAP (or ARP)

- Note on the social assessment process itself, stating any difficulties likely to be faced by the team in conducting the social assessment, and the most appropriate dissemination strategy for its findings.

(dates are indicative and depend on the scope of rehabilitation and resettlement under the project)

The report and accompanying materials will be provided in English and Hindi and posted in District Administration offices.

1.0 Organization Structure for Environmental and Social Cell

It is proposed to institutionalize the ESMF execution mechanism at PACT based on its current organizational structure given in Chapter 2. The proposed organizational structure at PACT is given below in Figure 1.

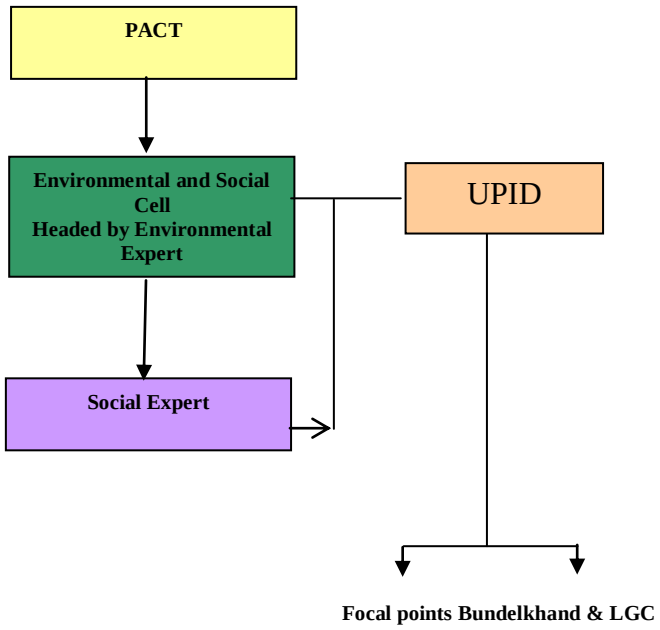


Figure 1: Environmental and Social Organizational Structure

2.0 Environmental and Social Cell

The Environmental and Social cell can be integrated under the existing organizational structure of PACT and can serve for mainstreaming social and environmental safeguards in UPWSRP Phase II. The proposed cell will be headed by Environmental expert similar in rank to Executive Engineer, UPID. He/she will be assisted by social expert. Both the staff will assist UPID focal points in Bundelkhand & LGC for planning, implementation & monitoring of ESMF.

Duties and Functions

Key duties and function of the proposed cell would be:

ESMF planning, implementation and monitoring - Provide technical assistance in ESMF planning implementation & monitoring for each sub project activity.

Information/ Data Base Management - Manage comprehensive environmental & social information management system/data bases and documentation.

Training and Capacity building - Periodic workshops/ Meetings seminars on Social & Environment aspects; develop tailor made courses; organize basic /orientation training programs; organize documentation of staff experience on Social & Environmental issues/ solutions / lessons learned program ; develop environmental 'tool kits' for staff – CDs/

slides organize inter and intra states field visits; experience sharing program; organize study tours to provide exposure to the similar experience /best practices of the oversees etc. Enhancement of the staff capacity and their commitment are key pre-requisite for the effective implementation of UPWSRP-II.

Awareness/ Sensitization - Develop/ Implement social & environmental awareness/ sensitization programs.

Inter-sectoral linkages and inter-agency coordination - Facilitate effective inter-sectoral linkages and inter-agency coordination among and between agencies and other key stakeholders involved in water sector management in relation to socio- environmental issues.

Grievance Redressal – Provide technical assistance to UPID related to grievance redressal mechanism to attend to any social and environmental grievances made by any person, community group or agency under UPWSRP Phase II.

Provide assistance for UPWSRP Phase III - Provide essential guidance and inputs related to Environmental & Social aspects for UPWSRP Phase III.

3.0 Dam Safety Organization Structure

UPID has a State Dam Safety Organization (SDSO) as mandated by the Central Water Commission (CWC) of the Government of India. The SDSO is headed by a director of the rank of Superintending Engineer supported by two executive engineers and is located in the Central Design Directorate of UPID. This SDSO receives the pre and post monsoon reports of all dams located within the State from the engineers responsible for the dam operation and compiles them for onward transmission to the CWC. The dams in the State are inspected by the assistant engineers of the responsible field divisions and the reports are countersigned by the concerned executive engineers who endorse the findings of the assistant engineers.

SDSO can be further strengthened under the existing organizational structure by including environmental & social expert as members of SDSO as shown below.

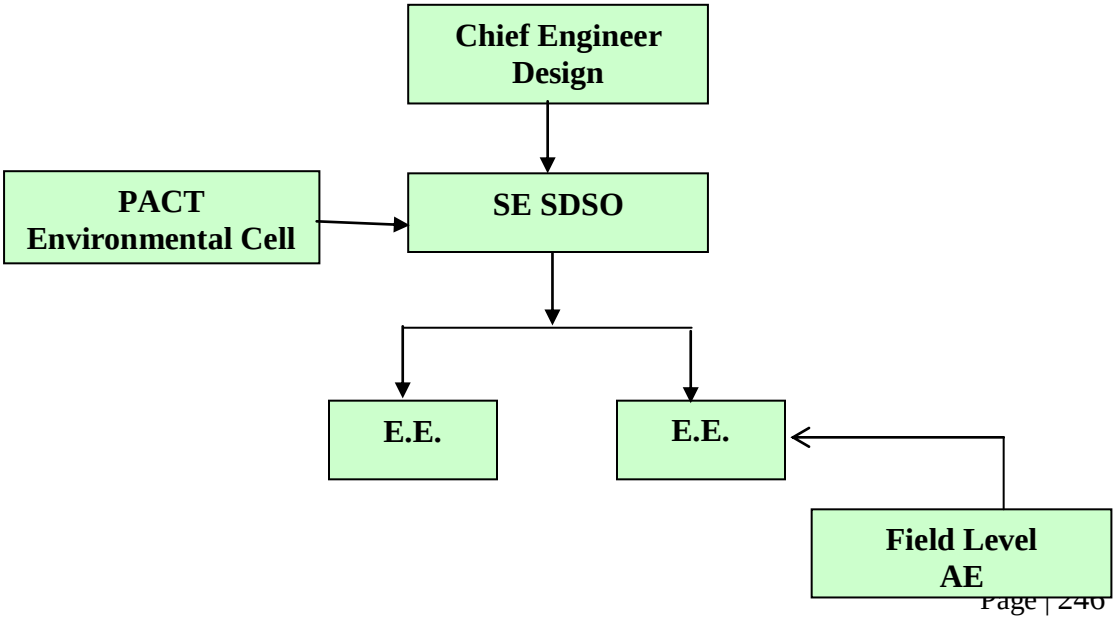


Figure 2: Dam Safety Cell

The inclusion of Environmental & Social experts from PACT would strengthen SDSO's capacity in implementation of emergency preparedness plans & disaster management & mitigation plans in line with ESMF.

Key duties and function of the proposed SDSO would be:

1. The technical documentation of all identified projects should be compiled and kept for record.
2. Arrange safety review of dam by an independent panel of experts once in two years.
3. Develop its own mechanism for safety review of the balance dams in their State.
4. Submit an annual report of the review done to the State with copy to Dam Safety Organization of State.
5. The State/Department should also arrange for review of spillway capacity of the existing dams after assigning priorities and convey the recommendation for provision of additional spillway / modification of operation if called for or any other alternative means by which it could be accommodated, to the Secretary to the Government who in turn will pass it on to the concerned Chief Engineer for implementation. A copy of that letter shall also be endorsed to the Dam Safety Cell for monitoring.
6. Ensure Pre- and post-monsoon inspection of the dam shall be done by an engineer not below the rank of an Executive Engineer. A responsible engineer should be stationed at the dam site throughout the monsoon period and he should send periodical reports about the behaviour and health of the dam.
7. His report should be forwarded to the Superintending Engineer who in turn will forward it to Chief Engineer with copy to SDSO for information.
8. The SDSO Cell should be responsible for speedy formation of the panel and it should act as secretariat to the independent safety panel. The coordination of various studies /investigations suggested by the panel should be done by the Cell.
9. SDSO should be responsible for monitoring the studies / investigations and for arranging the panel's inspection, investigation suggested by them, etc. They should also be responsible for preparation of the panel's report.
10. The monitoring of implementation of the proposal and expediting the same should be the responsibility of the Chief Engineer of the circle or project.
11. The SDSO should act as a data bank in respect of dam safety.
12. The SDSO should prepare a programme of review of safety of dams in the State from
    - Hydrological consideration; and
    - Structural consideration.
13. Reservoir silt survey should be done at regular intervals and the area capacity curve of the reservoir should be accordingly revised. This survey should be more frequent in the initial Month so as to know the trend of silting.
14. Flood carrying capacity of the river channels downstream of the dam shall be reviewed at intervals of five years.

4.0 Independent Dam Safety Review Panel

At present there is no independent Dam Safety Review Panel (DSRP) constituted / appointed for evaluating the safety of existing dams. However the state government of UP has applied to be included in the Bank-financed Dam Rehabilitation and Improvement Project (DRIP). It is expected that the Central Water Commission of the Government of India would approve this request soon. One of the criteria for inclusion under DRIP is to have an independent DSRP. The mission has recommended that the state set up such a panel as a matter of priority and include for their regular review the three dams to be considered under UPWSRP II.

The panel should consist of the following:

- Chairman – an experienced dam engineer who has background of design and construction.
- Chief Engineer (DSO) of Irrigation or his representative.
- Chief Engineer/Superintending engineer of the concerned division or project.
- Head of the Dam Safety Cell as Member-Secretary.