# GOVERNMENT OF HIMACHAL PRADESH
# Forest Department

## Integrated Project for Source Sustainability and Climate Resilient Rain-fed Agriculture
## The World Bank Assisted

## Environmental and Social Assessment
## Environmental and Social Management Framework

**Final Report**
**26 December 2019**


**Project Management Unit**
**Integrated Project for Source Sustainability and Climate Resilient Rain-fed Agriculture**
**Solan, Himachal Pradesh**

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## List of Acronyms

| | |
|---|---|
| APMB | Agricultural Produce Marketing Board |
| APO | Assistant Project Officer |
| BDA | Biological Diversity Act |
| BMC | Biodiversity Management Committees |
| BPEO | Best Practicable Environmental Option |
| CAG | Common Activity Group |
| CAMPA | Compensatory Afforestation *Fund* Management and Planning Authority |
| CAT | Command Area Treatment |
| CATP | Catchment Area Treatment Plan |
| CD Block | Community Development Block |
| CF | Conservator of Forest |
| CHS | Community Health and Safety |
| CIG | Common Interest Group |
| CPD | Chief Project Director |
| CPR | Common Property resources |
| CRMC | Community Reserve Management Committee |
| CSO | Civil Society Organisation |
| DFO | Divisional Forest Officer |
| DLT | Drainage Lines Treatment |
| DPO | District Project Officer |
| DPR | Detailed Project Report |
| EAP | Externally Aided Project |
| EC | Essentiality Certificate |
| EDC | Eco Development Committee |
| EDS | Environmental Data Sheet |
| ESA | Environmental and Social Assessment |
| ESCP | Environmental and Social Commitment Plan |
| ESMF | Environmental and Social Management Framework |
| ESS | Environmental and Social Standards |
| ESZ | Eco-sensitive Zone |
| FCA | Forest Conservation Act |
| FDG | Focus Group Discussion |
| FEO | Forest Extension Officers |
| FPC | Forest Protection Committee |
| FPP | Forest for Prosperity Project |
| FRA | Forest Rights Act |
| FSSAI | Food Safety and Standards Authority of India |
| GBV | Gender Based Violence |
| GHG | Green House Gas |
| GHNP | Great Himalayan National Park |
| GoHP | Government of Himachal Pradesh |
| GP | Gram Panchayat |
| GRM | Grievance Redressal Mechanism |
| GRS | Grievance Redress Service (GRS) |
| GS | Gram Sabha |
| Ha | Hectare |
| HH | Higher Himalayan |
| HHC | Higher Himalayan Crystalline |

| | |
|---|---|
| HIMCOSTE | Himachal Pradesh State Council for Science Technology & Environment |
| HPFD | Himachal Pradesh Forest Department |
| HPHDP | Himachal Pradesh Horticulture Development Project |
| HPMHWDP | Himachal Pradesh Mid Himalayan Watershed Development Project |
| HVC | High Value Crop |
| IBA | Important Bird Areas |
| IEC | Information, education & Communication |
| INR | Indian rupees |
| IPDP | Indigenous People Development Plan |
| IPNMP | Integrated Pest and Nutrient Management Plan |
| IRC | Implementation Completion Report |
| ITDP | Integrated Tribal development Project |
| IYSZ | Indus Yarung Suture Zone |
| JFM | Joint Forest Management |
| JFMC | Joint Forest Management Committee |
| JICA | Japan International Cooperation Agency |
| Km | Kilomter |
| LH | Lesser Himalayan |
| LMP | Labour Management Procedures |
| MADA | Modified Area Development Approach |
| MAP | Medicinal and Aromatic Plants |
| MBT | MainBoundary Thrust |
| MDF | Moderately Dense Forest |
| MFT | Main Frontal Trust |
| MGNREGA | Mahatma Gandhi National rural Employment Guarantee Act |
| mm | Millimetre |
| MT | Metric Ton |
| NAEB | National Afforestation and Eco-Development Board |
| NAP | National Afforestation Project |
| NFP | National Forest Policy |
| NGO | Non-Governmental Organisation |
| NOC | No Objection Certificate |
| NTFP | Non Timber Forest Produce |
| OP | Open Forest |
| PA | Protected Areas |
| PDO | Project Development objective |
| PESA | Panchayat extension to Schedule Areas |
| PGRC | Project Grievance Redressal Committee |
| PMU | Project Management Unit |
| PRA | Participatory Rural Appraisal |
| PRI | Panchayat Raj Institutions |
| RAP | Resettlement Action Plan |
| RFP | Resettlement Policy framework |
| RKVY | Rashtriya Krishi Vikas Yojana |
| SBB | State Biodiversity Boards |
| SC | Schedule Caste |
| SDS | Social Data Sheet |
| SEO | Social Extension Officers |
| SEP | Stakeholder Engagement Plan |
| SHG | Self Help Group |

| | |
|---|---|
| SMS | Subject Matter Specialist |
| SoER | State of Environment Report |
| ST | Schedule Tribe |
| STDZ | South Tibetan Detachment Zone |
| SWOT | Strength Weakness Opportunities and Treats |
| TAC | Tribes Advisory Council |
| TDP | Tribal Development Plan |
| TFR | Total Fertility Rate |
| TSP | Tribal Sub Plan |
| UG | User Group |
| VDF | Very Dense Forest |
| VEDC | Village Eco-Development Committee |
| VFCs | Village Forest Committee |
| VFDC | Village Forest Development Committees |
| WB | The World Bank |
| WLS | Wild Life Sanctuary |
| WPA | Wildlife Protection Act |
| WSHG | Women Self Help Group |

# Executive Summary

**Project Background**

The Government of Himachal Pradesh (GoHP) is preparing the Integrated Project for Source Sustainability and Climate Resilient Rain-fed Agriculture with financing from the World Bank. The project will be implemented in 10 of 12 districts of Himachal Pradesh (except Kinnaur and Lahaul and Spiti) covering 428 selected Gram Panchayats (GP) of 32 Development Blocks The project development objective is 'to improve upstream watershed management and increase agricultural water productivity in selected Gram Panchayats in Himachal Pradesh'. Under the project, investments will be made in measures to improve sustainable land and watershed management, to promote the sustainability of perennial water sources and to support diversification and commercialization of agricultural value chains. A new institutional arrangement for addressing complex multi-sectoral concepts such as sustainable landscape management, involving multiple sectors and line departments will be piloted. Lessons from the HP Mid Himalayan Watershed Development Project (HPMHWDP) that was completed 2017, have been incorporated into the project design.

**Applicability of World Banks Environmental and Social Framework**

The World Banks Environmental and Social Framework has been applied to the project to assess, manage and mitigate any risks or direct, indirect and cumulative impacts that may arise because of project activities. This report contains the findings and instruments prepared to address the environmental and social risks, comprising of Environmental and Social Assessment and Environmental and Social Management Framework and Plans

**Environmental and Social Assessment**

The project involves specific investments and interventions on i) sustainable land and water management measures like check dams and bio-engineering structures ii) forestry plantations, nursery development and seed management, weed management, spring development, forest and pasture management, forest fire prevention and piloting of silviculture systems; iii) water distribution systems with drip and sprinkler irrigation technology; iv) adoption of Climate Smart Agriculture practices for existing cropping patterns and facilitate diversification into high value crops; rural infrastructure (foot bridges, ropeways); v) promote agribusiness clusters including technical assistance to farmers groups and infrastructure provision to facilitate storage, packaging, waste management as well as last-mile linkages in agriculture and livestock; and vii) undertake institutional capacity building for integrated watershed management and making policy trade-offs focusing on the Himachal Pradesh Forest Department (HPFD).

The environmental and social assessment (ESA) comprised of a review of a) secondary research including information from government documents and studies, academic journals, findings from other projects safeguards implementation and b) primary research conducted through site visits, and stakeholder consultations in 20 GPs in 8 project districts. The Assessment details the Legal and Policy Framework in the State, the findings of of the Stakehlder Analysis and Engagement exercise, the Environmental and Socio-Economic Baseline in the State, and based on these identifies the Environmental and Social Risks and Impacts of the project.

**Environmental Assessment Summary**

The project acitivities are assesed to pose a moderate degree of risk. Risks and impacts of project activities on biodiversity and the provision of ecosystem services as well as key

sources of Green House Gas (GHG) emissions and potential sources of pollution have been evaluated. Potential risks to biodiversity and ecosystem services and from pollution could arise from i) unmanaged chemical pesticide and fertilizer use and agricultural run-off, ii) use of non-native varieties, iii) habitat and land-use conversion and un-sustainable harvesting of NTFPs iv) construction and repair of erosion control and water storage and distribution structures; temporary and small scale impacts relating to civil works, including on air, water, debris, soil, noise, drainage and aesthetics; v) improper disposal of agricultural waste and construction waste. The main sources of pollution under the project are from the application of chemical pesticides, fertilizer and unmanaged manure and Green House Gas (GHG) emission under the project may arise from the application of fertilizers, pesticides and compost. The Ex Ante Carbon Balance Tool (ExACT) tool has been applied to the project and the findings suggest, that due to extensive plantation and soil and water conservation measures, the interventions lead to no net emissions and overall, contribute positively to carbon sequestration. No adverse or irreversible impacts to critical habitats or cultural heritage are expected.

**Social Assessment Summary**

The SA covers the potential for small scale, manageable social risks and impacts that come from (i) small scale infrastructure related to soil and water conservation; water harvesting, storage and distribution; ii) delineation of grazing, pasture and nursery areas; and (iii) requirements for voluntary land donation. Other potential social risk is exclusion of disadvantaged and vulnerable groups such as small and marginal farmers, nomadic tribes & transhumant, scheduled castes and scheduled tribes from project institutions and project benefits such as farm irrigation inputs, seeds and other improved farming inputs and training. Conflicts could also arise from sharing and management of water systems, fodder lands/pastures and forests as community regulated common resources. While most interventions are likely to be small scale, and the impacts are not expected to be significant, the capacity of the borrower to implement and manage the above social risks as well as those related to community and contract labor, community health and safety and sustained stakeholder engagement raises the social risk profile to moderate.

**Findings of Stakeholder Consultations**

The key stakeholders of the Project include Gram Panchayats, farmers groups/cooperatives, Village Forest Development Committees (VFDCs), pastoralists and transhumant, as well as women's groups. HPFD through its field staff and consultants engaged with rural communities and potential project participants in 20 GPs of 8 districts. This included consultations and engagement with tribal communities and their community leaders, largely in Chamba and Mandi districts. In addition, more focused consultations were also held the with the nomadic, transhumant tribes, mainly *Gaddis* and *Gujjars*. The main feedback from consultations with the tribal communities has been around the need for more information on Project activities, specially opportunities and benefits for the tribal communities around irrigation, horticulture, fodder development and livestock production and health services. The key concern voiced by women was the drop in opprtunities accedible on livelihood skills for destitute and women above the age of 45. Other issues, concerns and needs raised during the village consultations were related to: protective fencing from wild animals, access pathways and bridges over the drains and nullahs, check dams and ponds for irrigation, plantations for stabilizing mountain slopes and preventing landslides, preventive measures for forest fires, more planting of medicinal fruit and fodder rich plants, development of pastures for providing fodder to livestock, opportunities for local employment in project activities, village camps on horticulture and veterinary services as well as on forest rights.

**Capacity of Himachal Pradesh Forest Deparment to Implement the ESF**
The Government of HP is familiar with the World Banks environmental and social safeguard policies as well as the new ESF, having implemented Bank supported projects in roads, watersheds, horticulture and hydropower projects. The HPFD has good experience of implementing the Bank's environment and social safeguards under the recently completed Mid Himalayan Watershed Development Project. The environmental management and social safeguard practices and guidelines were well mainstreamed in the Mid Himalayan Watershed Project, through the society and thus has a good track on environmental and social safeguards. HPFD is also implemeting projects supported by JICA and KFW on the themes of forestry and ecosytem management. The project will leverage the State's broad-based experience and expand it to the relatively newer areas of labor and working conditions, stakeholder engagement and community health and safety. The ESA has noted the presence of basic safeguard capacity with the HPFD, and has recommended institutional capacity building measures for HPFD and other line departments such as animal husbandry, agriculture, horticultre and rural development

**Legal and Policy Framework**
The Assssement has identified the Legal and Policy Framework at the National and State level that will apply to the project. The key environmental laws and policy at the national and state level on forests, biodviersity, pollution, waste management and agriculture and social laws and policy on constitutional safeguards, land acqusition and transfer, Panchayati Raj Institutions, Scheduled Tribes and labour and their applicability to the project have are covered by the assessment.

**Environmental and Social Framework**
The Environmental and Social Framework addresses the applicable Environmental and Social Standards (ESS) in lieu of the risks and impacts identified by the assessment and has prepared specific tools and guidance to address these risks. A summary of these is outlined below:

**ESS2 Labor and Working Conditions**
The project will utilize largely contract workers who will be employed through small, local contractors. Less than 10% of the contract labor is anticipated from other parts of the state, as well as from Bihar and Nepal. To address any labor related risks and to promote health and safety, Labor Management Procedures (LMP) proportional to the project risks has been prepared, with specific provisions for working conditions, occupational health and safety, child and forced labor, gender-based violence, management of labor influx, as well as labor focused grievance redress mechanism. The LMP also includes requirements on Environmental, Health and Safety Guidelines (EHSGs) that are included in the standard bidding documents. These works are likely to engage very small share of community labor as well. These scale of construction contracts is envisaged to be small-scale, which will not require labor camps and most of the labor is expected to come from nearby areas. The Gender Based Violence risk of the project is assessed as low.

**ESS3 Resource Efficiency and Pollution Prevention and Management**
The project has integrated resource efficiency through its design and interventions by focusing on water source sustainability and increased water efficiency in agricultural decision making. Green House Gas (GHG) emissions are anticipated from the application of fertilizers, pesticides and compost in agriculture. The carbon emissions anticipated from

annual cropping (agriculture) is 34,517 tCO2eq/year and from fertilizer use is 95,028 tCO2eq/year, however this is less than the emissions without the project scenario as the project will demonstrate and promote climate smart practices that reduce GHGs through reduced chemical fertilizer use. The overall GHG balance of the project is negative overall, with an estimated -87,294 tCO2eq/year sequestered because of afforestation and degraded forest restoration activities being undertaken under the project. The net GHG benefit on a per hectare basis for the project area is estimated to be 0.6 tCO2/ha/year.

Risks from pollution are anticipated from the application of chemical pesticides, fertilizer and unmanaged manure. The project will also involve pest management in livestock to reduce worm and pest load in livestock. Environmental impacts could result from runoff of pesticides and nutrients, leading to water, soil and air pollution, eutrophication, a loss of biodiversity and increased pest resistance.

To address these, an **Integrated Pest and Nutrient Management Plan (IPNMP)** has been prepared to promote safe, effective and environmentally sound pest and nutrient management in plantation, agricultural, horticultural and animal husbandry interventions. The aim is to promote the use of biological control methods and reduce synthetic chemical pesticides with a provision to increase capacity on addressing the same. The IPNMP contains the list of pesticides prohibited and restricted under the project and also provides guidance on the proper storage, handling and disposal of pesticides. The IPNMP will apply to forestry operations including nursery development, development of high-quality seed stands, plantation activities and eradication of invasive species and climate smart agricultural (CSA) practices including high-value fruit and vegetable production, diversification of agricultural and promotion of techniques such as organic farming, zero-budget natural farming, and promotion of water-efficient and drought resistant varieties of crops. The project IPNMP covers the generic approach, tools and mitigation measures; however, crop specific Package of Practices by subject matter specialists will be prepared for all crops taken up and promoted under the project.

**ESS4 Community Health and Safety**

The main risks and potential impacts to community health and safety would arise from small scale constriction work resulting in accidental trespassing and personal injury for humans, including children and livestock, from the use of chemical pesticides and fertilizers in agricultural land. Risks from stagnant water and associated vector borne diseases and safety of water harvesting structures are a possibility. Public health risks from increased labor influx and mobility are low given that most of the construction labor will be locals, and a very small share of construction labor will be from outside the state. The risk of traffic-related accidents and injuries to workers and local communities is also very low.

HPFD will implement specific risk mitigation measures to protect the project affected communities form potential risks and hazards that impact the community health and safety. The specific mitigation measures related to community health and safety especially for i) water quality and availability, disease prevention and communicable diseases; ii) general work site related hazards on dust, sound and debris; iii) fencing of water impounding structures and other construction areas, especially those closer to habitations. These mitigation measures are included in Labor Management Procedure, IPNMP and Community Health and Safety Guidelines.

**ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**

HPFD will not be acquiring any private land or cause any involuntary physical resettlement or relocation. Any intervention or construction activity requiring acquisition of private land and/or physical relocation will fall under the 'negative' list. Project investments on water harvesting, storage and distribution systems will be made on government as well as private land that will be donated voluntarily to the GP, following the due diligence provided under ESS5. A **Resettlement Policy Framework (RPF)** has been prepared to address and mitigate any adverse social and economic impacts arising from voluntary land donation, and includes specific screening, documentation and mitigation measures to ensure voluntariness and non-coerciveness of the land donation process.

Investments in new grazing pastures, fodder plots in forest areas and new plantations may involve temporary restrictions that have been agreed and imposed by the communities. Community-imposed use restrictions that may restrict traditional usage, and adversely affect the most vulnerable households. Such investment interventions will be screened for adverse impacts on traditional use and customary rights, and when needed suitable mitigation action plans will be prepared and implemented by the beneficiary groups, GPs and HPFD.

**ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources**

Under the project, potential risks to of biodiversity and ecosystem services could arise from unmanaged chemical pesticide and fertilizer use and agricultural run-off, use of non-native varieties and replacement of local varieties with hybrid or exotic trees, plants, and animal species, habitat and land-use conversion, un-sustainable and un-scientific harvesting of NTFPs and unmanaged grazing.

A **Biodiversity Management Plan (BMP)** has been prepared with key strategies for biodiversity conservation that include: i) site screening for avoiding critical natural habitats; ii) promotion of indigenous species in plantations, fodder plots and nurseries and avoidance of exotic, invasive species; iii) adoption of sustainable harvesting and production of NTFP; iv) updating of peoples biodiversity registers in recently denotified wildlife panchayats and community capacity building; v) negative list to ensure biodiversity conservation, prevent forest fires, habitat fragmentation, land use modifications, and prevent felling of trees. The ESMF contains the screening and eligibility checklists to ensure activities that would adversely affect biodiversity such as felling of trees, activities causing irreversible impacts to critical and natural habitats, activities causing forest fires, felling of trees without a permit, and activities that are inconsistent with forest working plans or Catchment Area Treatment (CAT) plans are not financed under the project.

**ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities**

Indigenous Peoples (scheduled tribes) are dispersed in varying numbers across the ten project districts and the identified Gram Panchayats. Their share in the project areas ranges from 1-25%, however they are largely concentrated around the project districts of Chamba and Kangra. Project interventions will not involve any land acquisition, involuntary resettlement, physical relocation, or economic displacement that will affect either tribal households or non-tribal households. Project interventions related to plantations, nurseries, fodder plots/pasture lands, community tanks are likely to involve voluntary, community adopted restrictions of access and usage (such as rotational or seasonal grazing or social fencing) in some cases. This may adversely affect some tribal groups. To mitigate any potential adverse impacts, such interventions will be screened for any potential 'restriction

impacts' on the lives and livelihoods of potentially affected peoples, especially tribal groups, and these interventions will have to follow the principles, guidelines and mitigation measures provided in the resettlement policy framework and the Indigenous Peoples Planning Framework/ Tribal Development Framework (TDF).

The **Tribal Development Frameowrk (TDF)** provides specific measures to ensure socially and culturally compatible consultations with, and participation of the tribal communities in project implementation processes and project benefits. The risk of tribal exclusion from project interventions, investments and institutions is mitigated through: i) screening and documentation of tribal households in GPRMP; ii) prioritised targeting and inclusion in beneficiary lists; iii) consultations with tribal leaders in local laungage; iv) disaggregated beneficiary tracking v) FPIC (only when applicable); vi) support for caapcity building and convergence, including indigenous knowledge and biodiversity registers. The livestock interventions will be providing targeted project benefits to the transhumant nomadic tribes that are traditionally dependent on grazing and common pastures. The TDF also supports community-identified additional interventions that would be needed to ensure the access of tribal communities to project benefits and preparation of selected TDPs.

**ESS8 Cultural Heritage**

The state has rich cultural heritage such as several pilgrimage sites and places of religious prominence, sacred groves and sacred water sources, that could be present in the project areas. Tangible cultural heritage, or Physical Cultural Resources (PCR) in Himachal include 2 UNESCO recognized World Heritage Sites, several temples and sites of religious and spiritual significance (estimated at over 10,000) and Sacred groves, of which 350 are well documented by several more exist. The state also has a rich tradition of water harvesting and water conveyance structures. These include 'Khatris' rectangular deep pits that are dug into the hard rock on hill slopes to collect rainwater which are present in Hamirpur, Kangra and Mandi districts and 'Kuhls' which are surface water channels found in the mountainous regions; The project may undertake activities that are located in the vicinity of a cultural heritage site and cause damage and/or disturbance to such sites; There is a possibility of archaeological finds during minor excavation during construction of tanks and other water harvesting/ conveyance structures. No negative irreversible impacts on intangible cultural heritage are envisaged; The project will attempt to build on traditional knowledge and practices on NTFPs and institutional mechanisms for the repair and maintenance of water harvesting and water conveyance structures.

Management and mitigation measures for cultural heritage will include i) Screening to ascertain the presence of any known cultural heritage sites ii) Consultation during preparation of GPRMP for identification of community acknowledged Cultural Heritage ensuring the participation of women, traditional knowledge holders and marginalized or backward groups such as tribals since such communities may not have adequate representation in the institutional structure of local governance institutions such as Gram Panchayats; iii) The project will seek to avoid disturbance to cultural heritage sites during construction and ensure that no damage through debris disposal or noise pollution is caused at any sites of cultural significance including, rocks, sacred groves or wetlands. iv) Conservation and Enhancement of Cultural Heritage, where applicable v) Application of a Chance Finds Procedure when artefacts or sites of cultural heritage are encountered by chance while undertaking excavation during construction activities v) Further Actions to avoid any environmental or social impacts on Physical Cultural Resources (PCRs) are incorporated in the Framework and Management Plan

**ESS10 Stakeholder Engagement and Information Disclosure**

A **Stakeholder Engagement Plan** has been prepared under the project with the aim to adopt a systematic, transparent and participatory approach to stakeholder engagement and information disclosure, and maintenance of positive stakeholder relationships, monitoring of stakeholder feedback and implementation of an accessible and responsive grievance redressal mechanism. The SEP identifies the main stakeholders of the projects as: i) *Positively affected Project Beneficiaries*, mainly relevant community organizations, GP user groups, Gram Panchayats, farmers groups/cooperatives, joint forest management committees (JFMCs), and women's groups; ii) *Disadvantaged and Vulnerable Households*, such as landless and marginal farmers, transhumant nomadic groups (Gaddis and Gujjars), scheduled castes households, scheduled tribes, women headed households, disabled households as well as households designated below the poverty line; iii) *Potentially negatively affected groups*, such as vulnerable households donating land for community infrastructure or households facing temporary access/use restrictions from new grazing pastures, fodder plots and plantations; and iv) *Other Interested stakeholders* such as HPFD as well as line departments of Agriculture, Animal Husbandry, Horticulture, Rural Development and Panchayati Raj, and Science and Technology. Private partners involved in agribusiness and value chain development as well as NGOs associated with forestry, agriculture, horticulture, animal husbandry, natural resource management and rural development are also important stakeholders of the project.

The project has also prepared a **Gender Action Plan**, identifying and acknowledging women, including active women farmers, women livestock rearers, women headed households and women leaders of self-help groups and PRIs, as key stakeholders and beneficiaries of the project. This will include women from vulnerable/ disadvantaged sections of the local communities, including from scheduled caste, scheduled tribe and transhumant households. Through the Gender Action Plan, Women farmers/land owners, workers, women headed households and community leaders will be supported by range of actions, especially systematic identification and participation in village plans, beneficiary group leadership, training programs, and investment planning and in targeted beneficiary lists.

The Project will establish a **Grievance Redress Mechanism (GRM)** with the aim to respond to queries or clarifications or complaints about the project and address complaints/concerns and grievances of the stakeholders. The GRM will focus on corrective actions that can be implemented quickly and at a relatively low cost to resolve identified implementation concerns, GRM will also serve as a channel for early warning, helping to target supervision to where it is most needed and identify systemic issues. The institutional arrangement, channels, and processes for a successful GRM are part of the SEP.

**Environmental and Social Management Framework**

Apart from the plans to ensure compliance with Standards mentioned in the section above including the Labor Management Procedure, Community Health and Safety Guidelines, Integrated Pest and Nutrient Management Plan Resettlement Policy Framework, Biodiversity Management Plan, Tribal Development Framework, Gender Action Plan and Stakeholder Engagement Plan (SEP), the Framework also consists of screening tools, checklists, and guidelines. These include; i) Guidelines on Participatory Planning for GPRMPs ii) the Negative List of Activities iii) Screening Procedures and Checklists iv) Activity wise Environmental and Social Management Plans (to be updated as sample GPRMPs are available) for Forestry Operations, Soil and Water Conservation, Agriculture

and Allied Activities and Construction of minor Infrastructure. The ESMF also includes suitable arrangements for implementation, supervision, and monitoring of the various mitigation measures on environmental and social aspects.

**Implementation Arrangements**

The project will have specific arrangements made at state, district and block level. This includes appointment of a SMS (Social) and SMS (Environment) at PMU and Experts at DPO and APO levels. Further the PMU, IDP will guide the Field level agencies on implementation of ESMF and build their capacity through capacity building and IEC strategy. The project would ensure targeting and inclusion of the key vulnerable groups especially the landless, agriculture labor, nomadic tribes, and women headed households from SC/ST households within the planning and implementation processes and community institutions. Such vulnerable households will be identified and targeted in the village planning exercise as well as in beneficiary selection for individual and group assets, formation of beneficiary groups, livelihood support interventions, dedicated consultations and identification of special measures for such vulnerable households. Through the Gender Action Plan, Women farmers/land owners, workers, women headed households and community leaders will be supported by range of actions, especially systematic identification and participation in village plans, beneficiary group leadership, training programs, interventions and investment planning and in targeted beneficiary lists. The existing cadre of largely women social mobiles will be provided training support to implement dedicated interventions for women and special vulnerable groups. Convergence with existing state level schemes for skill and enterprise development and financial inclusion will be supported. Special pilot interventions in partnership with resource agencies will be explored.

**Monitoring, Auditing and Reporting**

In order to carry out monitoring, evaluation and reporting, project will have specific arrangements made at PMU, DPO and APO level as mentioned above. This includes continuation of appointed Environmental and Social Subject Matter Specialists for the project period at PMU level. Further the project will have one District Project Officer in each District to guide the APOs on environmental and social matters related to project components, DPO will guide the APOs on how to implement the ESMF and ESMP. At the APO level there will be two Forest Extension Officers and two Social Extension Officers. They will oversee the implementation of the provisions of ESMF and ESMP. The PMU level SMS-E and SMS-S will train the FEOs and SEOs in the ESMF and ESMP implementation. In addition several orientations and trainings are proposed as a part of this ESMF to build their capacity. The PMU will be in charge of implementing the ESMF. All the GPRMPs will be visited at regular intervals by SMS-E and SMS-S to check if all environmental and social safeguard requirements are met and to identify any issues that need to be addressed. PMU would submit quarterly progress reports to The World Bank on environmental and social safeguards implementation. The concurrent internal social monitoring will be done as part of the regular monitoring by the PMU and DPO and APO level implementing agencies. However, , project will appoint Independent Environmental and Social Monitoring and Evaluation Consultants to do the environmental and social monitoring and evaluation at the beginning of 3rd and 5th year of project implementation. Half yearly, by 15th July and 15th January, the PMU will prepare a report, to be submitted to The World Bank, of the environmental and social safeguards status in the project districts including data and analysis of relevant parameters such as Environmental (Changes in Groundwater Table, Surface Water Quality, Soil Quality, Survival of plantations, Instances of archeological chance finds, Instances of Pest and Disease attacks, Reduction in pest and disease attacks,

Number of Farmers using bio-pesticides, Reduction in water usage for Agriculture and Horticulture, Produce per unit of water used, Number of climate resilient varieties used, Number of communities taking up conservation and source sustainability activities, Any induced impacts/activities arising from undertaking the project financed investments such as demand for (a) rural/feeder roads, (b) change in agriculture crops, due to increase availability of water and support services, Number of trainings organized and type of trainings, etc.) and Social (Number of grievances registered and resolved, Number of court cases, Number of women members in UGs/CAGs/ Federations, Number of trainings held, Number of women trained, Income restoration of communities, Livelihood Enhancement, Land holding status, Literacy, Housing, Ownership of household assets, etc.) indicators. The ESMF will be suitably revised as and when required by the PMU.

**Capacity Building Strategy**

The Project will give its staff and the participating communities some exposure to the Environmental and social safeguards issues. For seamless adaption of the environmental and social principles and safeguards by all the implementing partners, awareness creation and capacity building becomes necessary. The capacity building activities may be taken up by State Forest Training Institute at Chail & Sundernagar, other specialist institutions, consultants, etc. to deliver trainings to project stakeholders on environmental and social safeguards and their management. This capacity building and IEC strategy has been outlined as part of this ESMF developed for the project aims at building environmental and social awareness and management capacity in the project administration structure as well as in the intended target communities. The objectives of the capacity building initiatives are a) To build and strengthen the capability of Project PMU, DPOs and APOs staff, participating implementing agencies, to integrate sound environmental and social management into GPRMPs implementation and b) To orient the project staff, participating implementing agencies and communities to the requirements of the project's ESMF. Systematic capacity building initiatives need to be introduced only after completion of Training Needs Assessment. All the trained staff and master trainers developed for different training components will in turn conduct onsite or offsite trainings (at district, block or GP levels) depending on training requirement. The training programs consists of Orientation/ Learning Training Programs, Training on the ESMF and ESMP and Training on Environmental and Social Management. The total estimated cost of training on Environmental and Social Management for members of project, Participating Agencies' Staff, NGOs, etc. is Rs. 1 Crore.

**Environmental and Social Management Budget**

The total administrative budget for environmental and social management activities under the proposed project has been worked out as Rs. 15.48 Crore. The cost of implementing the proposed mitigation measures is not included in this costing.

**Means of Disclosure**

This Final ESA, ESMF, ESMP along with RPF and the TDF are disclosed on the project website along with the Hindi translation of the executive summaries. The documents along with the executive summaries in Hindi, will be kept at the PMU, DPOs and APOs Offices and District Collector's Office, for interested persons to read and copy. This will be made available at the Gram Panchayat Offices of the concerned villages.

# 1. Project Description

## 1.1 Background

The Government of Himachal Pradesh (GoHP) is preparing the Integrated Development Project for Source Sustainability and Climate Resilient Rain-fed Agriculture (Project) in the selected Gram Panchayats of the State, with financing from the World Bank. Project carries forward the ideas and learnings of H.P. Mid Himalayan Watershed Development Project (HPMHWDP). This project started in the year 2005 and completed on 31st March 2017. HPMHWDP exhibited increase in real income by 20.70%, increase in biomass production by 46.25%, increase in yield of Wheat, Maize & Milk by 25.92%, 28.94% and 10.72% respectively. Under Institutional strengthening a total of 3,098 Self Help Groups (SHGs), 6,977, Users Groups and 5,967 Common Interest Groups (CIG) were established.

The proposed Project will invest in measures in upstream catchment areas to improve sustainable land and watershed management to promote the sustainability of perennial water sources. It will also support continued diversification and commercialization of agricultural value chains in downstream areas by supporting production and value addition including the promoting efficient water use thereby increasing the productivity of water in agriculture. It will adopt a spatial approach by (i) applying a landscape approach to individual high-risk micro-watersheds within select river basins in Himachal Pradesh; and (ii) overlaying this with a cluster approach to target value chain investments in specific locations to leverage economies of scale and network externalities. In parallel, the project will develop and demonstrate the application of an analytical evidence base to inform strategic policy choices viz. the trade-offs between alternative water use and will pilot a new institutional arrangement for addressing complex multi-sectoral concepts such as sustainable landscape management that involves several sectors and multiple Government departments. The project will be applied in all districts with the exception of the two high mountain districts of Kinnaur and Lahaul and Spiti. With this background the GoHP has approached the World Bank for assistance to prepare and implement the Project.

### 1.1.1 Project Development Objective(s)

The project development objective of the proposed Integrated Development Project for Source Sustainability and Climate Resilient Rain-fed Agriculture (Project) is "To improve upstream watershed management and increase agricultural water productivity in selected Gram Panchayats in Himachal Pradesh."

Key Results – Proposed PDO –level indicators are as follows:

- ✓ Survival rate of seedlings planted with project support (Percentage)
- ✓ Share of participating farmers adopting climate smart agriculture practices (Percentage, gender disaggregated)

- ✓ Increase in farm area under higher efficiency irrigation in targeted GPs (Percentage)
- ✓ Share of target beneficiaries with rating "Satisfied" or above on process and impact of project interventions (Percentage, gender disaggregated) [Citizen Engagement Indicator]

## 1.2 Project Components

**Component 1: Sustainable Land and Water Resource Management:** This component promotes participatory and sustainable land and water management through financing the planning and implementation of upstream investments in selected micro-catchments.

*Under Subcomponent 1A (Improved planning for participatory and sustainable land and water management)*, the key interventions will be:

a) establishment of a network of hydrological monitoring stations to monitor the quality and quantity of water on a continuous basis;
b) preparation of GP level, site-specific, participatory resource management plans (GP-RMPs);
(c) diagnostic studies, designs, and assessments;
d) engagement of technical and Information Technology (IT) consultants to support the design, database and mapping requirements of GP-RMP; and
e) design and implementation of a catchment monitoring and evaluation (M&E) system that incorporates water flows and sediment loads.

*Subcomponent 1B (Implementation of participatory and sustainable land and water management investments)* will finance implementation of activities identified in the GP-RMPs and will have the technical specifications for works and equipment supply and terms of reference for consultancy services developed at this time. These activities will be implemented by the HPFD in cooperation with the community user groups and will include the following interventions:

a. *Soil and water conservation measures* including af/re-forestation, grass seeding, grass turfs, brushwood, live hedges, and spurs, as well as mechanical measures, such as check dams, drop structures, wire-crate spur structures, bunds and water harvesting, and drainage line treatments, such as gully plugging.
b. *Forest management*. Planting and management of trees in open and medium density forests and slopes vulnerable to soil erosion and protection of plantations.
c. *Pasture management*. Introduction of rotational grazing, delineation of forest areas for the supply of fodder, and the introduction of voluntary systems to prevent livestock from grazing in young forest.
d. Other activities at the project level rather than GP- or micro-catchment level would include: *Development of high-quality seed stands*. Establishment of a geo-referenced seed production system to select the best phenotypic seeds for given environmental conditions which will allow adaption to changing

climatic and vegetative zones; construction of a centralized seed center to process, treat, store, and test seed; and construction of a climate-controlled seed bank.

e. *Nursery development*. Procurement of works, machinery, and equipment to produce the additional seedlings of the correct quality in the right location.
f. *Forest fire prevention and suppression*. Organization of community fire protection groups; provision of locally-appropriate fire fighting equipment to the HPFD offices and participating communities; and training of communities on controlled burning, and the collection and use of pine needles.
g. *Innovative approaches to silviculture* will be trailed by HPFD as simple replicated plots to determine the most appropriate and most cost-effective treatments. Potential topics for research will include size and types of seedlings, plantation spacings, and the treatment of invasive species.
h. *establishment and financing of an operation, maintenance and investment fund (OMIF)*. The OMIF will be established under existing GP financial management procedures to meet the operations and maintenance (O&M) responsibilities of community infrastructure related to sustainable land and water management (SLWM) that is constructed under this project and that already existed.

**Component 2: Improved Agricultural Productivity and Value Addition.** This component will support interventions in downstream areas where the primary (existing or potential) water use is for irrigation in agriculture. It would seek to augment the use of irrigation as a principle strategy for shifting from low-value cereal production to climate resilient crop varieties, higher-value fruit and vegetable production but would do so with a focus on increasing climate resilience and water productivity to maximize the financial returns for water use.

*Subcomponent 2A (Improved water productivity)* will support investments in provision of water by investing in primary and secondary distribution infrastructure at the community level and farm-level irrigation equipment. Key interventions supported will be:

a. water harvesting, storage, and distribution infrastructure, such as (small) pond excavation, community tank renovation, roof rain-water tank installation, strengthening of traditional irrigation channels, and gravity and lift intake and distribution structures;

*Subcomponent 2B (Adoption of Climate Smart Technologies and Diversification into High-Value Crops*) will support wider adoption of Climate Smart Agriculture (CSA) practices in conjunction with increased access to irrigation, for existing cropping patterns and/or diversification into high-, climate-resilient crops. The key interventions will be:

a. partnerships to finance the incremental operational costs of existing State delivery agencies, research institutions and consultancy services where complementary non-state services are required;

b. Studies on market analysis and strategies for value addition in high value crops, including medicinal and aromatic plants;
c. "last-mile" market access infrastructure such as footbridges and manually operated, ropeways (but not roads or investments requiring land acquisition).
d. matching grants to individual farmers and farmer groups for essential productive assets (in addition to on-farm irrigation equipment under the previous sub-component). Private goods for individual beneficiaries will, on average, require a greater beneficiary contribution.

**Component 3: Institutional Capacity Building for Integrated Watershed Management**. This component will support adoption of a more comprehensive and holistic approach to managing the water resources in HP, along with better alignment of institutional mandates for Integrated Watershed Management (IWM). It will also strengthen HPFD's institutional structure and capacity for improved service delivery.

Under *Subcomponent 3A: Improving the governance structure for integrated watershed management*, the key activities will be

a. an institutional assessment of Integrated Watershed Management to inform GoHP and other state governments. This sub-component will be implemented by a consultancy company specializing in change management.

Under *Subcomponent 3B: Institutional reform and strengthening of the Himachal Pradesh Forest Department*, the key activities will be:

b. functional review of forest institutions to inform institutional reform in HP and other states. This subcomponent will also help develop an initial set of prioritized institutional governance reforms through TA;
c. training and capacity-building activities informed by climate change perspective, CSA practices and technologies, and resource-efficient agricultural production systems in HP;
d. Development and implementation of an IT Strategy including monitoring and evaluation;
e. Development and delivery of new training modules required for the changing role of HPFD.

**Component 4: Project Management:** This component will support the project management function, including key staff and operational costs. The project management entity will be in the form of a PMU, although at least in the medium-term financing will be required for staff on secondment from other Departments and externally recruited staff in areas with skillsets outside the current bureaucratic capacity. A key example is agribusiness for which few existing staff of Departments have the required expertise. It would also support the project monitoring and evaluation functions as well as grievance redress apparatus, and project communications and outreach including the contribution to Lighthouse India by which project lessons can be shared with other States.

## 1.3 Project Area

The project area shall cover 428 selected GPs of 32 Nos Development Blocks of the 10 districts of Himachal Pradesh viz; Shimla, Solan, Sirmour, Bilaspur, Hamirpur, Mandi, Kullu, Chamba, Kangra & Una (attached as Annexure-4). The project area shall be covering three out of the four major agro climatic zones of the State i.e. Shivalik hills, Mid-hills & the High hills.

## 1.4 Project Beneficiaries

The project beneficiaries include a) Local Communities who are the primary stakeholders including Gram Panchayats, farmers, user groups, common activity groups, including women groups, pastoralists and transhumants, and b) Government Departments, primarily the Himachal Pradesh Forest Department and Agriculture, Animal Husbandry, Horticulture, Rural Development and Panchayati Raj Departments, etc. These details are elaborated under the Stakeholder Engagement Plan.

## 1.5 Implementation Arrangements

The project will be implemented by an entity established specifically for the purpose. This PMU will be established under the HPDF. The project will also maintain district offices to oversee project activities at the District level. The PMU and district project offices (DPOs) will include technical specialists, such as Subject Matter Specialist (Environmental), Subject Matter Specialist (Social), Forestry, Agriculture, Animal Husbandry, etc., from a range of other departments to ensure a full complement of technical competence across the range of sectors. Where this is not feasible from existing departments additional expertise will be recruited directly into the PMU. The project will seek to leverage existing programs (e.g. KVK) and public sector providers such as the extension and research systems and agreements will be reach between agencies to this effect. Activities at the village level will be implemented by the GPs to promote direct community/ beneficiary participation. A project steering committee will be established chaired by the Additional secretary to *inter alia* review annual work plans and facilitate coordination across Departments.

## 1.6 Present ESA and ESMF Report

The Himachal Pradesh Forest Department has commissioned Samaj Vikas Development Support Organisation (info@samajvikas.org) to conduct the Environmental and Social Assessment of the Project and prepare the Environmental and Social Management Framework along with the Environmental and Social Management Plan and other Plans such as Labour Management Procedures, Integrated Pest & Nutrient Management (IP&NM) Plan, Community Health and Safety Guidelines, Biodiversity Management Plan, Tribal Development Framework, Gender Action Plan, Stakeholder Engagement Plan, Resettlement Policy Framework and Environmental and Social Commitment Plan. This present report is the Final

Report of Environmental and Social Assessment and Environmental and Social Management Framework submitted fulfilling the requirements of the contract.

# 2. Environment and Social Assessment

## 2.1 Introduction

Project interventions on soil and water conservation structures, water harvesting and conveyance channels, plantation and nursery development, weed management, as well as rural infrastructure; spring source development, manually operated pulley ropeways, small footbridges, agriculture/ horticulture processing infrastructure, etc., will involve civil works through small scale construction contracts. This necessitates an environmental and social assessment of a) risks and impacts due to and on labour and labour influx, if any, b) need for Best Practical Environmental Options (BPEO) such as efficient practices, management of pollution due to pesticide and fertilizer uses, etc., c) b) risks and impacts on community health and safety, d) need for land for project facilities and resulting risks and impacts, if any, e) risks and impacts on biodiversity due to project activities, f) issues related to tribal population in the project area including inclusion and development, g) risks and impacts, if any, on the rich cultural heritage of the project area, and h) any other risks and impacts due to project interventions.

## 2.2 Applicability and Requirements of The World Bank ESF to Project

As mentioned above, project activities could have social and environmental risks and impacts that need to be assessed and managed. A detailed Environmental and Social Assessment (ESA) is carried out, as per the provisions of The World Bank Environmental and Social Framework (ESF), for the planned activities under the project to identify risks and impacts. The World Bank Environmental and Social Framework sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of 10 Environmental and Social Standards that are designed to support Borrowers' projects. These ten (10) Environmental and Social Standards, detailed under chapter 3. Based on this assessment an Environment and Social Management Framework (ESMF) is prepared. This ESMF details, the appropriate mitigation measures for the risk and impacts identified under ESA, following the mitigation hierarchy; to avoid, minimize, mitigate or offset any potential risks and impacts. This ESMF will be implemented as part of the project. Based on the findings of the ESA and the provisions of ESMF, an Environment and Social Commitment Plan (ESCP) is prepared and agreed upon between the GoHP and WB.

The project will be implemented in 428 Gram Panchayats of the 10 districts. Each GP will prepare a Gram Panchayat- Resource Management Plan (GP-RMP) using participatory approaches. Given that the GP-RMPs are yet to be prepared and the locations of the GP-RMP activates are yet to be known, an Environment and Social Management Framework (ESMF) has been prepared along with an indigenous people's framework/plan. ESMF has summarized practical strategies and processes for planning, design and implementation stages of the project. The additional assessments and/or plans required under the ESF and also based on ESA

recommendations include World Bank Directives, including Resettlement Policy Framework (RPF), Process Framework, ESS capacity assessment, Labor Management Procedures, IPNMP, Community Health and Safety Guidelines, Biodiversity Management Plan (BMP), Stakeholder Engagement Plan (SEP), and GBV. These are prepared as per project requirements ESF guidance. Based on the findings of all these assessments, the Environmental and Social Commitment Plan (ESCP) is prepared. As migrant labour is common feature in construction works in Himachal Pradesh, labor influx and Gender based violence (GBV) issues too were covered as part of ESA. Management of these risks was undertaken through principle of 'mitigation hierarchy'. Overall project level and corridor specific mitigation tools such as RPF, IPPF, RAP, IPDF (TDF), etc. are prepared to address design and implementation stage social risks and impacts.

## 2.3 Methodology

The methodology basically comprised collection and collation of secondary data and generation of primary data using pre-tested tools using qualitative and quantitative methods. This methodology for ESA included the following:

- Literature Review
- Collection of Secondary Data
- Stakeholder Consultations through Focus Group Discussions (FGD)
- Stakeholder analysis
- Desk Analysis
- Environmental and Social impacts
- Analysis and Assessment of Risks

### 2.3.1 Literature Review

The available existing documentation was collected and reviewed. This included documentation related to environmental and social laws, regulations, policies related to forestry and agriculture sector, etc.

### 2.3.2 Collection of Primary Data

Primary Data was collected using qualitative techniques, i.e., Focus Group Discussions.

### 2.3.3 Beneficiary Assessment

- Beneficiary Assessment at Gram Panchayats, and HPFD and other line departments
- The project beneficiaries' assessment on the current status of forestry sector management and services
- The linkages thereof with governance mechanisms and functioning

### 2.3.4 Stakeholder Analysis

- Identifying stakeholders at different levels
- Mapping Key Expectations, Impacts, Issues and Concerns as related to each stakeholder and the subgroups thereof

This Stakeholder analysis was done using the below process. This process essentially involves four steps.

- Key Stakeholder Identification
- Stakeholders Interests Assessment
- Stakeholders Influence Assessment
- Stakeholders Importance Assessment

A thorough understanding of the political and social contexts is a prerequisite for conducting this assignment. For each key stakeholder group the following is assessed:

- Relative power
- Degree of organization
- Control of resources
- Informal influence
- Power relations with other stakeholders
- Importance to the success of the reform effort

The stakeholder involvement is planned according to the following.

- Interests, importance, and influence of each stakeholder group
- Particular efforts needed to involve important stakeholders who lack influence
- Appropriate forms of participation to be promoted

### 2.3.5 Desk Analysis

Desk analysis of existing Acts, Regulations, Policy and Programs was carried out highlighting specific gaps and shortcomings influencing the environmental and social aspects of the forestry and agriculture sector in the country.

### 2.3.6 Environmental and Social Impact Assessment

- Identifying positive and negative environmental and social impacts likely to occur for different sub-groups or beneficiaries as a result of project interventions
- Identifying critical habitats and Ecologically sensitive areas
- Assessing and prioritizing impacts based on their significance
- Suggesting measures to minimize negative impacts and derive the maximum from positive impacts.
- Documenting the practices currently commonly adopted

### 2.3.7 Analysis and Assessment of Risks

From ascertaining and analyzing the key environmental and social risks, internal and external, to the project, measures to address them were developed.

Based on the above, ESMF, ESMP and ESCP were formulated.

### 2.3.8 Participatory Approaches

The study was conducted using participatory approaches throughout. Some of the participatory tools used were PRA, women group interaction, SWOT Analysis, Brainstorming, etc. The study identified the stakeholders at different levels i.e. from the policy level to field level and used these tools as appropriate. Consultation with the identified stakeholders was ensured during all stages of the assignment. Process of consultation was continued till the end of study. The consultations with the PMU of Project during planning were used to choose proper data collection methods. The consultations with beneficiaries and field level stakeholders during fieldwork gave authenticity to the study findings.

### 2.3.9 Phases of Work

The assignment was completed in four distinct stages of work as below:

Table 2.1: Study stages of work

| S. No. | Stage | Activities | Output |
|---|---|---|---|
| 1 | Inception Stage | Literature Collection and Review<br>Desk Analysis of Secondary Data<br>FGD Tool Preparation and Field Testing | **Inception Report** |
| 2 | Field Surveys Stage | Primary Data Collection through FGDs/Consultations. About 20 FGDs cum Consultations were conducted at a rate of about 2 per district. | |
| 3 | Assessment Stage | Data and Dialogue Analysis<br>Assessment | **Draft ESA, ESMP, ESMF and ESCP Report** |
| **4** | **Final Reporting Stage** | **Reporting** | **Final ESA, ESMP, ESMF and ESCP Report** |

### 2.3.10 Sampling Rationale

For the purpose of undertaking the ESA, the selection of sites for conducting 20 FGDs was agreed, in consultation with the client. The list of sampled Gram Panchayats is given in the Annexure 3.

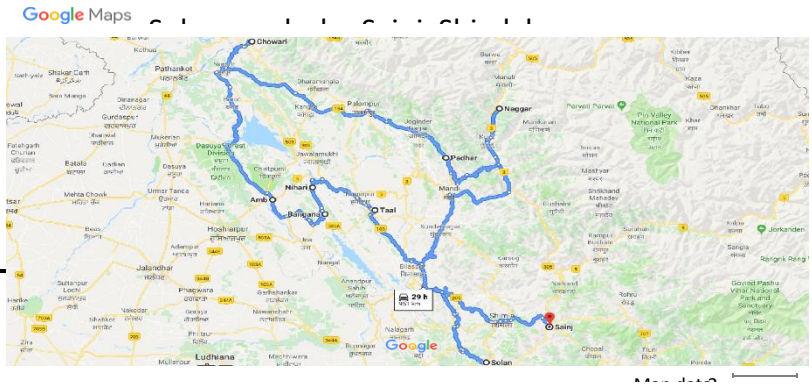
### 2.3.11 Research Tools

Both quantitative and qualitative data analysis techniques were employed during the study. The details of tools and techniques/ the instruments of observation used for collection of required data are presented in table below.

| S. No. | **Techniques** | **Tools/ Instruments** | Respondents |
|---|---|---|---|
| **1** | Transact Walks | Guidelines and Checklists | **Community Members from the habitations to be benefited/ affected by the project** |
| **2** | Focus Group Discussions (FGDs) | Guidelines and Checklists | **Community Members from the habitations to be benefited / affected by the project, Cooperatives Members, Personnel from Forest, Rural Development, Animal Husbandry and Agriculture institutions, Government Organizations, etc.** |
| **3** | **Public Consultations** | **Guidelines and Checklists** | **Community Members from the habitations to be benefited / affected by the project**<br>**District level and State level stakeholders in the final consultations** |

The FGD Checklists were prepared and shared with PMU of Project. These were discussed during the meeting with District Project Officers, which was chaired by The Chief Project Director on 25th September 2019, and necessary revisions were made incorporating the suggestions given by the participants. The suggestions made during the meeting were a) to prepare a tour plan for conducting the consultations, b) to simplify questions on climate change and c) include questions on government conducted camps on agriculture and animal husbandry. These suggestions were immediately incorporated into the FGD Tool and got approval from the PMU. These approved instruments were pretested before collection of data from the field. This FGD Checklist is attached as Annexure 2.

The route map that was followed for visiting the selected Gram Panchayats for conducting the FGDs is given here.



Required software packages (Microsoft Access, CSPro, SPSS etc.) were for carrying out the collation, data coding, analysis and generation of outputs.

### 2.3.12 Consultation and Disclosure

Consultations were conducted at various levels; before and during the screening of project activities and GPRMPs from social and environmental concerns, at the preparation of ESA, ESMP, ESMF and ESCP Reports. Before the consultations, relevant information in a form/ format that is meaningful and acceptable to the groups to be consulted (using local language) was prepared and distributed. This information included a brief description of the project objectives and a summary of key environmental and social issues, approaches and draft conclusions (for example framework and action plans). These were disclosed in accordance with the World Bank's Disclosure Policy.

### 2.3.13 Quality Control

For a study of the size and magnitude that is being attempted here, within a limited time period, maintaining quality was a key concern. Everyone involved in this study was responsible for maintaining high standards of quality, and avoiding compromises that can affect the quality of the results. Every attempt was made to closely and continuously monitor the field work. While monitoring the field work closely and continuously, we sought to minimize the problems and avoid compromises while we ensured the following:

- Study team members had previous experience and are trained, before starting the study fieldwork, in PRA methodology
- Field coordinators were well briefed about the study, and they in turn are able to brief their team members on the content, scope, process and expected results of the study
- This field research study approach and methodology is understood and followed by all the team members
- Two of the core team members provided back-up support in every district as Quality Control Experts
- The core team experts reviewed the initial site reports from the field and provided feedback
- Prompt trouble-shooting assistance was provided: by the Field Coordinators to their Field Team Members and by the Core Team Members to the Field Coordinators and the teams in the districts.
- The Core Team was moving between districts and kept close watch on the field teams.

### 2.3.14 Triangulation

There are two types of methods, qualitative and quantitative, for this field research study. Given the open-ended and flexible nature of some of these tools, it is important that all the information and analysis generated is verified or "triangulated". Triangulation is an iterative process and should be continuously sought during discussions with different groups of people. This can be done in a variety of ways:

- the same issue or topic is discussed with different groups of people
- an issue is analyzed by the same group of people using different methods
- the same group analyzes the issue at different points in time
- results from analysis carried out by one group are shared for discussion with another group
- Results of the study are shared with the community at the end of the process.

Regular review of the process ensured that triangulation is not lost sight of, and is not left to the end of the fieldwork. Daily reviews among the team helped in sorting out the information and results, to verify whether the findings generated on a topic cut across different groups or whether there are major differences among them. It is important to remember that we are not seeking common results from all the groups in a community; however, clarity is needed on which groups come up with different results and why.

## 2.4 Lessons Learnt from Previous Project – HP Mid-Himalayan Watershed Project

1 **Developing local institutional capacity:** As a departure from the convention of working through the village watershed development committees, the project took bold steps in engaging exclusively with the democratically elected PRIs in project planning and implementation. Substantial investments in capacity building of these locally authorized institutions ensured gender parity, and led a significant number of women getting elected to the PRIs, thus creating an approach that can provide dividends for future watershed projects.

2 **Enhanced fiscal decentralization:** To enhance efficiency in project management, it is important that fiscal decentralization and community empowerment move hand in hand. The project successfully established a web-based FMIS for operational effectiveness; developed an Android-based mobile application for real time monitoring of field activities; and discouraged cash transaction in favour of bank transfers. Coupled with a social audit by the community, these innovations contribute to financial transparency and accountability.

3 **Building infrastructure to access services:** The project has consciously encouraged PRIs to build infrastructure (footpaths, foot bridges, and rain shelters) on undisputed community land with appropriate cost-sharing norms and regular monitoring plans. In addition to improving all-weather rural connectivity and access to markets, these structures have ensured sustained

access to services (for example, healthcare, school education, transport) which are crucial for building overall resilience to unforeseen exigencies in the project areas.

4 **Promoting agribusiness opportunity:** The package of precision farming practices and the resultant shift to high-value niche crops is reported to have enhanced productivity and improved profitability. However, at the design stage the project was not geared to assess the quantum of surplus for creating agribusiness opportunities. Since such projects promote many CIGs around selected agriculture products, it will serve such projects better if productivity projections and agribusiness promotion are made integral part at the design stage.

5 **Creating resilient watersheds:** Comprehensive treatment of selected catchments and application of a package of productive practices have opened multiple income streams for beneficiaries from diversified agriculture productivity, improved livestock development, and monetized ecosystem services. This makes watershed development projects relevant for transforming rain-fed agriculture productivity, and for creating conditions for doubling of farmers' income, which create resilient watersheds that contribute to post-project sustainability.

6 **Harvesting climate co-benefits:** By distinguishing itself as the first watershed project that aligned with the Kyoto Protocol in harvesting global environmental benefits by sequestering carbon from degraded lands, it helped beneficiaries become co-creators of the 'greater global good' alongside developing a blueprint for the third-generation of watershed projects which not only harness gains from watershed treatment but maximize environmental, and economic benefits from carbon sequestration, demonstrating an excellent PES model for the mountain states.

In the context of the present project, the following were incorporated based on the lessons learnt from previous project:

- ✓ A capacity building plan to build the local institutional capacity
- ✓ All activities are taken up at GP level by the UG/ CAGs including O&M of the Community Assets.
- ✓ The project will be building infrastructure such as foot bridges, rope ways to access services.
- ✓ Participatory approaches for Preparing GP Resource Management Plans.
- ✓ Upgradation of existing FMIS Systems.
- ✓ Replication of climate smart agriculture practices, etc.

# 3. Legal and Policy Framework

## 3.1 Introduction

This section reviews the associated laws and regulations governing project related activities in the state.

## 3.2 Some Important Legal Provisions Related to Project Activities

The GPRMPs under the Project are small, low-cost and local interventions which would benefit the local population contributing to their livelihoods. In general, all these GPRMPs would result in positive environmental and social impacts. If there are any adverse environmental or social impacts; they would be minor, temporary, localized, reversible and mitigable. While the legislation given below has some important legal and policy provisions of Government of India and Government of Himachal Pradesh are briefly described below:

Some important legal and policy provisions of Government of India and Government of Himachal Pradesh are briefly described below:

Table 3.1: Some Important Legal Provision related Project Activities – Environmental and Social

| Relevant Acts and Policies of GoI and GoHP | Mandate of the Act/ Policy | Environmental and Social Issues/ Impacts on Project Interventions |
|---|---|---|
| | **ENVIRONMENTAL REGULATION** | |
| **National Forest Policy 1988** | It articulates the twin objectives of ecological stability and social justice; recognizes people's dependence and their symbiotic relation with forest, emphasizes protection of people's rights over forest resource and offers space for participation of forest dependent communities in the conservation, protection and management of state-owned forests. | • Lack of empowerment, low awareness about roles/ responsibilities among community institutions (JFMCs) to engage in forest governance.<br>• Poor capacities to support preparation of forest working plans.<br>• Elite capture of community institutions and lack of representativeness.<br>• Limited community participation, especially of vulnerable communities, women head-loaders, pastoralists, nomadic communities in site or species selection, pasture development, zonation of grazing and in bio-diversity |

| Relevant Acts and Policies of GoI and GoHP | Mandate of the Act/ Policy | Environmental and Social Issues/ Impacts on Project Interventions |
|---|---|---|
| | | conservation.<br>• Poor linkage of JFMCs with Panchayats (PRIs) for stronger community stake.<br>• Recognizes subsistence needs of women, but doesn't ensure their quality representation in Executive Committees/ decision making positions in JFMCs.<br>• Restrictive interpretation of rights and concessions granted by the Policy (e.g. relative to carrying capacity of forest).<br>• Lack of transparency in development of benefit-sharing mechanisms and absence of co-management/ actual ownership, impacting institutional sustainability.<br>• Absence of recognition of seasonal needs of pastoralist, nomadic communities.<br>• Absence of participatory monitoring or social audit systems to oversee implementation of Forest Working Plans or JFMC micro-plans.<br>• Absence of efforts to align customary laws, practices and traditional knowledge in the overall forest governance. |
| **Indian Forest Act 1927** | This Act enables the state to acquire ownership over forests and their produce and regulate access, use and extraction of forest resources for consumptive use.<br>Section 26 restricts grazing to only identified grazing units or in adjoining forest ranges. | • Creates barriers to benefit sharing, especially with regards to NTFPs and access to pastures<br>• Creates sanctions and punitive action that discourages access to and use of forest resources in Reserve Forests, unless specifically permitted<br>• In Protected Areas (PAs) it prevents/ regulates right of community/ individual to access any portion of protected forest for extracting forest produce, cut grass and pasture cattle.<br>• Takes ownership away from community, erodes customary rights & traditional practices, by shifting from |

| Relevant Acts and Policies of GoI and GoHP | Mandate of the Act/ Policy | Environmental and Social Issues/ Impacts on Project Interventions |
|---|---|---|
| | | community to scientific management of forests<br>• Poor community ownership and involvement can lead to resource degradation and perpetuate poverty in the long term<br>• Access and benefit sharing to be determined by concerned authority, reducing incentives for community conservation. |
| **Forest (Conservation) Act, 1980** | This Act aims at curbing deforestation and to conserve forests. The Act, among other things, strictly restricts use of forest for non-forest purpose, de-reservation of reserve forests and clear felling of naturally grown trees and use of forests for non-forestry purposes. Compensatory<br>Afforestation Fund Management and Planning Authority (CAMPA) is a scheme under this Act. | • Further restricts fair and equitable access to forest bio-resources, even for forests conserved and protected by community (non-reserve forests)<br>• Reduces incentives for community conservation, restriction on following traditional management practices and imposes forest working plan on any community initiated silvi-cultural operations.<br>• Seeks to protect forest dwellers against habitat loss, alienation and diversion of grazing lands and other common property resources (CPRs)<br>• Limited role of local community in planning compensatory afforestation, developing Catchment Area Treatment Plan (CATP), linking them to micro-plans.<br>• Poor implementation and consequent resource depletion can reduce community resilience and their adaptive capacity. |
| **Biological Diversity Act, 2002** | The Act provides a comprehensive legal framework for conservation and sustainable use of bio-resources, reflects a strict regime for access, control and benefit sharing. It restricts access and use of biological resources by outsiders and creates decentralized institutional structures (State Biodiversity Boards -SBB and GP level Biodiversity Management Committees) for conservation of biological diversity. | • Restrictive provisions of the Act hamper access and use by community, though it excludes local communities, growers /cultivators & practitioners of indigenous medicine.<br>• Absence of functional BMCs to oversee conservation of bio-resources.<br>• Lack of capacities among BMCs (where present) to |

| Relevant Acts and Policies of GoI and GoHP | Mandate of the Act/ Policy | Environmental and Social Issues/ Impacts on Project Interventions |
|---|---|---|
| | | understand their roles and meaningfully perform them.<br>• Lack of effective powers with BMCs to regulate bio-resource harvest or charge fee, despite the mandate provided by the Act.<br>• Absence of clear and transparent benefit sharing mechanism that reduce incentive for local community/BMCs to undertake *in-situ* conservation.<br>• Poor implementation of provisions related to granting joint ownership of IPR to the BMC or local community.<br>• No clarity on the status of Bio- heritage Sites created by the Act or role of community in their management.<br>• Issue of displacement of people affected by notification of bio-heritage sites.<br>• Poor documentation (PBR), leading to loss of ecological knowledge about MAPs present in the region.<br>• No institutionalized role for women in BMCs or in resource conservation, even though they play a key role in use/ collection and selection/ conservation of local biodiversity for meeting the household level nutritional needs. |
| **Wildlife(Protection) Act, 1972and amendment 2002** | An Act to promote conservation and development of wild life habitats, prescribes prohibitive and permissive provisions for use of forest resources in different categories of PAs. The amended Act provides for a licensing system to regulate cultivation and trade of specified plants and for creating Community Reserves (outside PA) to be conserved and protected by a Community Reserve Management Committee (CRMCs). Integrated Development of Wildlife Habitats is scheme under this act. | • Creates strict barriers for community access and use, by considering rights of community subservient to wildlife protection in the PAs.<br>• Only allows certain communities to pick, collect or possess forest resource for '*bona fide*' personal use, not for commercial purpose.<br>• Lack of transparency in defining *bona fide* use, hence scope for exploitation<br>• Limited awareness & low capacity of community institutions to understand Act. |

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| | | • Restricts diversion, limiting or enhanced flow of water into or outside the sanctuary and damage/ destruction of habitats, which covers activities related to Command Area Treatment (CAT)<br>• Does not allow construction of tourism infrastructure - tourist lodges, hotels inside a sanctuary, without prior approval, imposing barriers for community managed eco-tourism initiatives<br>• CRMCs not linked to the PRIs and hence low legal validity<br>• Improved forest density and quality through community conservation efforts may led to better wildlife base, potential man-animal conflicts and notification of new PAs (in the long term) leading to further restrictions on access and use. |
| **Eco-sensitive Zone Notifications 2015** | The activities in areas around Wildlife Sanctuaries and National Parks are regulated from the perspective of conservation of wildlife | Applicable. Monitoring Committee for ESZ in the State |
| **State Compensatory Afforestation Fund Management and Planning Authority Forest (Conservation) Amendment Rules, 2014** | It seeks to establish the National Compensatory Afforestation Fund under the Public Account of India, and a State Compensatory Afforestation Fund under the Public Account of each state.<br>The collected funds will be utilized for afforestation, regeneration of forest ecosystem, wildlife protection and infrastructure development. | • Applicable to the project, as it can leverage CAMPA funds for afforestation activities. |
| **Rules Governing the felling of trees on various types of land in HP, 2017** | Felling of Trees of Private, non- Private and forest lands is governed by various acts and rules: | • Applicable in the case any trees need to be felled for construction activities and approach roads. |
| **HP Forest Fire Rules Transit Rules-Notifications MFP,** | These rules may be called the Himachal Pradesh Forests (Protection from Fire) Rules, 1999. The objective is to set in place rules for precautionary measures to prevent fires, and also set forth prohibitions | • Applicable to storing/ stacking of inflammable forest produce, kindling of fire within one hundred meters from a forest without permission of the Divisional Forest |

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| **1999** | on activities which may lead to forest fires. | Officer, and Precautions to be taken in burning agriculture residue near forest. |
| **Insecticide Act 1968; Insecticide Rules 1971; Insecticide (Control) Order 1985** | The GOI has notified various Acts for the control and prevention of pollution due to pesticides and fertilizers. The Act to regulate the import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animal | • The project investments are likely to involve use of pesticides (in nurseries and plantation activities). These activities will comply with the requirements of the Insecticide Act – especially with regard to non-use of banned pesticides, safe use of pesticides, etc. Central Insecticides Board, GoI |
| **Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011 and subsequent amendment.** | The Food Safety and Standards Authority of India (FSSAI) has been established under the Food Safety and Standards Act, 2006 as a statutory body for laying down science based standards for articles of food and regulating manufacturing, processing, distribution, sale and import of food to ensure it is safe to consume. | • FSSAI standards would apply if NTFPs supported under the project are processed for consumption. |
| **National Environment Policy 2006** | It brings related legislations under an overarching frame and advocates decentralised governance by seeking transfer of power to State/ local authorities; participation of local bodies in management of sensitive zones. | • Absence of conducive policies and unilaterally imposed regulatory practices reduce people's incentives for afforestation.<br>• Threat of loss of natural heritage sites, biodiversity hotspots, sacred groves and landscapes that are repositories of significant genetic and eco-system diversity as a result of low community ownership. |
| **Environment (Protection) Act and amendments, 1986** | The Environment Protection Act, 1986 (the "Environment Act") provides for the protection and improvement of environment. The term "environment" is understood in a very wide term under s 2(a) of the Environment Act. It includes water, air and land as well as the interrelationship which exists between water, air and land, and human beings, other living creatures, plants, microorganisms and property. Under the Environment Act, the Central Government issues notifications under the Environment Act for the protection of ecologically-sensitive areas or issues guidelines for matters under the | • The various environmental quality standards notified under this act are applicable to the project. These include: General standards for discharge of environmental pollutants<br>• Ambient air quality standards in respect of noise<br>• Vehicular exhaust norms<br>• Noise limits for vehicles<br>• Emission and noise limits for gensets |

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| | Environment Act | |
| **Water (Prevention and Control of Pollution) Act (and subsequent amendments) , 1974** | To provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water. | • The Project may have few investments on supply chain that may increase wastewater flow. Proper measures as per the requirement of the Act will incorporated accordingly. |
| **Air (Prevention and Control of Pollution) Act (and subsequent amendments), 1981** | To provide for the prevention, control and abatement of air pollution, and for the establishment of Boards to carry out these purposes. | • The project will involve construction of infrastructure and their clearance may be required by the Project.<br>• The project activities (especially construction and NTFP processing) will have to comply with the National Ambient Air Quality Standards. |
| **The Municipal Solid Waste (Management and Handling) Rules, 2000** | The rule facilitates and provides methods to manage the Municipal Solid Wastes in an efficient and reusable manner. | • As project investments, will involve construction/up gradation of buildings/nurseries, supply chain infrastructure, generation and disposal of solid waste under different components will need to be managed in line with the rules. |
| **The Noise Pollution (Regulation and Control) Rules, and amendments 2000** | Work place noise is covered under Indian factories Act, 1948 but this rule provides safety against noise in ambient condition with generation of noise by certain point and area source. | • Project activities may lead to generation of Noise due to construction activity, and operation of DG sets for power backup. |
| **Central Motor Vehicle Act 1988 Central Motor Vehicle Rules 1989** | To control vehicular air and noise pollution. To regulate development of the transport sector, check and control vehicular air and noise pollution. | • Operation of vehicles in carriage and construction activities in the project. Also, applicable to vehicles used under forest fire control / patrol and management.<br>• All vehicles will comply with relevant emission control norms. |
| **Roof-top Rain Water Harvesting, 1999** | Rain water harvesting for any infrastructure facility more than 1000 Sq.m plinth area. | • However, infrastructure of this scale is unlikely to be supported under the project. |
| **Himachal Pradesh Non-Biodegradable Garbage (Control) Act, 1995** | Ban on non-biodegradable garbage including plastics | • The project may use non-biodegradable material for nurseries, crates and packing material. However, biodegradable alternatives will be encouraged. Any plastic waste generated will be managed through proper storage |

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| | | and onward sale to recycling units. |
| **Construction and Demolition Waste Management Rules , 2016** | Every waste generator shall prima-facie be responsible for collection, segregation of concrete, soil, storage of construction/ demolition waste generated and deposition to collection centre or handover to authorized processing facilities | • Applicable as construction waste will be generated during the construction phase.<br>• Some of the projects involve dismantling / demolition of existing infrastructure such as intake wells, etc.) |
| | **SOCIAL REGULATION** | • |
| **Constitutional Safeguards** | The constitutional safeguards related to tribals are : (i) Article 14, related to Equal rights and opportunities; (ii) Article 15, prohibits discrimination on grounds of sex, religion, race, caste etc.; (iii) Article 15 (4), enjoins upon state to make special provisions for the Scheduled Tribes; (iv) Article 16 (3), empowers state to make special provisions for reservation in appointments or posts in favor of Scheduled Tribes; (v) Article 46, enjoins upon State to promote with special care educational and economic interests of Scheduled Tribes, protection from social injustice and exploitation; (vi) Article 275 (1), Grant-in-aid for promoting the welfare of Scheduled Tribes; (vii) Article 330, 332, 335, related to the reservation of seats for Scheduled Tribes in Lok Sabha and State Assemblies; and (viii) Article 339, 340, related to Control of the Union over the Welfare of Scheduled Tribes and powers to investigations thereof.<br><br>Article 366 (25) refers to Scheduled Tribes as those communities, who are scheduled in accordance with Article 342 of the Constitution, wherein communities shall be declared as such by the President through an initial public notification or through a subsequent amending Act of Parliament. The Fifth Schedule under Article 244(1) of Constitution defines "Scheduled Areas" as such areas as the President may by order declare to be Scheduled Areas after consultation with the Governor of that State.<br>Defines following essential characteristics, for a community to be identified as Scheduled Tribes are; 1) Indications of primitive traits, 2) | These constitutional safeguards provides the following for the Scheduled Tribes:<br>• Equal rights and opportunities<br>• Prohibits discrimination<br>• Provides special provisions<br>• Provides for reservation<br>• Promotes educational and economic interests<br>• Protection from social injustice<br>• Protection against exploitation<br>• Promotes welfare |

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| | Distinctive culture, 3) Shyness of contact with the community at large, 4) Geographical isolation and 5) Backwardness. | |
| **The Himachal Pradesh Transfer of Land (Regulation) Act, 1968** | Objective is to ensure protection to tribes in respect of their possession of land. It provides that "No person belonging to an Scheduled Tribe transfer his interest in any land by way of sale, mortgage lease, gift or otherwise to any person not belonging to such tribe except with the previous permission in writing of the Deputy Commissioner, excepting i) by way of lease of a building on rent; ii) by way or mortgage for securing loan to any Cooperative land Mortgage bank or cooperative society (all or majority members belonging to any ST) or by acquisition by the state government under LA act". Right, title or interest held by persons belonging to Scheduled Tribes in land are not be attached except when the amount due under such decree or order is due to the state government or to any cooperative land mortgage bank or cooperative society. | • The act is applicable as the act's coverage extends to whole districts of Lahaul and Spiti and Kinnaur and to the sub-tehsils of Pangi and Bharmour in Chamba district; i.e., to all 5 ITDPs |
| **Himachal Pradesh Public Premises and Land (Eviction and Rent Recovery) Act, 1971** | An Act to provide for the eviction of unauthorized occupants from public premises and for certain incidental matters. DFOs have been delegated powers of Collectors under HP Public Premises & Land (Eviction & Rent Recovery) Act, 1971 to try the cases of encroached forest land vide Notification No. 1-21/71-LSG dated 8.6.1994. Form of order under sub-section (2) of section 7 of the Himachal Pradesh Public Premises and Land (Eviction and Rent Recovery) Act, 1971; In the event of your refusal of failure to pay the damages within the said period, the amount will be recovered as an arrear of land revenue. | • Eviction of about 10,000 plots is in progress under High Court order.<br>• Forest Rights might be getting affected<br>• The provisions of this act will not be used for this project since it is not consistent with the World Bank ESSs |
| **HP Tenancy and Land Reforms Act, 1972: Section 118 of Act Himachal Pradesh Tenancy and Land Reform Rules, 1975.** | Provides for restriction on transfer of land in favour of a person who is not an agriculturist of the State.<br>Amendments in Rule 38-A (a) (2) of the Himachal Pradesh Tenancy and Land Reform Rules, 1975 provides that for all purposes, other than for a dwelling unit or shop, any non-agriculturist seeking to acquire land with permission under section 118 of Himachal Pradesh Tenancy and Land Reform Act 1972, shall need an essentiality certificate (EC) from the concerned department that will certify his eligibility. It must also be | • Places restrictions on land transfer to non-agricultural activities. |

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| | stated that land required is as per norms and that NOCs from all relevant departments and authorities including Local Bodies have been obtained. | |
| **Land Reforms Legislations - HP Village Common Land Vesting and Utilization Act, 1974** | Aims to stream line the utilization of village common lands popularly known as 'Shamlat Land '. Under this act, following categories of land were vested in the State Government Those areas which were vested in a Panchayat under section 4 of the Punjab Village Common Land (Regulation) Act, 1961, as enforced in merged areas of Himachal Pradesh under section 5 of the Punjab Re-organisation Act, 1966.<br>This precludes lands used or reserved for the benefit of village community including streets, lanes, play-grounds, Schools, wells and ponds within Abadideh or Gohrdeh; areas which were described in the Revenue records as shamlat taraf, patties and thola, and not used as per revenue records for the benefit of the village community or a part thereof for community purposes of the village; Areas which were described in revenue records as shamlat, shamlat deh, taraf, shamat, shamlat chak and patti.<br>This applied in respect of those areas which comprised Himachal Pradesh immediately before November 1, 1966. Through an amendment made later, the vested land can now also be transferred to some other Departments, of the State Government or can be given on lease to an individual in connection with development activities of the state. | • Some of the lands with the implementing agency could be subject to provisions of this act. |
| **Panchayat Raj Institutions 73rd Amendment Act, 1992** | The Act aims to provide a 3-tier system of Panchayat Raj for all States having a population of over 2 million, to hold Panchayat elections regularly every 5 years, to provide seats reservations for scheduled castes, scheduled tribes and women; to appoint a State Finance Commission to make recommendations regarding the financial powers of the Panchayats and to constitute a District Planning Committee, to prepare a development plan for the district. The 3- tier system of Panchayat Raj consists of: Village-level Panchayats; Block-level Panchayats and District-level Panchayats. Besides, it indicates the | • Ineffective devolution of subjects and lack of systems to support PRIs.<br>• Absence of clarity among elected representatives regarding their mandate in the area of forest governance.<br>• Poor linkage between PRIs and local community institutions created by different forest legislations.<br>• Resulting inability of PRIs in ensuring equitable benefit sharing, inclusion, improved access or resource planning |

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| | powers and responsibilities and also sources of funds.<br>The Act provides for establishment of self-governance in rural areas, with primary mandate to work for economic development & social justice. Among 29 subjects devolved to PRIs most relevant are fuel and fodder, NTFP, social and farm forestry, small scale, khadi, cottage and village industries, watershed development.<br>14th Finance Commission Grants is a scheme under this Act. | around forest resources.<br>• Lack of flexibility to PRIs to work on forest management using FFC grants received (based on conservation value of their forests and forest cover) |
| **Joint Forest Management Policy 1993 (revised Feb 2000)** | The policy seeks involvement of village communities in the regeneration of degraded forests and conservation of well-stocked forests. Subsequent guidelines shifted focus from timber to NTFP, encouraged people's participation in forest management, spelt mechanisms for sharing ecological as well as economic benefits with the community. National Afforestation Programme is a scheme under this Act. | • Despite the mandate, poor delegation of powers and hence low involvement of users in planning restoration/ management of forests and pastures.<br>• Lack of integration of JFM micro-plans with departmental working plans.<br>• Low effective representation of vulnerable communities, especially women, in decision making roles in VFCs/FPCs /EDCs, despite existence of such provisions.<br>• Low capacities among user groups, WSHGs, JFMCs to understand NTFP value chains, get better prices or improve incomes.<br>• Loss of traditional practices that assured sustainable NTFP harvest for optimized and long term returns. |
| **The Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Rules, 1995** | The act provides for specific provisions to prevent atrocities on the Scheduled Castes and the Scheduled Tribes and suggests State Government to frame rules for the same. These include identification of areas where atrocity may take place or there is an apprehension of reoccurrence of an offence under the Act. The State Government is required to set up a Scheduled Castes and the Scheduled Tribes Protection Cell at the State headquarters under the charge of Director of Police, Inspector-General of Police. This Cell is responsible for, conducting survey of the identified area; maintaining public order and tranquility in the identified area; recommending to the State | • Provides protection to Scheduled Castes and Tribes<br>• Prevents atrocities on Scheduled Castes and Tribes |

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| | Government for deployment of special police force or establishment of special police post in the identified area; and restoring the feeling of security amongst the members of the Scheduled Castes and the Scheduled Tribes | |
| **Panchayat (Extension to Scheduled Areas) Act 1996** | The Act empowers the Gram Sabha (GS) to safeguard and preserve traditions and customs of the people, their cultural identity, community resources (including ownership of forest resources) and the customary mode of dispute resolution, in the notified Scheduled Areas by upholding the rights of tribals to self-governance. It grants powers for decision-making to the habitation *(Grama Sabha*) and entitles them to ownership of NTFPs.<br>Key provisions include:<br>▪ state legislation on Panchayats in the scheduled area should take care of the customs, religious practices and traditional management practices of community resources<br>▪ Every village shall contain a gram sabha whose members are included in the electoral list for the panchayats at village level<br>▪ Planning and management of minor water bodies are entrusted to the Panchayats | • National and state forest legislations have not been suitably modified to bring them in line with PESA, for decentralized governance and effective enforcement.<br>• Lack of complete ownership of NTFPs with the GS, and hence absence of power to independently plan determine prices and sell.<br>• Issue of conflict between community institutions and forest department over right of ownership, access to collect, use and dispose NTFPs.<br>• Poor capacity of the GS to plan its development priorities and lack of recognition of GS' local development plans by the forest department.<br>• Neglect of mandatory mechanisms for seeking GS concurrence while planning interventions/ activities in the Scheduled Areas. |
| **State Participatory Forest Management Policy 2000** | The policy provides for creation of Village Forest Development Society (VFDS), as a registered society to manage any government forest or common land brought under Participatory Forest Management. Provides usufruct and revenue sharing benefits to the society. | • Lack of community consultations for arriving at benefit sharing mechanisms.<br>• Issues of conflicts between different societies, and with transhumant communities/graziers, related to overlapping forest resources and pastures.<br>• Lack of integration of micro-plans prepared by the society for holistic forest development with the working plans. |
| **National Agricultural Policy, 2000** | The National Policy on Agriculture seeks to actualise the vast untapped growth potential of Indian agriculture, strengthen rural infrastructure to support faster agricultural development, promote value addition, accelerate the growth of agro business, create employment in rural | • Project comprises many of the features enunciated in the policy |

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| | areas, secure a fair standard of living for the farmers and agricultural workers and their families, discourage migration to urban areas and face the challenges arising out of economic liberalization and globalization<br>Provides approach for sustainable agriculture, food and nutritional security, generation and transfer of technology; inputs management and incentives for agriculture, Generation and Transfer of Technology, management reforms, institutional structure | |
| **Right to Information Act, 2005** | Provides a practical regime of right to information for citizens to secure access to information under the control of Public Authorities. The act sets out obligations of public authorities with respect to provision of information;<br>▪ requires designating of a Public Information Officer;<br>▪ process for any citizen to obtain information/disposal of request, etc.<br>▪ provides for institutions such as Central Information Commission/State Information Commission | • All documents pertaining to the project would be disclosed to public. |
| **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006** | This is an act to recognize and vest the forest rights and occupation in forest land in forest dwelling scheduled tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded; to provide for a framework for recording the forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land. The Act provides for use, access and ownership to forest resources, biodiversity and provision for benefit sharing for ST and other forest dwelling communities.<br>It provides individual & community rights of ownership, access to collect, use, and dispose of NTFPs; to protect, conserve and develop any forest resource which the community has traditionally/ seasonally protected/ used; to protect and access their cultural and natural heritage sites and habitats, water bodies, pastures. It also provides for occupation of forest land for cultivation and/ or habitation, including | • Poor enforcement of provisions like the need for complete ownership, participation and concurrence of local communities (Gram Sabha) in forest management, species selection for NTFP/ pasture development and bio-diversity conservation.<br>• Need to document all customary rights, dependent forest resources for upholding the existing arrangements while preparing plans.<br>• Conflicts between community and state related to collection and disposal of NTFPs (Section 3(1) (c)).<br>• Operational challenges for GS in using provisions of the Act to work on NTFP value addition and processing (transit rules).<br>• Risk of displacement of right-holders from lands notified as (inviolate) critical wildlife/ tiger habitats within Parks |

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| | in the PAs. | and Sanctuaries, leading to loss of livelihoods for affected families/ communities.<br>• Conflicts among different communities due to diffused boundaries where customary rights are accessed. |
| **Himachal Pradesh State Medicinal Plant Sector Policy 2006** | The Policy aims at long-term development of the sector for meeting requirements of rural and tribal populations.<br>Its objective is to conserve and augment the State's medicinal plant resource in its natural habitat through adaptive, sustainable and participatory management, encourage organic cultivation of commercially important species, regulate pricing of wild harvest, encourage PPCP models for cultivation, value addition and processing of MAPs, involvement of stakeholders in management (conservation, cultivation, sustainable use, value addition and trade) of medicinal plant resources | • Erosion of community's role in the management of resource related to medicinal and aromatic plants (MAPs).<br>• Lack of enabling environment has led to severe depletion of medicinal plant resource base, impacting sustenance of forest dependent communities.<br>• Unscrupulous/ unscientific exploitation of MAPs, loss of traditional knowledge and harvesting practices, threatens the supplementary incomes it provides to the economically vulnerable, especially women, during lean season and in distress.<br>• Absence of clarity on benefit sharing mechanism with community, leading to low community involvement in the *in-situ* conservation, cultivation, value addition and marketing of MAPs.<br>• Low involvement of PRIs in ensuring sustainable harvest or for creating regulatory mechanism, due to lack of clarity about related roles and functions.<br>• State management of forest resource has weakened community property rights leaving little incentive for them to engage in sustainable harvest. |
| **National Policy for farmers, 2007** | Sets goals such as to: (i) improve economic viability of farming by substantially increasing the net income of farmers and to ensure that agricultural progress is measured by advances made in this income. (ii) To protect and improve land, water, bio-diversity and genetic resources essential for sustained increase in the productivity, profitability and stability of major farming systems by creating an economic stake in conservation. (iii) To develop support services including provision for | • Project comprises many of the features enunciated in the policy |

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| | seeds, irrigation, power, machinery and implements, fertilizers and credit at affordable prices in adequate quantity for farmers, etc.(iv) defines farmers that include tribal families / persons engaged in shifting cultivation and in the collection, use and sale of minor and non-timber forest produce  prescribes assets reforms required to empower farmers such as land, water, livestock,  provides for support services including credit, climate change, agricultural practices, etc. | |
| **APMBDepartment Notification (150-26/2004 dated 11.3.2010. Amendment toThe Schedule section 2 (a) of HP Agricultural and Horticultural Produce Marketing (Development and Regulation) Act, 2005(Amendment to the Schedule)** | HPSAMB to provide for improved regulation in marketing of agricultural produce, development of efficient marketing system, promotion of agri- processing and agricultural exports, establishment and proper administration of markets for agricultural produce in the State of Himachal Pradesh. | • APMB provides marketing support to Medicinal and Aromatic plants. APMB mandis can be used to auction this produce |
| **Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013** | It makes prior consent of landowners a pre-requisite & calls for detailed Social Impact Assessment; restricts acquisition in Scheduled Areas without prior Gram Sabha consent. Alternate fuel, fodder to be developed to meet the needs of resettled communities. | • Absence of formalized mechanism for holding consultations with affected families, regarding the nature and scale of resettlement (and the region to be notified) for creating Critical Wildlife Habitats.<br>• Resettlement of affected families deprives them of forest and other natural resources on which they traditionally depended for livelihoods and food security. |
| **Himachal Pradesh Lease Rules, 2013** | Provides for leasing of land and to be granted only in the interests of the development of State,<br>The land may be granted on lease for purposes and to persons as provided under these rules with the sanction of the competent | • During implementation, some of the project interventions requiring land may use this as an option. |

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| | authority, out of land vested with the State Government under Section 3 (HP Village Common Lands Vesting and Utilization Act) or the land vested under section 11 (HP Ceiling on Land Holdings Act, 1972 (Act No.19 of 1973), in the interest of the development of the State.<br>The land vested with the Government under the Acts, which is encroached, shall not be leased out to the encroacher. The lease may be granted only in the interests of the development of State, if the State Government is satisfied that there are sufficient reasons to do so.<br>The development of State shall include amongst others: location of the specific infrastructure projects, any other common purpose in the interest of the development of the State and shall include the traditional cultural activities of the State of Himachal Pradesh.<br>In Scheduled areas the lease application to the concerned Gram Sabhas for consultation and would be processed further only after obtaining the Gram Sabha's resolution in this regard. | |
| **State Policy on Payment of Eco-system Services in Himachal Pradesh, 2013** | The policy aims to protect and manage natural resources for sustained production of ecosystem services, address impacts of climate change on such services, generate economic incentives for communities conserving natural ecosystems; community driven ecosystem services shall have priority for receiving incentive, which will be determined through a participatory process involving ES generator and user while securing resource rights of community. | • Incentive flow to the community is restricted unless they have larger stake/ participation in forest governance and development of resources.<br>• Prerogative with forest department for determining interventions within the forest for providing enhanced services.<br>• Lack of community role in determining the price to be charged for the eco-system services and the benefit/ incentive sharing mechanism.<br>• Difficulty in pricing complex services, like protection & conservation of corridors between wildlife habitats/ sensitive ecological zones or indirect services.<br>• Lack of institutional mechanism to negotiate incentives on behalf of community.<br>• Absence of clarity on the mechanism for incentive sharing among different communities contributing to provide a |

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| | | single service. |
| **Himachal Pradesh Eco-tourism Policy 2016/17** | The policy aims to protect states flora-fauna, while enhancing local livelihoods and generating resources through promotion of eco-tourism. Eco-tourism is considered a sustainable approach for responsible conservation of fragile mountain eco-systems. | • Inadequate representation of PRIs and other community institutions in the Divisional Eco-tourism societies.<br>• Lack of clarity on benefit sharing between Eco-tourism societies and CBOs/ PRIs/ SHGs/ Youth Clubs/ JFMCs/ FDCs engaged in promoting or implementing projects.<br>• Absence of clarity on the overall role to be performed by PRIs under the policy, including role in determining sites or circuits and management of assets. |
| **State Grazing Policy** | This policy talks of a balanced and complimentary land use. This policy states that continuous grazing is destructive and cheap forest grazing has a demoralizing effect and grazing fee should regulate and control both quality of grazing and cattle. | As there is an increasing demand for fodder, there is a need to take into account the animal population and strike a balance between grazing requirements and conservation needs of the forests. |
| **Himachal Pradesh Public Services Guarantee Act 2011** | The Act provides legally enforced right to select services related to-Grazing Permits, Compensation for injuries or loss of life of domestic animals and humans and Grant of Timber Distribution rights to the right-holders within a stipulated timeframe based on applications received from the citizens. | • Designates officers and timeframes for issuing permits and for making requests for compensation. These have to go through Gram Sabha; the gram sabha needs to be transparent and should make equitable and inclusive decisions.<br>• Low awareness about these provisions among pastoral and forest dependent communities restricts its effective use. |
| **Himachal Pradesh Forest (Timber Distribution to the Right Holders) Amendment Rules, 2016** | These rules specify procedures to grant rights for timber to right holders. No green trees are allotted to the applicants and only felled and dry or salvaged trees are allowed to be used for timber distribution. Timber distribution period for house construction and repair has gradually been increased from 10 to 20 years. | This is a long procedure and needs to be approved and recommended by a resolution of the Gram Panchayat. |
| **Himachal Pradesh Forest Produce Transit (Land Routes) Rules,** | These rules sets the fee for issuing transit passes for NTFP. This rules apply to forest produce as well as species of NTFP listed on the schedule that are cultivated on private lands. | • Creates complex procedures for movement of forest produce including NTFPs in the form of transit permits |

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| **2014** | | • These TP rules do not apply any minimum threshold for exempting from permit.<br>• Cultivation from private lands also needs to be certified and royalty paid, at the same rate as those for produce collected from the forest.<br>• Onus of proving/ establishing source of produce (forest or private land) is on the seller, creating disincentive for ex situ cultivation by private growers |
| | **LABOUR REGULATION** | • |
| **Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996** | It regulates the employment and conditions of service of building and other construction workers and provides for their safety, health and welfare. | • This will be applicable for all building or other constructions works under the project that employ 10 or more workers. |
| **Workmen Compensation Act, 1923** | It provides for payment of compensation by employers to their employees for injury by accident i.e. personal injury or occupational disease. | • Construction workers will be involved in the GPRMPs. |
| **Inter-state Migrant Workers Act, 1979** | It protects workers whose services are requisitioned outside their native states in India. A contractor who employs or who employed five or more Inter-State migrant workmen need to obtain registration under this act | • Construction workers will be involved in the GPRMPs |
| **The Child Labour (Prohibition & Regulation) Amendment Act, 2016** | It prohibits employment of children in specified hazardous occupations and processes and regulates the working conditions in others. | • There should not be any child labour (less than 14 years) in any project activity and adolescents (above 14 and less than 18 years) in any hazardous activity. |
| **Minimum Wages Act, 1948** | Payment of minimum rate of wages as fixed and periodically revised by the State Government | • Construction/daily wage workers will be involved in the GPRMPs |
| **Building and Other Construction Workers** | An Act to provide for the levy and collection of a Cess on the cost of construction incurred by employers. | • GPRMPs will involve construction workers |

| Relevant Acts and Policies of GoI and GoHP | Mandate of the Act/ Policy | Environmental and Social Issues/ Impacts on Project Interventions |
|---|---|---|
| **Welfare Cess Act, 1996** | | |

It can be summed up that the while some legal provisions safeguard the forests from over exploitation and advocates strict conservation and protection (FCA-1980, WPA-1972), there are other instruments that recognize the customary rights of over forest resources meet, their role in conservation and development (PESA-1996, FRA-2006) while some provisions try to strike a balance between the two by suggesting judicious use of forest resources and brining in community as the co- owners of forest along with the forest department (NFP-1988, JFM-1993, PFM- 2000 and BDA-2002).

In the absence of a clear alignment/harmonization of forest polices at the national level to establish the exact role of communities in conservation, protection as well as development of forest resources, the legal environment with respect to communities' rights and entitlement over forests remains nebulous.

### 3.3 The World Bank Environmental and Social Framework

The World Bank Environmental and Social Framework sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity. This Framework comprises the following:

- A Vision for Sustainable Development, which sets out the Bank's aspirations regarding environmental and social sustainability;

    - The World Bank Environmental and Social Policy for Investment Project Financing, which sets out the mandatory requirements that apply to the Bank; and
    - The Environmental and Social Standards, together with their Annexes, which set out the mandatory requirements that apply to the Borrower and projects.

The World Bank Environmental and Social Policy for Investment Project Financing sets out the requirements that the Bank must follow regarding projects it supports through Investment Project Financing.

The Environmental and Social Standards set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts associated with projects supported by the Bank through Investment Project Financing. The Bank believes that the application of these standards, by focusing on the identification and management of environmental and social risks, will support Borrowers in their goal to reduce poverty and increase prosperity in a sustainable manner for the benefit of the environment and their citizens. The standards will: (a)

support Borrowers in achieving good international practice relating to environmental and social sustainability; (b) assist Borrowers in fulfilling their national and international environmental and social obligations; (c) enhance non-discrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement.

The ten (10) Environmental and Social Standards establish the standards that the Borrower and the project will meet through the project life cycle, as follows:

1. Environmental and Social Standard 1: Assessment and Management of Environmental and Social Risks and Impacts – ESA is done as per this.
2. Environmental and Social Standard 2: Labor and Working Conditions – Applicable though only number of labour required is little.
3. Environmental and Social Standard 3: Resource Efficiency and Pollution Prevention and Management – Applicable as some small scale construction activities are involved.
4. Environmental and Social Standard 4: Community Health and Safety – Applicable as some agriculture, horticulture and animal husbandry activities are involved.
5. Environmental and Social Standard 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement – Applicable as land, though in small parcels, is required for project facilities.
6. Environmental and Social Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources – Applicable as project location is in forest areas.
7. Environmental and Social Standard 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities – Applicable as there is substantial tribal population in some of the project areas.
8. Environmental and Social Standard 8: Cultural Heritage – Applicable as the project area has rich cultural heritage.
9. Environmental and Social Standard 9: Financial Intermediaries – Not applicable as this is an Investment Project Finance.
10. Environmental and Social Standard 10: Stakeholder Engagement and Information Disclosure – Applicable as the project involves diverse stakeholders and project information needs to be disclosed.

### 3.4 Status of Tribal Communities in HP

Out of total 55673 square kilometer geographical area of HP about 23,655 square kilometer area falls in Scheduled V, which constitutes 42.49 percent of the total area of the state. The total population living in the Scheduled Area is 173,661 of which 123,585 are tribals which constitute nearly 71.16 percent of the total population living

in this area. Out of total ST population in the state 68.51 percent resides outside the Scheduled Areas while the rest is dispersed in other districts and regions of the state[1].

As per the Socio Economic Caste Census of 2011, tribals of HP are better off among Scheduled Tribe (ST) households in the rural areas of India. Nearly 21.37 percent ST rural households have an income of more than Rs 10,000 per month and as many as 42.76 percent tribal households own irrigated agricultural land. Among salaried government jobs too, HP tribals are ahead of other states with 23.72 percent such households with at least one member in a government job.

However, this does not represent the complete picture of the scheduled tribes in Himachal. The state's tribal areas have a lower literacy rate at 73.64 percent against the state average of 82.80 percent.[2] Owing to their present in the remote and geographically challenging areas (Lahaul, Spiti, Kinnaur and Chamba districts) their access to health services is low, which reflects in the poor health infrastructure in tribal areas as well as low health attainments. The average landholding size in tribal areas is around 1.16 hectares but over the years the cropping intensity of these farms has fallen from 136 to 124 percent due to water scarcity and low availability of irrigation facilities.

The remoteness of tribal habitations, while creating barriers in mobility, also pose challenges in the provisioning of basic public services like - primary and secondary health services, school and higher education, banking services- apart from low access to established markets.

## 3.5 Provision of Scheduled Areas under 5th Schedule of the Constitution

### *3.5.1* Scheduled Areas:

The tribals live in contiguous areas unlike other communities. It is, therefore, much simpler to have area approach for development activities and also regulatory provisions to protect their interests. In order to protect the interests of the Scheduled tribes with regard to land alienation and other social factors, provision of "Fifth Schedule " and "Sixth Schedule" have been enshrined in the Constitution. The Fifth Schedule under article 244 (2) of the Constitution defines " Scheduled Areas" as such areas as the President may by Order declare to be Scheduled Areas after consultation with the governor of that State.

[1]Source: Directory of Villages with ST concentration, Tribal Development Department, GoHP
[2] Annual Tribal Sub-Plan 2017-18, GoHP

### *3.5.2* Fifth Schedule Areas

The criteria for declaring any area as a "Scheduled Area "under the Fifth Schedule are:

- Preponderance of tribal population,
- Compactness and reasonable size of the area,
- Available administrative entity such as district, block or taluk, and
- Economic backwardness of the area as compared to neighboring areas.

The specification of "Scheduled Areas" in relation to a state is by notified Order of the President, after consultation with State Government concerned. The same applies for altering, increasing, decreasing, incorporating new areas, or rescinding any Orders relating to "Scheduled Areas".

### *3.5.3* Purpose and Advantage of Scheduled Areas:

Scheduled Areas have certain distinct provisions meant to protect and benefit tribal people in a State:

a. The Governor of a State which has Scheduled Areas is empowered to make regulations in respect of (1) Prohibit or restrict transfer of land from tribals; (2) Regulate the business of money lending to the members of Scheduled tribes. In making any such regulation, the Governor may repeal or amend any Act of Parliament or of the Legislature of the State, which is applicable to the area in question.
b. The Governor may by public notification direct that any particular Act of Parliament or of the Legislature of the State shall not apply to a Scheduled Area or any part thereof in the State or shall apply to such area subject to such expectations and modifications as he may specify.
c. The Governor of a State having Scheduled Areas therein, shall annually, or whenever so required by the President of India, make a report to the President regarding the administration of the Scheduled Areas in that State and the executive power of the Union shall extend to the giving of directions to the State as to the administration of the said area.
d. Tribes Advisory Council [TAC] shall be established in States having Scheduled Areas. The TAC may also be established in any State having Scheduled Tribes but not Scheduled Areas on the direction of the President of India. The TAC consists of more than twenty members of whom, as nearly as may be, three fourth are from the representatives of Scheduled Tribes in the Legislative Assembly of the State. The role of TAC is to advise the State Government on matters pertaining to the welfare and advancement of the Scheduled Tribes in the State as may be referred to it by the Governor.

e. The Panchayaths (Extension to Scheduled Areas), Act 1996, which the provisions of Panchayaths, contained in Part IX of the Constitution, were extended to Schedule Areas, also contains special provisions for the benefit of Scheduled Tribes.

### *3.5.4* Modified Area Development Approach (MADA), Pockets and clusters

From the 5th Five year plan onwards, tribal development gathered momentum with the introduction of a Tribal Sub-Plan (TSP) approach. Since the 8th Five Year Plan (1992-97), the concept of TSP has been modified by extending the coverage to the entire ST population outside the scheduled areas, but those who live in contiguous areas. Three criteria are laid down for identification of tribal pockets under MADA approach. These include (i) a minimum population of 10,000 (ii) 50% of ST population in the pockets (iii) contiguity of villages in the pockets. The Working Group on development of STs during Seventh Five Year Plan (1985-90), suggested relaxation of present norm of population of 10000 to 5000 with 50% ST population.

### 3.5.5 ITDPs and MADA Clusters in HP

The Kinnaur and Lahaul-Spiti districts, in their entirety, and Pangi and Bharmour (now tehsil Bharmour and sub-tehsil Holi) Sub-Divisions of Chamba district constitute the Scheduled Areas in the State, fulfilling the minimum criterion of 50% ST population concentration in a CD Block. These are situated in the north and north-east of the state forming a contiguous belt in the far hinterland behind high mountain passes with average altitude being 3281 metre above the mean sea-level. The most distinguishing mark of the tribal areas in the State is that they are very vast in area but extremely small in population with the result that per unit cost of infrastructure activity is very exorbitant. Snow glaciers, high altitudes and highly rugged terrain, criss-crossed by fast flowing rivers and their tributaries are the peculiar features of the Tribal Areas.

These areas have also been declared as Schedule Area under the Fifth Schedule of the Constitution by the President of India as per the Schedule Area (Himachal Pradesh) Order, 1975(CO 102) dated the 21st November, 1975. The five ITDPs are Kinnaur, Lahaul, Spiti, Pangi and Bharmour. Except Kinnaur which is spread over 3 CD Blocks, rest of the ITDPs comprise one CD Block each.

### *3.5.6* Pockets of Tribal Concentration

Tribal development envisaged a two-pronged strategy to cover both the concentrated and dispersed tribals. The areas of tribal concentration with 50% or above tribal population were taken up in the first instance during Fifth Plan 1974-78. For the dispersed tribals, Modified Area Development Approach (MADA) was

devised during the Sixth Plan to cover such pockets of tribal concentration which had a population threshold of 10,000 in contiguous areas of whom 50% or more were tribals. A target-group or community approach marked the pockets of tribal concentration in contradiction to area of tribal concentration where area approach ruled the roost. In Himachal Pradesh, two such pockets Chamba and Bhatiyat Blocks were identified in Chamba district covering an area of 881.47 Sq.Km. and population of 29455 (7.51%) of Scheduled Tribes as per 2011 census. Coupled with tribal areas, 100% of ST population was covered under Sub-Plan treatment.

### *3.5.7* Dispersed Tribes in Non-Scheduled Areas

The ultimate objective of sub-plan strategy being 100% coverage of ST population under its treatment, the Union Welfare Ministry now Tribal Affairs Ministry came out with the SCA supplementation for such dispersed tribes in 1986-87 but because of late receipt of guidelines, the actual adoption was deferred to 1987-88 and in this way, 100% ST population in the State came under sub-plan ambit. In view of larger dispersed ST population in the State, Union Tribal Affairs Ministry needs to consider larger allocation under Special Central Assistance than hither to fore for such tribes in commensurate with their population living in the non-tribal areas.

In HP there are two major tribal communities namely *Gaddis* who are basically small ruminant nomadic graziers and *Gujjars* who are buffalo rearers. Both the communities are forest dependent for fodder purposes only. Both the communities are not involved in collection of NTFP. The Tribal Development Framework has additional details about the tribals.

## 3.6 Continuity Note

This chapter has listed out the environmental, social, labour and tribal legal and regulatory instruments that are applicable to the sector. As mentioned in the approach and methodology, this is done through a desk assessment. The next chapter presents the stakeholders analysis, through the fieldwork and analysis of interactions with 20 project communities, the identified stakeholders, their issues, problems and concerns, suggestion and perceptions.

# 4. Stakeholder Analysis and Engagement

## 4.1 Introduction

For the purpose of undertaking the ESA, to assess and analyses the various stakeholders 20 Focus Group Discussions were conducted and meetings were conducted with stakeholder departments. The list of sampled Gram Panchayats is given in the Annexure 3. Based on the discussions with the stakeholders and analysis and their issues, concerns and perceptions are present below:

## 4.2 Stakeholder Analysis, Issues, Concerns and Perceptions

Table 4.1: Stakeholder Analysis, Issues, Concerns and Perception

| Stakeholders | Importance / Influence | Issues | Problems/ Concerns | Suggestions/ Perceptions | Issues addressed under project design |
|---|---|---|---|---|---|
| FARMERS | High Importance/ Moderate Influence | Lack of Storage Facilities | ▪ Farmers have to sell their produce immediately after harvesting<br>▪ Middlemen or traders take undue advantage of this situation and offer lower prices<br>▪ Farmers get lower prices of their produce particularly cash crops like potatoes and fruits like apples | ▪ Adequate storage facilities be provided with easy access particularly in fruit growing areas<br>▪ This will ensure higher bargaining power to the farmers | ▪ Machinery and equipment for processing and storage facilities |
| | | Lack of Agro-Processing units | ▪ Farmers can sell semi-processed and processed products to these units<br>▪ High dependence on local traders and middlemen as they do not have access to other marketing avenues | ▪ Agro-processing units in areas like Kullu, Theo - Shimla where fruits like apples or tomatoes are produced would help the farmers in getting better prices<br>▪ Setting up of these units would provide alternative to the farmers to sell their crops to these units<br>▪ This would ensure higher bargaining power to the farmers<br>▪ Training and | |

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| | | | | support in food processing to rural women and youth to setup such units would help in promoting income generating activities | |
| | | Poor access to markets | ▪ Most of the GPs particularly in Mandi, Solan, Shimla, Hamirpur have poor road connectivity<br>▪ Kathog and Tikker GPs in Mandi district have very poor connectivity to the main road and hence the farmers are forced to sell their produce to traders and locally to other villagers. They grow traditional crops only. Most of the livestock produce is self-consumed or sold locally to other villagers.<br>▪ Farmers have to restrict their sale of produce to local areas / markets near Gram Panchayats due to poor road conditions or lack of connectivity<br>▪ Veterinary doctors and agricultural specialists from the department rarely visit these GPs<br>▪ Exploitation of traders and middlemen | ▪ Adequate road connectivity to main road or highways or market would help in increased vehicular movement and thus provide opportunity to explore new markets for selling their produce.<br>▪ Improve access to services from Veterinary Doctors and Agricultural Department<br>▪ Improved access would allow adopting to high yielding varieties of crops | ▪ Ropeways and foot bridges<br>▪ Formation of Clusters and linkages to financial institutions<br>▪ Awareness camps |
| | | Lack of irrigation facilities | ▪ Most of the GPs visited had limited or no irrigation facility available | ▪ Improved irrigation facilities<br>▪ Development | ▪ Decentralized water distribution through |

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| | | | ▪ Farmers depend on rainfed agriculture totally dependent on rains.<br>▪ Low production and yield<br>▪ Lower income from crop production<br>▪ High risk of total crop failure | and maintenance of water harvesting structures.<br>▪ Support to villagers in developing rainwater harvesting structures<br>▪ This will help in diversification of agricultural produce and improve crop production and yield<br>▪ Participation of local rural people in development and management of water structures | community tanks, irrigation channels, etc. |
| | | Limited Availability of Drinking Water | ▪ Water from natural sources have reduced considerably<br>▪ Shortage of drinking water in peak summers in most of GPs visited<br>▪ Sometimes conflicts also take place among community members | | ▪ Spring source management |
| | | Awareness on improved agricultural practices | ▪ Almost all the farmers in GPs follow traditional methods of cultivation<br>▪ Rural community is not aware of proper use of synthetic fertilizers and pesticides, insecticides and weedicides resulting in over-application of these chemicals leading to reduction in fertility in long run<br>▪ Excess use resulting in increased toxic levels in drinking/ground water<br>▪ Inadequate knowledge of precautions often lead to mishaps – allergy, infection, fever etc. | ▪ Regular awareness camps and demonstrations be conducted by department and other experts<br>▪ People be sensitized towards optimal use of synthetic fertilizers<br>▪ Awareness camps particularly towards transition from use of synthetic fertilizers and insecticides / pesticides / weedicides to organic farming in a manner that the production and yield of crops is not affected in short term.<br>▪ Special sessions be organized on precautions to be taken during | ▪ Demonstrations including zero budget natural farming, vermicompost<br>▪ Awareness about Climate resilient agriculture<br>▪ Diversification in crop and livestock<br>▪ Integrated Pest and Nutrient Management |

| | | | | | |
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| | | | | application of inorganic pesticides | |
| | | Damage caused by the Wild Animals | ▪ Wild animals like monkeys, wild boars, nilgai, peacocks, etc. cause immense damage to agricultural crops and fruit crops.<br>▪ In some GPs rural community have stopped cropping and are now engage in employment as labourers | ▪ Solar fencing along the GP boundary so as to prevent the wild animals from entering the fields. | ▪ Post-harvest technologies interventions<br>▪ Wild fruit trees plantations in forest areas |
| | | Skill Development Trainings | ▪ Rural youth and women be provided skill development trainings on income generating activities like food processing, sewing, knitting etc. | ▪ Almost all the GPs visited have a small group of women – Mahila Mandals which are operational, hold regular meetings, generate savings and show active participation in social causes.<br>▪ Rural youth have formed Yuva Mandal in almost all GPs and organize sports activities and participate in activities for social welfare. | ▪ Entrepreneur development at cluster level |
| | | Soil Erosion | ▪ Soil erosion due to water run-off particularly during monsoon<br>▪ Land slides | ▪ Check dams, trench drainages be taken up<br>▪ Protection works along land slide zones | ▪ Drainage Line Treatment |
| | | Revenue village as Unit for Planning and Implementation | ▪ Topography of villages (wards) within a Gram Panchayat can be quite varied in hilly region.<br>▪ Villages near the road would have better access to facilities than the villages away from the road | ▪ The planning exercise shall be taken up in each village of a Gram Panchayat and consolidated at GP level | ▪ Preparation of GP Resource Management Plans |

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| | | | ▪ Villages in higher altitude would have less access to water as compared to villages at lower altitude | | |
| | | Participation and Implementation | ▪ Engagement of local rural community for effective implementation and ensuring higher sense of ownership of the project developments and assets. | ▪ Committees for planning and implementation of program in a GP be formed at village level and at GP level.<br>▪ Common interest groups (CIG) must be formed for different users with interest in different activities like CIG for wheat may consist of farmers cultivating wheat in a GP similarly for Apples a separate group may be formed | ▪ Entrepreneur development at cluster level<br>▪ Preparation of GP Resource Management Plans |
| Gram Panchayat: Pradhan, Secretary and Members | High Importance/ Moderate Influence | Separate Committee to undertake planning and implementation at GP Level | ▪ Gram Panchayat Secretary are often over-burdened with the management of finances for regular development works undertaken by the government administration and other departments.<br>▪ Secretary is often over-burdened with management of finance and record keeping of the development works. | ▪ Separate committee should be formed at GP Level to handle Planning, implementation and management of financial and physical resources | ▪ Preparation of GP Resource Management Plans |
| Women | High Importance/ Low Influence | Skill Development Programs for destitute, elder women | ▪ Generally all skill development and training programs of the government schemes for women are targeted for women below the age of 45.<br>▪ Almost all the GPs | ▪ Training programs for women should not be age restricted and all willing participants be allowed to participate in | ▪ Training and Capacity Building<br>▪ Differential cost sharing for the vulnerable |

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| | | | visited have single women above the age of 45 who are willing to participate in such skill development activities which may provide them with income generating opportunities and skills | programs and activities of the project where they feel they are able to participate and contribute meaningfully. | |
| Landless Labourers | High Importance/ Low influence | Opportunity to Participate in planning and implementation | ▪ Landless labourers are often not consulted in development of schemes and their implementation | ▪ Every GP has quite a few landless labourers who often migrate to other places in different seasons in search of work.<br>▪ Their participation in implementation and management of resources and assets would provide them income generating opportunities | ▪ Will be part of GP RMP |
| Transhumant | Moderate Importance/ Low Influence | Opportunity to Participate in planning and implementation | ▪ Often could not be consulted due to shifting place of residence. | ▪ Generally interested<br>▪ Look forward to redressal of their issues | ▪ Will be included in TDF |
| Forest Department | High Importance/ High Influence | Opportunities to take forward lessons learnt from previous project continuation | ▪ Lack Funds for implementation of projects learnings | ▪ Very much interested With the experience in such projects like Mid Himalayan project and other external aided they can implement | ▪ Activities would be converged with the Dept. |
| Agriculture Dept. | High Importance/ High Influence | Opportunity to implement climate resilient farming technologies and research | ▪ Lack Funds for implementation | ▪ Demonstration on climate resilient farming helps improving the income of farmers | ▪ Activities would be converged with the Dept. |
| Science and Technology Dept. | Moderate Importance/ Low Influence | Opportunity to implement prepared climate change adaptation | ▪ Lack of Funds and staff for implementation | ▪ Prepared climate change adaption plan, also conducting small | ▪ Activities would be converged with the Dept. |

| | | | | | |
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| | | plan | | scale climate resilient agriculture, prepared trg. material for climate change adaptation training. Material | |
| Animal Husbandry Department | Moderate Important/ Moderate influence | Opportunity to conduct and implement through awareness Camps | ▪ Conduct research to rear cattle in scientific manner and wants to take forward these approaches | ▪ They can implement good animal husbandry practices in a scientific manner by converging | ▪ Activities would be converged with the Dept. |

## 4.3 Consultation with Tribal Communities

As mentioned earlier, consultations with rural communities and potential project participants in 20 GPs of 8 districts were conducted. This included dedicated consultations and engagement with tribal communities and their community leaders, largely in Chamba and Mandi districts. In addition, more focused consultations were also held the with the nomadic, transhumant tribes, mainly *Gaddis* and *Gujjars*.

The main feedback from consultations with the tribal communities has been around the need for more information on Project activities, especially opportunities for benefits for the tribal communities around irrigation, horticulture, fodder development and livestock production and health services. Many of the tribal areas are situated in geographically difficult terrain with extreme climate. As a result, communities suffer from isolation and inhospitable living conditions due to lack of basic amenities. Due to this, tribal areas also face problems in communication, transport and access to educational, health and irrigation facilities. Increase in livestock herd size with transhumant also results in grazing issues, and resource conflict among communities.

Limitations of grazing areas force the transhumant communities to depend on panchayat or private lands for grazing. Absence of knowledge and facilities on value addition of agriculture and forest produce also limits income opportunities. Lack of non-farm employment opportunities perpetuates the dependence on seasonal, rainfed agriculture. This also results in seasonal outmigration for jobs and livelihoods. Greater convergence with other government projects/ programs for skill development of tribal youth in the project area. There is little awareness about climate change, its impacts and adoption measures at the community level. There is a need to orient the tribal communities towards adopting climate change adaptation measures.

Other issues, concerns and needs raised during the village consultations were related to: protective fencing from wild animals, access pathways and bridges over the drains and nullahs, check dams and ponds for irrigation, plantations for stabilizing mountain

slopes and preventing landslides, preventive measures for forest fires, more planting of medicinal fruit and fodder rich plants, development of pastures for providing fodder to livestock, opportunities for local employment in project activities, village camps on horticulture and veterinary services as well as on forest rights.

HPFD has also conducted extensive consultations with tribal communities as part of preparation for the Forests for Prosperity Project (FPP), which has also informed the preparation of the IPPF/ TDF.

## 4.4 Conclusions

The Project proposes to address the issues identified through various means. The farmers issues are addressed; a) inadequate processing and storage facilities will be addressed through provision of machinery and equipment for processing and provision of storage facilities, b) poor access to markets will be addressed through the provision of ropeways and foot bridges, formation of clusters, linkages to financial institutions and awareness camps, c) lack of irrigation facilities will be addressed through decentralized water distribution through community tanks, irrigation channels, etc. d) limited availability of drinking water will get addressed through spring source management, e) limited awareness on approved agricultural practices through demonstrations including zero budget natural farming, vermicompost, awareness about climate resilient agriculture, diversification in crop and livestock, Integrated Pest and Nutrient Management, etc., f) damages caused by wild animals through providing solar fencing, g) skill development requirement through enterprise development at cluster level, h) GP as a unit for development through the preparation of GP Resource Management Plans and i) participation during implementation through entrepreneur development at cluster level. The issues related to Gram Panchayat are proposed to be addressed through participatory planning and by preparing a Gam Panchayat Resource Management Plan duly optimally utilizing all the community resources. The issues of women and vulnerable such as skill requirement, etc. will be addressed through training and capacity Building, differential cost sharing for the vulnerable. The landless labourers will be the focus and part of GP-RMP. The transhumants will be the focus and part of the TDF. The Forest Department, Agriculture department, Animal Husbandry Department and Science and Technology Department will be able to bring out their expertise and good practices through the convergence of project activities with the respective departments,

## 4.5 Continuity Note

As mentioned in the approach and methodology, this stakeholder analysis is done through fieldwork duly engaging the stakeholders and analysis through a desk work, duly listing the interactions with 20 project communities, the identified stakeholders, their issues, problems and concerns, suggestion and perceptions. The next chapter presents, the environmental and socio-economic baseline conditions in the project area, which is collated through secondary data.

# 5. Environmental and Socio-Economic Baseline

## 5.1 State Profile

The state of Himachal Pradesh is divided into four agro-climatic zones, viz., Shivalik Zone, Mid-Hill Zone, High hill zone, Trans-Himalayan zone ranging from upto200 m in valley areas to 3600 m in Lahaul-Spiti and Kinnaur. The climatic conditions are sub-tropical to Dry and extremely cold conditions. The average rainfall ranges from 500 mm in Trans-Himalayan zone to upto 3000 mm in mid-hill zone. The cultivated areas are naturally high in the valley with 55% and least at Trans-Himalayan zone at 5%. Due to extreme variation in elevation, great variation occurs in the climatic conditions of Himachal Pradesh. The climate varies from hot and sub-humid tropical in the southern tracts to, with more elevation, cold, alpine, and glacial in the northern and eastern mountain ranges. The state has areas like Dharamsala that receive very heavy rainfall, as well as those like Lahaul and Spiti that are cold and almost rainless.

Table 5.1: Profile of HP

| ITEM | PERIOD | UNIT | PARTICULARS |
|---|---|---|---|
| Area | (31.3.2016) | Sq. Kms. | 55,673 |
| Districts | (31.3.2016) | Nos. | 12 |
| Divisions | (31.3.2016) | Nos. | 3 |
| Sub – Divisions | (31.3.2016) | Nos. | 62 |
| Tehsils | (31.3.2016) | Nos. | 97 |
| Sub – Tehsils | (31.03.2016) | Nos. | 49 |
| Blocks | (31.03.2016) | Nos. | 78 |
| Total Villages | (2011 Census) | Nos. | 20,690 |
| Inhabited Villages | (2011 Census) | Nos. | 17,882 |
| Un-Inhabited Villages | (2011 Census) | Nos. | 2,808 |
| Towns & Cities | (2011 Census) | Nos. | 59 |
| Population | (2011 Census) | Lakh | 68.65 |
| Males | (2011 Census) | Lakh | 34.82 |
| Females | (2011 Census) | Lakh | 33.83 |
| Rural Population | (2011 Census) | Lakh | 61.76 |
| Urban Population | (2011 Census) | Lakh | 6.89 |
| Scheduled Caste Population | (2011 Census) | Lakh | 17.29 |
| Scheduled Tribe Population | (2011 Census) | Lakh | 3.92 |
| Literacy | (2011 Census) | Percent | 82.8 |
| Growth Rate | (2001-2011) | Percent | 13 |
| Density of Population | (2011 Census) | Persons | 123 |
| Total No. of Main Workers | (2011 Census) | Lakh | 20.63 |
| Birth Rate | 2014 | Per | 16.4 |
| Death Rate | 2014 | Per | 6.7 |
| Per Capita Income at current Prices | 2015-16 (Adv.) | Rupees | 1,30,067 |

### 5.1.1 Administrative divisions

The state of Himachal Pradesh is divided into 12 districts which are grouped into three divisions, Shimla, Kangra and Mandi. The districts are further divided into 69 subdivisions, 78 blocks and 169 Tehsils and sub-Tehsils.

Table 5.2: Administrative Division

| Divisions | Districts |
|---|---|
| Kangra | Chamba, Kangra, Una |
| Mandi | Bilaspur, Hamirpur, Kullu, Lahaul and Spiti, Mandi |
| Shimla | Kinnaur, Shimla, Sirmaur, Solan |


**PIC 1: Administrative Divisions and Boundary Map**

## 5.2 Socio-Economic Baseline

### 5.2.1 Demography

Himachal Pradesh has a total population of 6,864,602 including 3,481,873 males and 3,382,729 females as per the final results of the Census of India 2011. This is only 0.57 per cent of India's total population, recording a growth of 12.81 per cent. The total fertility rate (TFR) per woman is 1.8, one of lowest in India. 90% of the total population resides in rural areas.

Table 5.3: District wise Distribution of Rural and Urban Population in HP

| DISTRICT | Rural | | | | Urban | | | | Total ('000) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HH | POP | M | F | HH | POP | M | F | HH | POP | M | F |
| **Bilaspur** | 6% | 6% | 6% | 6% | 3% | 4% | 4% | 4% | **80** | **382** | **193** | **189** |
| **Chamba** | 7% | 8% | 8% | 8% | 5% | 5% | 5% | 5% | **102** | **519** | **261** | **258** |
| **Hamirpur** | 7% | 7% | 6% | 7% | 4% | 5% | 4% | 5% | **106** | **455** | **217** | **238** |
| **Kangra** | 24% | 23% | 23% | 23% | 12% | 13% | 12% | 13% | **339** | **1,510** | **751** | **759** |
| **Kinnaur** | 2% | 1% | 1% | 1% | - | - | - | - | **20** | **84** | **46** | **38** |
| **Kullu** | 6% | 6% | 7% | 6% | 6% | 6% | 6% | 6% | **95** | **438** | **225** | **212** |
| **Lahul & Spiti** | 1% | 1% | 1% | 0.5% | - | - | - | - | **7** | **32** | **16** | **15** |
| **Mandi** | 16% | 15% | 15% | 15% | 9% | 9% | 9% | 10% | **219** | **1000** | **498** | **501** |
| **Shimla** | 10% | 10% | 10% | 10% | 32% | 29% | 30% | 29% | **184** | **814** | **425** | **388** |
| **Sirmaur** | 6% | 8% | 8% | 7% | 8% | 8% | 8% | 9% | **98** | **530** | **276** | **253** |
| **Solan** | 7% | 8% | 8% | 7% | 15% | 15% | 16% | 14% | **122** | **580** | **309** | **271** |
| **Una** | 8% | 8% | 8% | 8% | 6% | 7% | 6% | 7% | **110** | **521** | **264** | **257** |
| **HIMACHAL PRADESH ('000)** | **1,312** | **6,176** | **3,110** | **3,065** | **170** | **688** | **371** | **317** | **1,483** | **6,864** | **3,481** | **3,382** |
| **% of Total** | **88%** | **90%** | **89%** | **91%** | **12%** | **10%** | **11%** | **9%** | **100%** | **100%** | **100%** | **100%** |

***Source: Census of India 2011***

### 5.2.2 Age Group wise Distribution

The age group wise distribution of the population indicates that 54% of the population is in the age group of 19-60 years i.e. they contribute to the workforce of the state, while 11% of the population is above 60 and comprise of the retired or old age group.

Table 5.4: District wise Age Group wise Distribution of Population in HP

| DISTRICTS | 18 YEARS or BELOW | 19 - 60 | 60 - 80 | ABOVE 80 YEARS | AGE NOT STATED | POPULATION ('000) |
|---|---|---|---|---|---|---|
| BILASPUR | 33% | 55% | 10% | 2% | 0.1% | **382.0** |
| CHAMBA | 41% | 51% | 7% | 1% | 0.1% | **519.1** |
| HAMIRPUR | 33% | 53% | 11% | 2% | 0.0% | **454.8** |
| KANGRA | 34% | 54% | 10% | 2% | 0.3% | **1510.1** |
| KINNAUR | 30% | 61% | 8% | 2% | 0.1% | **84.1** |
| KULLU | 36% | 55% | 7% | 1% | 0.1% | **437.9** |

| | | | | | | |
|---|---|---|---|---|---|---|
| LAHUL & SPITI | 32% | 57% | 9% | 2% | 0.8% | **31.6** |
| MANDI | 35% | 54% | 9% | 2% | 0.2% | **999.8** |
| SHIMLA | 33% | 58% | 8% | 1% | 0.1% | **814.0** |
| SIRMAUR | 40% | 52% | 7% | 1% | 0.1% | **529.9** |
| SOLAN | 35% | 56% | 7% | 1% | 0.1% | **580.3** |
| UNA | 35% | 53% | 10% | 2% | 0.0% | **521.2** |
| **HIMACHAL PRADESH** | **35%** | **54%** | **9%** | **2%** | **0.1%** | **6864.6** |
| **Total Population ('000)** | **2415.8** | **3735.6** | **596.3** | **106.7** | **10.2** | **6864.6** |

***Source: Census of India 2011***

### 5.2.3 SC Population

Table 5.5: District wise distribution of SC Population in HP

| DISTRICTS | Rural | | | Urban | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | **POP** | **M** | **F** | **POP** | **M** | **F** | **POP** | **M** | **F** |
| Bilaspur | 26% | 26% | 26% | 21% | 21% | 22% | 26% | 26% | 26% |
| Chamba | 22% | 22% | 22% | 17% | 16% | 18% | 22% | 21% | 22% |
| Hamirpur | 24% | 25% | 24% | 18% | 18% | 18% | 24% | 25% | 23% |
| Kangra | 21% | 22% | 21% | 17% | 17% | 17% | 21% | 21% | 21% |
| Kinnaur | 18% | 16% | 19% | - | - | - | 18% | 16% | 19% |
| Kullu | 29% | 29% | 29% | 17% | 17% | 18% | 28% | 28% | 28% |
| Lahul & Spiti | 7% | 7% | 7% | - | - | - | 7% | 7% | 7% |
| Mandi | 30% | 30% | 30% | 21% | 21% | 21% | 29% | 30% | 29% |
| Shimla | 29% | 29% | 30% | 18% | 18% | 19% | 27% | 26% | 27% |
| Sirmaur | 32% | 31% | 32% | 19% | 19% | 20% | 30% | 30% | 31% |
| Solan | 31% | 31% | 31% | 15% | 15% | 17% | 28% | 28% | 29% |
| Una | 23% | 23% | 23% | 17% | 16% | 17% | 22% | 22% | 22% |
| **HIMACHAL PRADESH** | **26%** | **26%** | **26%** | **18%** | **17%** | **18%** | **25%** | **25%** | **25%** |
| **HIMACHAL PRADESH TOTAL POP ('000)** | **6,176** | **3,110** | **3,065** | **688** | **371** | **317** | **6,864** | **3,481** | **3,382** |

***Source: Census of India 2011***

SC population in HP is 25% of the population of the state. SC population is 26% in rural areas however in urban areas they are only 18% of the total population. Sirmaur (32%), Solan (31%) and Mandi (30%) have a high presence of SC Population in rural areas in relation to the total population

### 5.2.4 ST Population

Table 5.6: District wise Distribution of ST Population in HP

| Districts | Rural | | | Urban | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | **POP** | **M** | **F** | **POP** | **M** | **F** | **POP** | **M** | **F** |
| **Bilaspur** | 3% | 3% | 3% | 1% | 1% | 1% | 3% | 3% | 3% |
| **Chamba** | 28% | 28% | 28% | 7% | 7% | 8% | 26% | 26% | 26% |
| **Hamirpur** | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| **Kangra** | 6% | 6% | 6% | 5% | 5% | 5% | 6% | 6% | 6% |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Kinnaur** | 58% | 51% | 66% | - | - | - | 58% | 51% | 66% |
| **Kullu** | 3% | 3% | 3% | 11% | 10% | 11% | 4% | 4% | 4% |
| **Lahul & Spiti** | 81% | 77% | 87% | - | - | - | 81% | 77% | 87% |
| **Mandi** | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| **Shimla** | 1% | 1% | 1% | 2% | 2% | 2% | 1% | 1% | 1% |
| **Sirmaur** | 2% | 2% | 2% | 1% | 1% | 1% | 2% | 2% | 2% |
| **Solan** | 5% | 5% | 5% | 2% | 1% | 2% | 4% | 4% | 5% |
| **Una** | 2% | 2% | 2% | 0.3% | 0.3% | 0.3% | 2% | 2% | 2% |
| **HIMACHAL PRADESH** | **6%** | **6%** | **6%** | **3%** | **2%** | **3%** | **6%** | **6%** | **6%** |
| **HIMACHAL PRADESH TOTAL POP ('000)** | **6,176** | **3,110** | **3,065** | **688** | **371** | **317** | **6,864** | **3,481** | **3,382** |

***Source: Census of India 2011***

ST Population comprises of 6% of total population of the state. However ST population is quite dominant in Lahaul & Spiti and Kinnaur – two rural districts of the state, where they contribute to 81% and 58% of the total population of the districts respectively.

### 5.2.5 Population Density

Population density per square kilometer of area has nearly doubled over the last forty (40) years. As per Census 2011, population density recorded was 123 persons per sq. km., which is almost double of 62 as recoded in the year 1971.

Hamipur (407), Una (338), Bilaspur (327), Solan (300), Kangra (263), Shimla (159) are some more densely populated districts of the state. Kinnaur (13) and Lahaul Spiti (2) have the least population density.

### 5.2.6 Life Expectancy at birth:

Life expectancy at birth has increased continuously over years. For the period 2006-10, the male life expectancy at birth was 67.7 years as compared to 72.4 years for females. It is 3.4 years longer than the national average.

The infant mortality rate stood at 40 in 2010, and the crude birth rate has declined from 37.3 in 1971 to 16.9 in 2010, below the national average of 26.5 in 1998. The crude death rate was 6.9 in 2011.

### 5.2.7 Literacy and Education

Since the late 20th century, Himachal Pradesh has made considerable efforts to expand education. Consequently, there has been a remarkable rise in the number of primary, secondary, and post - secondary institutions and a corresponding increase in enrollment at all levels.

Himachal Pradesh University, founded in 1970 in Shimla, was the state's first institution of higher education; it now has dozens of affiliated or associated colleges.

Other major tertiary institutions include a medical college in Shimla, an agricultural university in Palampur an engineering college in Hamirpur, a university of horticulture and forestry near Solan, and a university of information technology, also in Solan district. In addition to its universities and colleges, Himachal Pradesh has some important research centres, most notably the Indian Institute of Advanced Study in Shimla and the Central Research Institute in Kasauli.

Himachal ranks 3rd in the entire country in terms of literacy in rural and urban areas while the state with overall literacy level of 83% ranks 4th in overall literacy level closely following Kerala (91%), Mizoram (89%) and Lakshadweep (87%) – the three top ranking states.

Hamirpur, Una and Kangra are the three top ranking districts in HP with literacy rates of 88%, 87% and 86% respectively.

State has a high literacy rate of 93% and 89% in urban and rural areas, amongst male population however the literacy rate is lagging behind at 75% in the rural areas.

Table 5.7: Literacy Rate in Rural and Urban areas of HP

| DISTRICTS | LITERACY RATES | | | | | | | | | TOTAL POPULATION ABOVE 6 YRS ('000) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | | Urban | | | Total | | | | | |
| | POP | M | F | POP | M | F | POP | M | F | POP | M | F |
| **Bilaspur** | 84% | 91% | 77% | 92% | 94% | 89% | 85% | 91% | 78% | 340 | 171 | 169 |
| **Chamba** | 71% | 82% | 60% | 92% | 95% | 88% | 72% | 83% | 62% | 449 | 225 | 223 |
| **Hamirpur** | 88% | 94% | 82% | 93% | 95% | 90% | 88% | 94% | 83% | 406 | 191 | 215 |
| **Kangra** | 85% | 91% | 80% | 90% | 93% | 87% | 86% | 91% | 80% | 1345 | 663 | 683 |
| **Kinnaur** | 80% | 87% | 71% | - | - | - | 80% | 87% | 71% | 76 | 42 | 34 |
| **Kullu** | 78% | 87% | 70% | 88% | 91% | 85% | 79% | 87% | 71% | 387 | 200 | 188 |
| **Lahul & Spiti** | 77% | 86% | 67% | - | - | - | 77% | 86% | 67% | 28 | 15 | 13 |
| **Mandi** | 81% | 89% | 73% | 92% | 94% | 89% | 82% | 90% | 74% | 888 | 440 | 448 |
| **Shimla** | 80% | 88% | 73% | 93% | 95% | 91% | 84% | 90% | 77% | 732 | 383 | 350 |
| **Sirmaur** | 77% | 85% | 69% | 91% | 93% | 88% | 79% | 86% | 71% | 460 | 240 | 220 |
| **Solan** | 82% | 89% | 75% | 90% | 92% | 88% | 84% | 90% | 77% | 512 | 273 | 239 |
| **Una** | 87% | 92% | 81% | 87% | 90% | 83% | 87% | 92% | 81% | 462 | 232 | 230 |
| **HIMACHAL PRADESH** | **82%** | **89%** | **75%** | **91%** | **93%** | **88%** | **83%** | **90%** | **76%** | **6087** | **3074** | **3012** |
| **POP. HP > 6 YRS ('000)** | **5463** | **2737** | **2726** | **623** | **337** | **287** | **6087** | **3074** | **3012** | | | |
| **Rank in India** | **3** | **3** | **4** | **3** | **4** | **3** | **4** | **4** | **5** | | | |
| **Literacy Rate Kerala** | 90% | 94% | 87% | 93% | 96% | 91% | 91% | 94% | 88% | | | |
| **Literacy Rate India** | 59% | 71% | 46% | 80% | 86% | 73% | 65% | 75% | 54% | | | |

***Source: Census of India 2011***

### 5.2.8 Disability

| | Disability | | | | | | | | | | % of Population |
|---|---|---|---|---|---|---|---|---|---|---|---|
| District | In seeing | In Hearing | In Speech | In Movement | Mental Retardation | Mental Illness | Any Other | Multiple Disability | Total | Total Population | |
| Chamba | 1638 | 1895 | 535 | 1791 | 518 | 294 | 1659 | 1170 | 9500 | 519080 | 1.83 |
| Kangra | 5096 | 5850 | 1911 | 7077 | 2221 | 1345 | 6366 | 3890 | 33756 | 1510075 | 2.24 |
| Lahul & Spiti | 193 | 124 | 28 | 146 | 33 | 6 | 94 | 72 | 696 | 31564 | 2.21 |
| Kullu | 1242 | 1689 | 548 | 1637 | 384 | 203 | 1878 | 1000 | 8581 | 437903 | 1.96 |
| Mandi | 4549 | 4492 | 1368 | 5018 | 1259 | 703 | 5913 | 2619 | 25921 | 999777 | 2.59 |
| Hamirpur | 1149 | 1289 | 489 | 2920 | 654 | 406 | 1713 | 1375 | 9995 | 454768 | 2.20 |
| Una | 1501 | 995 | 502 | 2611 | 749 | 532 | 1233 | 1265 | 9388 | 521173 | 1.80 |
| Bilaspur | 1140 | 1099 | 419 | 2060 | 684 | 331 | 1090 | 1142 | 7965 | 381956 | 2.09 |
| Solan | 2390 | 2551 | 612 | 3149 | 756 | 462 | 3010 | 1885 | 14815 | 580320 | 2.55 |
| Sirmaur | 2135 | 1954 | 613 | 2185 | 557 | 348 | 1857 | 1297 | 10946 | 529855 | 2.07 |
| Shimla | 4687 | 4339 | 1111 | 3644 | 1113 | 494 | 3915 | 2531 | 21834 | 814010 | 2.68 |
| Kinnaur | 356 | 423 | 142 | 312 | 58 | 42 | 296 | 290 | 1919 | 84121 | 2.28 |
| Total | 26076 | 26700 | 8278 | 32550 | 8986 | 5166 | 29024 | 18536 | 155316 | 6864602 | 2.26 |

About 2.26% of the people are differently abled in Himachal Pradesh. Among the district, Shimla District has highest disability rate of 2.68% while Una has 1.80% differently abled persons. Among the differently abled persons in the state, the persons with movement disabilities are the highest while persons with mental disabilities are the lowest.

### 5.2.9 Employment

Table 5.8: Workers and Main Workers Population (in '000) in HP

| DISTRICTS | Total Workers | | | Main Workers as % of Total Workers | | |
|---|---|---|---|---|---|---|
| | POP | M | F | POP | M | F |
| Bilaspur | 205.9 | 111.5 | 94.3 | 50% | 66% | 32% |
| Chamba | 294.0 | 158.8 | 135.2 | 41% | 56% | 24% |
| Hamirpur | 241.9 | 118.7 | 123.2 | 52% | 63% | 41% |
| Kangra | 675.2 | 403.8 | 271.4 | 47% | 61% | 25% |
| Kinnaur | 56.3 | 33.9 | 22.4 | 83% | 88% | 75% |
| Kullu | 269.1 | 148.8 | 120.3 | 72% | 80% | 62% |
| Lahul & Spiti | 19.3 | 10.8 | 8.5 | 79% | 81% | 76% |
| Mandi | 572.7 | 297.5 | 275.2 | 50% | 62% | 36% |
| Shimla | 430.9 | 258.6 | 172.3 | 72% | 83% | 56% |
| Sirmaur | 280.1 | 169.4 | 110.7 | 69% | 80% | 53% |
| Solan | 298.7 | 190.0 | 108.7 | 74% | 84% | 56% |
| Una | 215.3 | 141.6 | 73.7 | 63% | 75% | 39% |

| DISTRICTS | Total Workers | | | Main Workers as % of Total Workers | | |
|---|---|---|---|---|---|---|
| | POP | M | F | POP | M | F |
| **HIMACHAL PRADESH** | **3559.4** | **2043.4** | **1516.0** | **58%** | **71%** | **41%** |

***Source: Census of India 2011***

Out of a total of around 6.9 million people in the state only around 52% are engaged in some sort of economic activities and 30% them are Main workers. 18% of the female population is main workers while 41% males are main workers. 70% of total workers are Main workers among Male Population while only 41% of the female work force is Main Workers.

42% of the total work force of the state falls under the category of Marginal Workers. 17% of Male population and 26% of female population falls under this category.

Table 5.9: District wise Distribution of Marginal Workers in HP

| DISTRICTS | Marginal Workers as % of Total Population | | | Marginal Workers as % of Total Workers | | |
|---|---|---|---|---|---|---|
| | POP | M | F | POP | M | F |
| Bilaspur | 27% | 20% | 34% | 50% | 34% | 68% |
| Chamba | 34% | 27% | 40% | 59% | 45% | 76% |
| Hamirpur | 25% | 20% | 30% | 48% | 36% | 59% |
| Kangra | 24% | 21% | 27% | 54% | 39% | 75% |
| Kinnaur | 11% | 9% | 15% | 17% | 12% | 25% |
| Kullu | 17% | 13% | 21% | 28% | 20% | 38% |
| Lahul & Spiti | 13% | 12% | 14% | 21% | 19% | 24% |
| Mandi | 29% | 22% | 35% | 50% | 38% | 64% |
| Shimla | 15% | 10% | 19% | 28% | 17% | 44% |
| Sirmaur | 16% | 12% | 20% | 31% | 20% | 47% |
| Solan | 14% | 10% | 17% | 27% | 17% | 44% |
| Una | 16% | 14% | 18% | 38% | 25% | 61% |
| **HIMACHAL PRADESH** | **22%** | **17%** | **26%** | **42%** | **30%** | **59%** |
| **Total Population ('000)** | **6865** | **3482** | **3383** | **1497** | **604** | **893** |

***Source: Census of India 2011***

Non-workers are 48% of the total population of the state. Maximum non-workers are found in Una and Kangra districts where the non-worker population is 59% and 55% respectively. 55% of the females and 41% males are non- workers in the state. Highest number of female non-workers as compared to the total female population of the district is reported in Una, Kangra and Solan with 71%, 64% and 60% respectively.

Table 5.10: District Wise Distribution of Non-Workers in HP

| DISTRICT | NON_WORK_P | NON_WORK_M | NON_WORK_F |
|---|---|---|---|
| Bilaspur | 46% | 42% | 50% |

| DISTRICT | NON_WORK_P | NON_WORK_M | NON_WORK_F |
|---|---|---|---|
| Chamba | 43% | 39% | 48% |
| Hamirpur | 47% | 45% | 48% |
| Kangra | 55% | 46% | 64% |
| Kinnaur | 33% | 27% | 41% |
| Kullu | 39% | 34% | 43% |
| Lahul & Spiti | 39% | 35% | 43% |
| Mandi | 43% | 40% | 45% |
| Shimla | 47% | 39% | 56% |
| Sirmaur | 47% | 39% | 56% |
| Solan | 49% | 38% | 60% |
| Una | 59% | 46% | 71% |
| **HIMACHAL PRADESH** | **48%** | **41%** | **55%** |

***Source: Census of India 2011***

### 5.2.10 Poverty

Himachal Pradesh is still predominantly rural, and between 1993 - 94 and 2011, rural poverty (using the poverty line suggested by the Tendulkar Committee) declined from 36.8 percent to 8.5 percent - a fourfold drop, which is impressive by any standard. While rural poverty continued to decline after 2004, urban poverty changed only marginally between 2004 and 2011.

### 5.2.11 Agriculture and Manufacturing

Agriculture is the main occupation of the people of the state. About 69 per cent of the main workers are engaged in agricultural pursuits. Agriculture is beset with the disadvantage of small holdings.

Only 75 per cent of the total reporting area is available for cultivation. Out of this area, 'net area sown' and 'current fallows', accounts for only 13 percent.

There is hardly any scope for mechanized farming due to preponderance of small holdings and terraced fields. Against all these odds, the farmers of Himachal Pradesh are constantly endeavoring to exploit fully the agricultural potential of the State to increase food production and also to supplement the income by producing quality cash crops. Wheat, barley, paddy and maize are the important cereal crops under cultivation. Seed potato, ginger and off-season vegetables are the important cash crops. There is potential for the development of crops like hops, mushrooms, olives, saffron and zeera.

Table 5.11: District wise Distribution of Land available for Agriculture in HP

| Year/ District | Geographical Area by village papers (ha) | Tree crops & Groves | Culturable wasteland | Current Fallows | Net area sown | Area sown more than once | Agricultural Land | CROPPING INTENSITY |
|---|---|---|---|---|---|---|---|---|
| Bilaspur | 111776 | 0.1% | 5% | 1% | 26% | 95% | 33% | 195% |
| Chamba | 692419 | 0.03% | 1% | 0.3% | 6% | 63% | 7% | 163% |
| Hamirpur | 110224 | 0.001% | 10% | 5% | 32% | 92% | 47% | 192% |
| Kangra | 577681 | 1% | 5% | 2% | 20% | 84% | 27% | 184% |
| Kinnaur | 624216 | 0.02% | 1% | 0.2% | 1% | 28% | 2% | 128% |
| Kullu | 64224 | 6% | 2% | 4% | 60% | 55% | 66% | 155% |
| L&S | 911206 | 0.01% | 0.1% | 0.01% | 0.4% | 4% | 0.4% | 104% |
| Mandi | 397948 | 0.1% | 1% | 2% | 22% | 81% | 25% | 181% |
| Shimla | 525386 | 2% | 2% | 3% | 13% | 31% | 18% | 131% |
| Sirmaur | 224760 | 16% | 5% | 2% | 18% | 88% | 25% | 188% |
| Solan | 180923 | 0.3% | 8% | 1% | 21% | 65% | 31% | 165% |
| Una | 154875 | 4% | 15% | 2% | 25% | 92% | 41% | 192% |
| **HP** | **4575638** | **1%** | **3%** | **1%** | **12%** | **73%** | **16%** | **173%** |

***Source: Census of India 2011***

Most people in Himachal Pradesh depend for their livelihood on agriculture, pastoralism, transhumance (seasonal herding), horticulture, and forestry. However, the government of Himachal Pradesh has encouraged the development and dispersal of manufacturing, with different towns—mostly in the southern part of the state—often specializing in the manufacture of particular goods.

Table 5.12: Main Workers Engaged in Agriculture and Allied Activities

| DISTRICT | MAIN WORKERS ENGAGED IN AGRICULTURE AND ALLIED SECTORS AS PERCENTAGE OF MAIN WORKERS | | | | | | | | | | | | TOTAL MAIN WORKERS ('000) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CULTIVATORS | | | AGRICULTURAL LABOUR | | | ALLIED ACTIVITIES | | | TOTAL | | | POP | M | F |
| | POP | M | F | POP | M | F | POP | M | F | POP | M | F | | | |
| BILASPUR | 39% | 27% | 68% | 1% | 1% | 1% | 2% | 2% | 2% | 42% | 30% | 71% | 103 | 73 | 30 |
| CHAMBA | 43% | 37% | 59% | 2% | 2% | 3% | 4% | 3% | 4% | 49% | 42% | 67% | 121 | 89 | 32 |
| HAMIRPUR | 43% | 23% | 72% | 3% | 2% | 4% | 2% | 1% | 2% | 47% | 26% | 78% | 126 | 75 | 51 |
| KANGRA | 22% | 18% | 38% | 4% | 3% | 4% | 2% | 2% | 3% | 28% | 23% | 44% | 315 | 246 | 69 |
| KINNAUR | 55% | 43% | 77% | 4% | 4% | 4% | 1% | 1% | 1% | 60% | 48% | 81% | 47 | 30 | 17 |
| KULLU | 68% | 61% | 80% | 4% | 4% | 4% | 1% | 1% | 1% | 74% | 66% | 85% | 193 | 119 | 75 |
| LAHUL & SPITI | 58% | 46% | 75% | 2% | 2% | 1% | 1% | 2% | 0% | 62% | 50% | 77% | 15 | 9 | 6 |
| MANDI | 52% | 42% | 72% | 2% | 2% | 2% | 1% | 2% | 1% | 55% | 45% | 75% | 284 | 186 | 99 |
| SHIMLA | 50% | 44% | 64% | 6% | 5% | 6% | 1% | 2% | 1% | 57% | 51% | 71% | 311 | 215 | 97 |
| SIRMAUR | 60% | 53% | 75% | 3% | 3% | 3% | 1% | 1% | 1% | 64% | 58% | 79% | 194 | 135 | 59 |
| SOLAN | 36% | 27% | 61% | 3% | 2% | 3% | 1% | 1% | 1% | 40% | 31% | 65% | 220 | 160 | 61 |
| UNA | 26% | 23% | 40% | 5% | 5% | 4% | 3% | 1% | 8% | 34% | 29% | 53% | 135 | 106 | 29 |
| **HIMACHAL PRADESH** | **45%** | **36%** | **65%** | **3%** | **3%** | **4%** | **2%** | **2%** | **2%** | **50%** | **41%** | **70%** | **2066** | **1441** | **624** |
| **MAIN** | **920** | **515** | **405** | **69** | **46** | **22** | **36** | **24** | **12** | **1025** | **585** | **439** | **2066** | **1441** | **624** |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WORKERS ('000)** | | | | | | | | | | | | | | | |

***Source: Census of India 2011***

50% of the main workers are engaged in some sort of agriculture or allied activities, 70% female main workers are engaged in agriculture, this percentage goes upto 66% and 85% in Kullu for male and female workers respectively. Kullu Sirmaur and Lahul & Spiti are the top three districts where agriculture is the main activity of the workers. Most of the workers engaged in agriculture are cultivators on their own land and they are 45% of the total main workers. Females mostly prefer to work on their own land and this is evident from the fact that 65% of the female main workers are cultivators.

The town of Nahan, for instance, is known for its production of agricultural implements, turpentine, and resin, while television sets, fertilizer, beer, and liquor have been among the major manufactures of Solan. Meanwhile, Rajban is identified with cement production, and Parwanoo is recognized for its processed fruits, tractor parts, and electronics. Shimla is also known for its manufacture of electrical goods, while paper and hardboard products generally have come from Baddi and Barotiwala. Alongside the growth of heavier industry, thousands of artisan-based small-scale manufacturing units have remained in operation across the state.

### 5.2.12 Land Holdings

Out of the total geographical area of 55.67 lakh hectare the area of operational holdings is about 9.55 lakh hectares and is operated by 9.61 lakh farmers. The average holding size is about 1.00 hectare.

Distribution of land holdings according to 2010-11 Agricultural Census shows that 87.95 percent of the total holdings are of small and Marginal. About 11.71% of holdings are owned by Semi Medium and Medium farmers and only 0.34% by large farmers.

Table 5.13: Distribution of Landholding by Area in HP

| Size of Holdings (ha) | Category (Farmer) | No. of Holdings (Lakhs) | Area (lakh ha) | Av. Size of Holding (ha) |
|---|---|---|---|---|
| Below 1.0 | Marginal | 6.70 (69.78%) | 2.73 (28.63%) | 0.41 |
| 1.0 - 2.0 | Small | 1.75 (18.17%) | 2.44 (25.55%) | 1.39 |
| 2.0 - 4.0 | Semi Medium | 0.85 (8.84%) | 2.31 (24.14%) | 2.72 |
| 4.0 - 10.0 | Medium | 0.28 (2.87%) | 1.57 (16.39%) | 5.61 |
| 10.0 - Above | Large | 0.03 (0.34%) | 0.51 (5.29%) | 17.00 |
| | **Total** | **9.61** | **9.56** | **1.00** |
| *Source: Economic Survey of Himachal Pradesh 2014-15* | | | | |

### 5.2.13 Women

Women 33,82,729(49.28%) constitute nearly half of the state population 68, 64,602.

### 5.2.14 Literacy

Literacy rate of women in the state is high at 75% and the state is ranked 12th in the country. Literacy level of women folk is better than the national rate of 65.46%. Districts in the state with a higher rate than the state rate are Hamirpur (82%), Una (81%) and Kangra (80%).

### 5.2.15 Health Status

Health of women is an important factor in determining the overall health of the society. It is seen that Himachal Pradesh is amongst a few states like Kerala, Tamil Nadu, Goa, Delhi, and the smaller northeastern states that consistently perform well in terms of various health indicators.

In 2012, there were about 56.1 percent live births per 1000 women in the age group 15-49 years (General Fertility Rate) as compared to about 57.3 live births per 1000 women in the same age group in 2011. There were about 145.3 live births per 1000 women in the age group 20-24 years as compared to about 127.6 live births per 1000 women in the 25-29 age groups. The total Fertility Rate for 2012 was 1.7.

### 5.2.16 Workforce participation

As per Census, 2011, females constitute 44.82% of the total work force, main workers (18%), marginal workers (26%) and non-workers (55%). Districts Kinnaur (59%), Kullu (57%), Chamba (52%), Lahaul Spiti (57%) Mandi (55%) and Hamirpur (52%) record high female work participation rates.

Table 5.14: WFPR in Himachal Pradesh

| DISTRICTS | WFPR_POP | | | WFPR_M | | | WFPR_F | | |
|---|---|---|---|---|---|---|---|---|---|
| | Rural | Urban | Total | Rural | Urban | Total | Rural | Urban | Total |
| Bilaspur | 55% | 41% | 54% | 58% | 53% | 58% | 51% | 26% | 50% |
| Chamba | 58% | 37% | 57% | 61% | 54% | 61% | 55% | 16% | 52% |
| Hamirpur | 55% | 35% | 53% | 55% | 48% | 55% | 54% | 20% | 52% |
| Kangra | 45% | 35% | 45% | 54% | 51% | 54% | 37% | 17% | 36% |
| Kinnaur | 67% | | 67% | 73% | | 73% | 59% | | 59% |
| Kullu | 64% | 41% | 61% | 67% | 57% | 66% | 60% | 22% | 57% |
| Lahul & Spiti | 61% | | 61% | 65% | | 65% | 57% | | 57% |
| Mandi | 59% | 37% | 57% | 60% | 52% | 60% | 57% | 21% | 55% |
| Shimla | 57% | 42% | 53% | 62% | 58% | 61% | 51% | 23% | 44% |
| Sirmaur | 55% | 35% | 53% | 62% | 52% | 61% | 47% | 15% | 44% |
| Solan | 53% | 45% | 51% | 61% | 63% | 62% | 44% | 19% | 40% |

| DISTRICTS | WFPR_POP | | | WFPR_M | | | WFPR_F | | |
|---|---|---|---|---|---|---|---|---|---|
| | Rural | Urban | Total | Rural | Urban | Total | Rural | Urban | Total |
| Una | 42% | 35% | 41% | 54% | 53% | 54% | 30% | 16% | 29% |
| **HIMACHAL PRADESH** | **53%** | **39%** | **52%** | **59%** | **56%** | **59%** | **47%** | **20%** | **45%** |

***Source: Census of India 2011***

5.2.17 Rural Economy of HP

Agriculture dominates the economy of the State; although because of the mountainous terrain, only a little over 10 percent of the total land area is cultivated.

Population pressure on cultivated land is high and the holdings of most of the cultivators are small and scattered i.e. 88% of the farmers are small and marginal. Most of the holdings are self-cultivated.

About 20% of the cultivated area is under irrigation and remaining 80% of the area is rainfed. The cultivation is carried out right from 300 to 3000 meters above sea level. Agro-climatically the region is more suitable for growing off-season vegetables and temperate fruits. Animal Husbandry and Fisheries also generate wealth and employment in Agriculture Sector.

Rice, Wheat and Maize are important cereal crops of the State. Groundnut, Soybean and Sunflower in Kharif and Rapeseed/ Mustard and Toria in the Rabi season are important oilseed crops. Urd, Bean, Moong, Rajmash in Kharif season and Gram Lentil in Rabi are the important pulse crops of the State.

Table 5.15: Agro-Ecological Zones of Himachal Pradesh[3]

| Zone | | Area in Sq km [% of Total area] | Elevation (M) | Mean Annual temperature [$^0$C] | Soil type | Rainfall [mm] | Important crops |
|---|---|---|---|---|---|---|---|
| Sub-Tropical Sub Montane & Low Hills | **Zone 1.1** | 8201 [14.73%] | 240-1000 | 15 to 23 | Sandy loams (Light Textured, Shallow) | ≤ 1500 | Wheat, Maize, Paddy, Pulses, Oilseeds, barley, Sugarcane, Potato, Watermelon & Vegetables |
| | **Zone 1.2** | 2059 [3.70%] | 240-1000 | 18.6 - 21.9 | Loamy sand (medium in depth) | >1500 | Wheat, paddy, Maize, Seed potato, Pulses, Oil seeds. |
| Sub humid Mid hills | **Zone 2.1** | 3770 [6.77%] | 1001-1500 | 14.2 - 22.1 | Sandy Loam- Clay loam (Acidic) | ≤ 1500 | Wheat, Paddy, Barley, Pulses, Oil seed, Off season vegetables. |
| | **Zone 2.2** | 894 [1.60%] | 1001-1500 | 16.53 - 21.25 | Silt Loam- Loam | > 1500 | Wheat, Paddy, Barley, Pulses, Oil seed, Off season vegetables in some parts |
| Temperate | **Zone 3.1** | 8207 [14.74%] | 1501-2500 | 9.1 - 20.6 | Mainly Loamy shallow, acidic | ≤ 1500 | Wheat, Barley, Maize, Millets, Pulses, Oilseeds. |

[3] http://hpenvis.nic.in/Database/Agriculture_3768.aspx

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Zone 3.2** | 1010 [1.81%] | 1501-3250 | 15.4 - 20.5 | Sandy Loams shallow to Medium depth. | > 1500 | Maize, Wheat, Pulses, Oilseeds. |
| **Dry temperate high hills** | **Zone 4.1** | 4616 [8.29%] | 2501-3250 | 9 - 20 | Sandy Loams (Shallow in depth) | < 700 (Dry) | Wheat, Potato, Barley, Buckwheat, Peas Minor Millets, Kuth & Temperate Vegetables, Hops, Cumin & Saffron. |
| | **Zone 4.2** | 7003 [12.58 %] | 3251-4250 | 8.8 – 19.9 | Sandy Loams (Shallow) | Dry / snow | Quality Potato seeds, Temperate & European type vegetables, Barley, Buckwheat. |
| | **Zone 4.3** | 19890 [35.74%] | > 4250 | 8.7- 19.7 | Sands & Pebbles (Loose Textured) | Dry / Snow | Buck wheat, Barley, Minor millets & Kala Zeera. |

5.2.18 Holdings

Agriculture being main occupation of the people of Himachal Pradesh has an important role in the economy of the state. It provides direct employment to about 62% of the main working population. Income from the Agriculture and allied sectors accounts for nearly 9.40% of the total State Domestic Product. Out of the total geographical area of 55.67 lac ha area of operational holding is about 9.56 lac ha owned by 9.61 lakh farmers. The average holding size is about 1.0 ha Distribution of land holdings according to 2010-11 Agriculture Census is tabulated below:

Table 5.16: Distribution of landholding-Himachal Pradesh

| **Size of holding** | **Category** | **No. of holdings** | | **Area** | | **Av. size of holding** |
|---|---|---|---|---|---|---|
| **ha.** | **farmers** | **Lakhs** | **%** | **Lakh ha** | **%** | **ha** |
| Below 1 ha | Marginal | 6.70 | 69.8% | 2.73 | 28.6% | 0.4 |
| 1.0-2.0 | Small | 1.75 | 18.2% | 2.44 | 25.6% | 1.4 |
| 2.0-4.0 | Semi-medium | 0.85 | 8.8% | 2.31 | 24.1% | 2.7 |
| 4.0-10.0 | Medium | 0.28 | 2.9% | 1.57 | 16.4% | 5.6 |
| More than 10 ha | Large | 0.03 | 0.3% | 0.51 | 5.3% | 17 |
| **Total** | | 9.61 | 100.0% | 9.56 | 100% | 1.0 |

*Source: Agricultural Census 2010-11*

It would be seen from the above table that marginal and small farmers constitute 88.0% of total land holding. The semi-medium and medium holding together constitute 11.7% and the large holdings cover only 0.3%.

Thus in Himachal Pradesh bulks of the holdings constitute small and marginal holdings. About 54.2% of the operational area belongs to the category of small and marginal farmers. Out of total number of 9.61 lac holdings in the state, 22.11% holding are with the scheduled castes and 5.83% with the scheduled tribes. About 13.82% of the operational area is with scheduled castes and 5.25% with the scheduled tribes. The average size of holding with scheduled caste and scheduled tribes is 0.62 and 0.90 ha respectively against state average of 1.0 ha. The cropping intensity is about 174.7%. The cultivated area in the state is about 5.38 Lac. Ha. About 81.50% of the area under crops is rainfed and farmers have to depend on rain water for raising crops.

### 5.2.19 Area, Production and Productivity

During the year 2012-13, the food grains production was achieved at a record level 15.68 lakh MT against 15.44 lakh MT during 2010-11. The production of Potato increased from 1.52 lakh MT in 2011-12 to 1.83 lakh MT in 2012-13. The production of vegetables witnessed a marginal increase from 13.8 lakh MT during the year 2012-13 as against 13.57 lakh MT in 2011-12. Due to an increasing shift towards commercial crops, the area under food grains is gradually declining from 853.88 thousand hectares in 1997-98 to 798.31 thousand hectares in 2012-13. There is an increase in productivity over the years as evident from the Table 4 below.

**A. Food Grains**

During the year 2018-19 it has been envisaged to produce 1668.75 thousand tons of food grains, out of which 896.30 thousand tons of food grains are targeted to be produced during Kharif-2018 and the remaining 772.45 thousand tons are targeted to be produced during Rabi 2018-19. The District-wise targets in respect of area and production for Kharif-2018 are as under

Table 5.17: District wise Area and Production Targets of Food grains for 2018-19

*(Areain000ha./productionin000MT)*

| S. No | District | Paddy | | Maize | | Ragi | | Millets | | Pulses | | Total Kharif | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | P | A | P | A | P | A | P | A | P | A | P |
| 1. | Bilaspur | 1.40 | 2.40 | 27.00 | 68.35 | - | - | - | - | 0.50 | 0.48 | 28.90 | 71.23 |
| 2. | Chamba | 2.15 | 3.80 | 26.00 | 65.80 | 0.03 | 0.03 | 0.80 | 0.60 | 2.00 | 1.95 | 30.98 | 72.18 |
| 3. | Hamirpur | 2.00 | 3.50 | 30.00 | 76.00 | - | - | - | - | 0.50 | 0.48 | 32.50 | 79.98 |
| 4. | Kangra | 36.50 | 65.00 | 57.40 | 144.40 | - | - | 0.20 | 0.15 | 2.70 | 2.60 | 96.40 | 212.15 |
| 5. | Kinnaur | 0.05 | 0.09 | 0.50 | 1.30 | 0.10 | 0.11 | 1.10 | 0.80 | 1.00 | 0.99 | 2.75 | 3.29 |
| 6. | Kullu | 1.00 | 1.70 | 15.00 | 38.00 | 0.40 | 0.42 | 0.55 | 0.40 | 1.80 | 1.75 | 18.75 | 42.27 |
| 7. | Lahul & Spiti | - | - | 0.05 | 0.15 | - | - | - | - | - | - | 0.05 | 0.15 |
| 8. | Mandi | 19.20 | 34.00 | 47.00 | 119.00 | 0.52 | 0.55 | 0.25 | 0.18 | 2.00 | 1.95 | 68.97 | 155.68 |
| 9. | Shimla | 1.70 | 3.80 | 15.00 | 38.00 | 0.75 | 0.78 | 2.00 | 1.50 | 2.70 | 2.60 | 22.15 | 46.68 |
| 10. | Sirmour | 4.80 | 8.45 | 24.00 | 60.75 | 0.20 | 0.21 | 0.10 | 0.07 | 2.00 | 1.95 | 31.10 | 71.43 |
| 11. | Solan | 2.80 | 5.00 | 24.20 | 61.25 | - | - | - | - | 1.20 | 1.15 | 28.20 | 67.40 |
| 12. | Una | 2.40 | 4.26 | 27.25 | 69.00 | - | - | - | - | 0.60 | 0.60 | 30.25 | 73.86 |
| **TOTAL** | | **74.0** | **132.0** | **293.0** | **742.0** | **2.00** | **2.10** | **5.00** | **3.70** | **17.00** | **16.50** | **391.0** | **896.30** |

Area and Production of Food grains in different districts during 2010-11 are presented in Table 5.18. The target area under Kharif production for the year 2018-19 has reduced by 3.5% over a period of 8 years. From the table it is evident that area under production of food grains during kharif season is highest in Kangra district followed by Mandi and Chamba accounting for 25%, 17.9% and 8.9% of total area of state under food-grain production during Kharif season. While, the highest productivity of food-grains during Kharif season was recorded in Lahul and Spiti at 3.06 MT/ha, followed by Sirmaur at 2.94 MT/ha and Solan at 2.33 MT/ha

respectively, during Kharif season. Area under food-grain production during Rabi season was highest in Kangra followed by Mandi and Una district accounting for 24.6%, 18.5% and 8.9% respectively of the total area. However, the productivity of crops was highest in Lahul and Spiti at 4.64 MT/ha followed by Bilaspur at 2.2 MT/ha and Sirmaur at 1.96 MT/ha.

Table 5.18: Area and Production of Food grains in 2010-11

*(Areain000ha./productionin000MT)*

| District | Kharif | | Rabi | | Total | |
|---|---|---|---|---|---|---|
| | Area | Production | Area | Production | Area | Production |
| BILASPUR | 28.5 | 56.7 | 27.1 | 59.7 | 55.6 | 116.3 |
| CHAMBA | 36.0 | 82.1 | 27.8 | 40.7 | 63.8 | 122.8 |
| HAMIRPUR | 33.4 | 56.3 | 33.3 | 43.9 | 66.7 | 100.2 |
| KANGRA | 101.4 | 173.0 | 99.4 | 169.0 | 200.8 | 342.0 |
| KINNAUR | 2.4 | 1.4 | 1.9 | 2.3 | 4.3 | 3.7 |
| KULLU | 22.1 | 43.8 | 23.9 | 33.5 | 46.1 | 77.3 |
| LAHUL AND SPITI | 0.1 | 0.2 | 2.3 | 10.6 | 2.3 | 10.8 |
| MANDI | 72.5 | 157.8 | 74.8 | 107.8 | 147.3 | 265.6 |
| SHIMLA | 18.1 | 28.8 | 18.0 | 32.2 | 36.0 | 60.9 |
| SIRMAUR | 29.9 | 88.0 | 31.9 | 62.4 | 61.8 | 150.4 |
| SOLAN | 27.5 | 63.9 | 27.9 | 52.3 | 55.3 | 116.2 |
| UNA | 33.1 | 67.5 | 35.9 | 66.7 | 69.0 | 134.3 |
| **Grand Total** | **405.0** | **819.5** | **404.1** | **681.0** | **809.1** | **1500.5** |

The detailed crop wise production of food-grains in different districts of HP is presented in details in Table 5.19. From the table it is evident that wheat is the highest grown crop in the state accounting for 44.2% of the total area under cultivation of the food-grains followed by Maize and Paddy which account for 36.6% and 9.5% respectively.

Average yield of wheat is highest in Bilaspur, Sirmaur and Solan at 2.23 MT/ha, 2.07 MT/ha and 1.99 MT/ha and average yield of wheat in state is 1.72 MT/ha. Similarly average yield of maize is highest in Sirmaur at 3.38 MT/ha followed by Chamba at 2.66 MT/ha and Solan at 2.44 MT/ha.

Paddy is mostly cultivated in Kangra and Mandi districts while the highest yield is recorded in Una, Solan and Sirmaur districts at 2.75 MT/ha, 2.47 MT/ha and 2.26 MT/ha respectively.

Table 5.19: Crop wise Area and Production of Food grains in 2010-11

*(Areain000ha./productionin000MT)*

| DISTRICTS | WHEAT | | MAIZE | | RICE | | PULSES | | MILLETS | | RAGI | | OILSEEDS | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | P | A | P | A | P | A | P | A | P | A | P | A | P | A | P |
| BILASPUR | 26.4 | 58.8 | 26.8 | 53.6 | 1.5 | 3.0 | 0.2 | 0.1 | 0.2 | 0.3 | - | - | 0.5 | 0.5 | 55.6 | 116.3 |
| CHAMBA | 20.8 | 35.5 | 27.5 | 73.2 | 3.5 | 5.8 | 3.8 | 3.1 | 5.0 | 4.3 | 0.05 | 0.03 | 3.1 | 0.9 | 63.8 | 122.8 |
| HAMIRPUR | 33.2 | 43.8 | 31.5 | 53.4 | 1.9 | 2.9 | 0.02 | 0.01 | 0.1 | 0.1 | - | - | 0.1 | 0.03 | 66.7 | 100.2 |

| DISTRICTS | WHEAT | | MAIZE | | RICE | | PULSES | | MILLETS | | RAGI | | OILSEEDS | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | P | A | P | A | P | A | P | A | P | A | P | A | P | A | P |
| KANGRA | 93.5 | 162.3 | 58.2 | 111.1 | 37.6 | 59.2 | 3.1 | 1.9 | 3.3 | 5.4 | 0.02 | 0.02 | 5.1 | 2.1 | 200.8 | 342.0 |
| KINNAUR | 0.2 | 0.3 | 0.2 | 0.4 | 0.02 | 0.03 | 1.7 | 1.2 | 2.2 | 1.8 | 0.01 | 0.01 | - | - | 4.3 | 3.7 |
| KULLU | 19.3 | 28.4 | 16.9 | 39.5 | 1.5 | 1.8 | 3.5 | 2.9 | 3.7 | 3.9 | 0.5 | 0.4 | 0.7 | 0.4 | 46.1 | 77.3 |
| LAHUL AND SPITI | 0.05 | 0.1 | 0.02 | 0.04 | - | - | 1.8 | 10.0 | 0.4 | 0.6 | - | - | 0.03 | 0.04 | 2.3 | 10.8 |
| MANDI | 67.1 | 96.8 | 49.0 | 124.8 | 19.5 | 30.5 | 6.5 | 6.9 | 3.6 | 5.8 | 1.0 | 0.7 | 0.6 | 0.1 | 147.3 | 265.6 |
| SHIMLA | 10.8 | 19.6 | 10.3 | 22.3 | 1.4 | 1.5 | 7.1 | 8.7 | 5.6 | 8.0 | 0.5 | 0.7 | 0.3 | 0.1 | 36.0 | 60.9 |
| SIRMAUR | 26.3 | 54.4 | 21.3 | 72.1 | 6.1 | 13.8 | 4.1 | 5.2 | 2.4 | 3.8 | 0.3 | 0.2 | 1.2 | 0.8 | 61.8 | 150.4 |
| SOLAN | 24.7 | 49.0 | 24.0 | 58.5 | 2.1 | 5.2 | 2.2 | 1.7 | 1.5 | 1.5 | - | - | 0.9 | 0.4 | 55.3 | 116.2 |
| UNA | 35.0 | 65.8 | 30.7 | 62.1 | 1.9 | 5.3 | 0.3 | 0.1 | - | - | - | - | 1.1 | 1.0 | 69.0 | 134.3 |
| **Grand Total** | **357.2** | **614.9** | **296.4** | **670.9** | **77.1** | **128.9** | **34.3** | **41.8** | **28.1** | **35.6** | **2.3** | **2.1** | **13.7** | **6.3** | **809.1** | **1500.5** |

Lahul and Spiti which recorded highest productivity of food grains is famous for its peas which is grown widely across the district accounting for 1768 ha area yielding around 5.6 MT/ha (highest recorded yield of any district for any food – grain crop in the state).

## B. Commercial Crops

Potato, Vegetables and Ginger are the main commercial crops of the State. It is proposed to cover an area of 15 thousand hectare under Potato, 75 thousand hectare under Vegetables and 2.90 thousand hectare under Ginger (Green) with production targets of 195 thousand MT, 1650 thousand MT and 35.00 thousand MT (Green), respectively for the year 2018-19. The district–wise targets for Kharif-2018 are provided in Table 5.20

Table 5.20: District wise Area and Production of Commercial Crops

*(Areain000ha./productionin000MT)*

| S. No | District | Potato | | Vegetable | | Ginger | |
|---|---|---|---|---|---|---|---|
| | | A | P | A | P | A | P |
| 1. | Bilaspur | 0.12 | 1.56 | 1.78 | 49.30 | 0.215 | 2.190 |
| 2. | Chamba | 0.64 | 8.32 | 1.94 | 38.70 | 0.015 | 0.155 |
| 3. | Hamirpur | 0.12 | 1.56 | 2.20 | 37.20 | 0.110 | 1.100 |
| 4. | Kangra | 0.96 | 12.48 | 4.87 | 106.20 | 0.025 | 0.315 |
| 5. | Kinnaur | 0.56 | 7.28 | 2.17 | 32.30 | - | - |
| 6. | Kullu | 0.72 | 9.36 | 3.60 | 77.30 | 0.075 | 0.825 |
| 7. | Lahul & Spiti | | | | | | |
| | i)Lahaul | 1.00 | 13.00 | 1.92 | 26.50 | - | - |
| | ii) Spiti | 0.30 | 3.90 | 2.28 | 31.45 | - | - |
| 8. | Mandi | 1.28 | 16.60 | 6.44 | 130.80 | 0.190 | 2.090 |
| 9. | Shimla | 4.56 | 59.28 | 7.50 | 150.00 | 0.320 | 3.955 |
| 10. | Sirmour | 1.12 | 14.56 | 5.10 | 118.80 | 1.450 | 17.695 |
| 11. | Solan | 0.24 | 3.12 | 5.60 | 193.80 | 0.450 | 6.075 |
| 12. | Una | 0.56 | 7.28 | 1.20 | 22.65 | 0.050 | 0.600 |

| S. No | District | Potato | | Vegetable | | Ginger | |
|---|---|---|---|---|---|---|---|
| | | A | P | A | P | A | P |
| | **TOTAL** | **12.18** | **158.30** | **46.60** | **1015.00** | **2.90** | **35.00** |

Table 5.21 provides the details of area, production and yield of commercial crops in HP during 2010-11. Potato is the major commercial crop cultivated in the state accounting to 59% of the total area under cultivation of commercial crops in the state.

Shimla accounts for 26.04% of total area under potato cultivation followed by Mandi and Kangra districts which account for 22.37% and 12.35% respectively of total area under potato cultivation in the state. However highest productivity is recorded in Lahul and Spiti followed by Chamba and Mandi districts at 11.9 MT/ha, 10.4 MT/ha and 9.3 MT/ha respectively.

Table 5.21: APY of Commercial Crops

*(Areain000ha./productionin000MT)*

| DISTRICT | POTATO | | | GINGER | | | ONION | | | COMMERCIAL CROPS | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | P | Y | A | P | Y | A | P | Y | A | P | Y | A | P | Y |
| BILASPUR | 0.11% | 0.11% | 8.7 | 3.75% | 7.12% | 14.3 | 10.11% | 8.10% | 7.2 | 8.10% | 1.32% | 0.1 | 1.26% | 1.23% | 8.1 |
| CHAMBA | 7.09% | 8.88% | 10.4 | 0.14% | 0.15% | 7.7 | 6.26% | 7.06% | 10.2 | 7.06% | 2.05% | 0.2 | 5.00% | 5.62% | 9.4 |
| HAMIRPUR | 0.06% | 0.06% | 8.4 | 0.38% | 0.38% | 7.5 | 4.69% | 4.28% | 8.2 | 4.28% | 1.78% | 0.3 | 0.74% | 0.49% | 5.6 |
| KANGRA | 12.35% | 10.95% | 7.4 | 0.86% | 0.86% | 7.5 | 20.46% | 19.15% | 8.4 | 19.15% | 11.68% | 0.4 | 11.26% | 10.73% | 7.9 |
| KINNAUR | 0.88% | 0.55% | 5.2 | - | - | - | - | - | - | - | 0.17% | - | 0.56% | 0.33% | 4.8 |
| KULLU | 10.98% | 8.40% | 6.4 | - | - | - | 7.34% | 5.96% | 7.3 | 5.96% | 18.32% | 2.0 | 11.47% | 5.78% | 4.2 |
| LAHUL AND SPITI | 6.65% | 9.53% | 11.9 | - | - | - | - | - | - | - | - | - | 3.92% | 5.62% | 11.9 |
| MANDI | 22.37% | 25.08% | 9.3 | 5.28% | 5.28% | 7.5 | 12.39% | 10.62% | 7.7 | 10.62% | 20.45% | 1.2 | 19.55% | 16.48% | 7.0 |
| SHIMLA | 26.04% | 22.50% | 7.2 | 9.27% | 12.86% | 10.4 | 6.38% | 7.19% | 10.2 | 7.19% | 6.16% | 0.5 | 18.25% | 15.08% | 6.9 |
| SIRMAUR | 6.93% | 7.42% | 8.9 | 63.98% | 57.60% | 6.8 | 19.25% | 21.12% | 9.9 | 21.12% | 28.14% | 0.9 | 19.21% | 29.53% | 12.8 |
| SOLAN | 0.58% | 0.39% | 5.6 | 16.23% | 15.65% | 7.2 | 4.21% | 4.75% | 10.2 | 4.75% | 4.41% | 0.6 | 3.45% | 2.34% | 5.6 |
| UNA | 5.95% | 6.13% | 8.6 | 0.10% | 0.10% | 7.5 | 8.90% | 11.76% | 11.9 | 11.76% | 5.54% | 0.3 | 5.32% | 6.78% | 10.6 |
| **Grand Total** | **11.08** | **92.21** | **8.3** | **2.08** | **15.62** | **7.5** | **0.83** | **7.49** | **9.0** | **7.49** | **4.79** | **0.6** | **18.78** | **156.40** | **8.3** |

### 5.2.20 Constraints

- Problem of erosion due to serious topographical and climatic factors and abiotic pressure on the Land.
- 80 % area is rainfed; therefore, the adoption rate of improved technologies and inputs by the farmers is less as compared to irrigated areas.
- Small and Scattered Land holdings. (88.0% of farmers are small/marginal).
- Occurrence of natural calamities like drought, cloud bursts, hailstorm, heavy rains, storms, unusual rise in temperature are quite frequent causing losses to crops.
- Squeezing of agricultural lands because of diversion to non-agricultural purposes.
- Inadequate infrastructure like rural roads, irrigation, marketing grading and packing facilities of Agricultural produce.
- Low risk bearing capacity and poor purchasing power of the farmers.
- Low productivity of crops
- Erratic behavior of rainfall.
- Limited mechanization.

- Increasing population of stray cattle and monkey menace.

### 5.2.21 Horticulture

The rich diversity of agro- climatic conditions, topographical variations and altitudinal differences coupled with fertile, deep and well drained soils favour the cultivation of temperate to sub-tropical fruits in Himachal. The region is also suitable for cultivation of ancillary horticultural produce like flowers, mushroom, honey and hops.

This particular suitability of Himachal has resulted in shifting of land use pattern from agriculture to fruit crops in the past few decades. The area under fruits, which was 792 hectares in1950-51 with total production of 1,200 tons increased to 2.29 Lac during 2016-17. The total fruit production in 2016-17 was 6.12 lakh tons, while during 2017-18 (upto December,2017) has been reported as 5 lakh tons. During 2017-18, it was envisaged to bring 3,000 ha of additional area under fruit plants against which 2,552.44 ha of area was brought under plantations and 6.69 lakh fruit plants of different species were distributed up to 31st December, 2017.

Apple is so far the most important fruit crop of Himachal Pradesh, which constitutes about 49 percent of the total area under fruit crops and about 85 per cent of the total fruit production. Area under apple has increased from 400 hectares in 1950-51 to 3,025 hectares in 1960-61 and 1,11,896 hectares in 2016-17.

The area under temperate fruits other than apple has increased from 900 hectares in 1960-61 to 28,163 hectares in 2016-17. Nuts and dry fruits exhibit area increase from 231 hectares in 1960-61 to 10,364 hectares in 2016-17, Citrus and other sub-tropical fruits have increased from 1,225 hectares and 623 hectares in 1960-61 to 24,475 hectares and 54,304 hectares in 2016-17 respectively.

Table 5.22: Fruit Production in HP[4]

| Item | 2014-15 | 2015-16 | 2016-17 | 2017-18 up to December |
|---|---|---|---|---|
| Apple | 625.20 | 777.13 | 468.13 | 427.61 |
| Other temperate fruits | 43.61 | 70.26 | 51.50 | 25.36 |
| Nuts and dry fruits | 2.41 | 3.37 | 2.99 | 1.29 |
| Citrus fruits | 22.17 | 26.62 | 28.05 | 16.74 |
| Other sub-tropical fruits | 58.55 | 51.45 | 61.21 | 29.29 |
| **Total** | 751.94 | 928.83 | 611.88 | 500.29 |

### 5.2.22 Floriculture

[4] https://himachalservices.nic.in/economics/ecosurvey/en/agriculture_and_horticulture.html

To bring diversification in horticulture industry a total area of 156.19 hectares has been brought under flower cultivation upto 31.12.2017. To promote flower cultivation two Tissue Culture Laboratories have been established under Model Flower Cultivation Centres at Mahogbagh (Chail, District Solan) and Palampur District Kangra.

Four Farmers' Cooperative Societies are functioning for the production and marketing of flowers in district Shimla, Kangra, Lahaul and Spiti and Chamba. Ancillary horticultural activities like mushroom and Bee keeping are also being promoted.

During 2017-18 upto December, 2017, 429.76 MT of pasteurized compost for mushroom was prepared and distributed from the department units located at Chambaghat, Bajoura and Palampur. A total of 5,077.00 MT of mushroom was produced in the State upto December, 2017.

### 5.2.23 Animal Husbandry

Rearing of livestock is an integral component of rural economy. In Himachal Pradesh there is a dynamic relationship between common property resources (CPRs) such as forests, water and grazing land, livestock and crops. Livestock depend to a certain extent on fodder and grass grown on CPRs as well as on crops and residues. At the same time the animals return fodder, grass and crop residues to the CPRs and fields in the form of manure and provide much needed draught power.

Livestock thus is an important integral to the sustainability of economy of Himachal Pradesh. The contribution of major livestock products during the year 2016-17 was 13.28 lakh ton of milk, 1,476 tonne of wool, 95.90 million eggs and 4,406 tonnes of meat which will likely to be of the order of 14.48 lakh tonne of milk, 1,500 tonnes of wool, 100 million eggs and 4,400 tonne of meat during 2017-18. Milk Production has increased 13.28 lakh tons in 2016-17 to 14.48 lakh tons in 2017-18 and Per Capita availability has increased from 531 grams / day to 570 grams / day during the corresponding period.

Animal Husbandry plays an important role to boost the rural economy and as such for livestock development programme attention is paid in the state by way of:

i) Animal Health and Disease control.
ii) Cattle Development.
iii) Sheep Breeding and Development of Wool.
iv) Poultry Development.
v) Feed and Fodder Development.
vi) Veterinary Education.
vii) Livestock Census.

Under Animal Health and Disease Control, following infrastructure facilities is available

- 1 State level Veterinary Hospital,
- 1 Zonal Hospital,
- 9 Polyclinics,
- 59 Sub-Divisional Veterinary Hospitals,
- 338 Veterinary Hospitals,
- 30 Central Veterinary Dispensaries and
- 1,772 Veterinary Dispensaries

### 5.2.24 Fisheries and Aquaculture

Himachal Pradesh is one of the States amongst a few in the union of India which has been gifted by mother nature with rivers emanating from glaciers which traverse through hilly terrains and finally enrich the semi- plain area of the state with their oxygen rich water. Its linearly flowing rivers Beas, Satluj and Ravi receive many streams during their downward journey and harbour the precious cold water fish fauna such as Schizothorax, Golden Mahseer and exotic Trouts.

About 6,098 fishermen in the State depend directly on reservoir fisheries for their livelihood. During 2017-18 cumulative fish production was 6,980.96 metric tonne valued at Rs 8,904.56 lakh.

The reservoir of Himachal Pradesh has the distinction of highest per hectare fish production in Govind Sagar and highest sale price value of fish catch in Pong Dam in the country.

### 5.2.25 Cultural Life

The fairs and festivals of the rural communities provide many occasions for song, dance, and the display of colorful garments. The Kullu valley, known as the valley of the gods, provides the setting for the Dussehra festival held each autumn.

Pilgrims from neighboring states and from within Himachal Pradesh itself converge in large numbers to worship at shrines of legendary antiquity. The town of Dharmshala has more recently emerged as a sacred site, particularly for Tibetan Buddhists; it was in Dharmshala that the Dalai Lama settled after he fled from Tibet in 1959 in the wake of China's occupation of Lhasa.

Aside from their festivals and sacred sites, the Shimla hills, the Kullu valley (including the town of Manali), and Dalhousie are popular tourist destinations, especially for outdoor recreation. Indeed, skiing, golfing, fishing, trekking, and mountaineering are among the activities for which Himachal Pradesh is ideally suited.

### 5.2.26 Government Schemes for Women Empowerment

The state government has many schemes for the all-round development of women right from the time of their birth. Some of the key ones are:

- Beti Hai Anmol Yojna: This scheme is for girls of BPL families up to two girl children. After their birth, the department deposits rupees 10,000 per girl child in the post office/ Bank account. These girls get scholarship ranging from Rs. 300 to Rs.1200 from first to 12th Class for their books/ uniforms etc.
- Mukhya Mantri Kanyadan Yojna: In this scheme girls who are orphan or whose father is physically/Mentally incapacitated or bed ridden can get rupees 25,000 grant for their marriage if their parents annual income is not more than rupees 35,000 per annum.
- Self Employment Assistance for women: In this scheme women are granted rupees 2500 for establishing any project or venture who have annual income not more than 35,000 per annum.
- Mahila Vikas Nigam: Objective of Mahila Vikas Nigam is to provide self-employment to the women by providing loan on subsidised interest rates.
- Widow Re-marriage Scheme: The objective of the scheme is to rehabilitate the widows. In this scheme Rs. 50,000 grant is providing to widow, on her remarriage.
- Mother- Teresa Asahaya Matri Sambal Yojna: Objective of this scheme is to provide financial assistance to widow women for educating and looking after their children up to two children till they attain age of 18 years. In this scheme women get rupees 3000 per annum per child.
- State Home For women: State home is meant for housing destitute, widow and the women who are in moral danger. Department is running one state home at Mashobra in Shimla Dist. These inmates get free residence and free diet. For their rehabilitation they get various skill trainings in the state home so that after leaving the state home they can earn and be rehabilitated. After leaving the state home department provides grant of Rupees 20,000 per inmates for her rehabilitation.
- VISHESH MAHILA UTHAAN YOJNA: The Hon'ble Supreme Court of India in a criminal appeal No.135,2010 titled Buddha Dev Karmaskar & state of West Bengal, had issued direction to Union Of India and all the states and Union territories to formulate schemes for rehabilitation of physically and sexually abused women through technical and vocational training. In pursuance of the decision of Hon'ble supreme court of India. A scheme namely "VISHESH MAHILA UTHAAN YOJNA" has been implemented in the State by the department vide notification No. SJ&E AE(2)-12/2011 Dated 18/08/2011 and women are provided vocational training under this scheme in selected ITI's of the State.
- FINANCIAL ASSISTANCE & SUPPORT SERVICE TO VICITM OF RAPE SCHEME -2012: Rape is one of the most violent forms of crimes against women, which not only impact her bodily integrity but in the long run, impairs her capacity to develop meaningful personal and social relationships, and affects her life and livelihood. The victim of rape suffers mental and psychological trauma, which must be addressed so that she is able to lead a dignified and meaningful life. Under this scheme State Government is providing Rs. 75,000/- for support

and other related services to the victims which in exceptional circumstances can be increased to Rs. One Lakh.

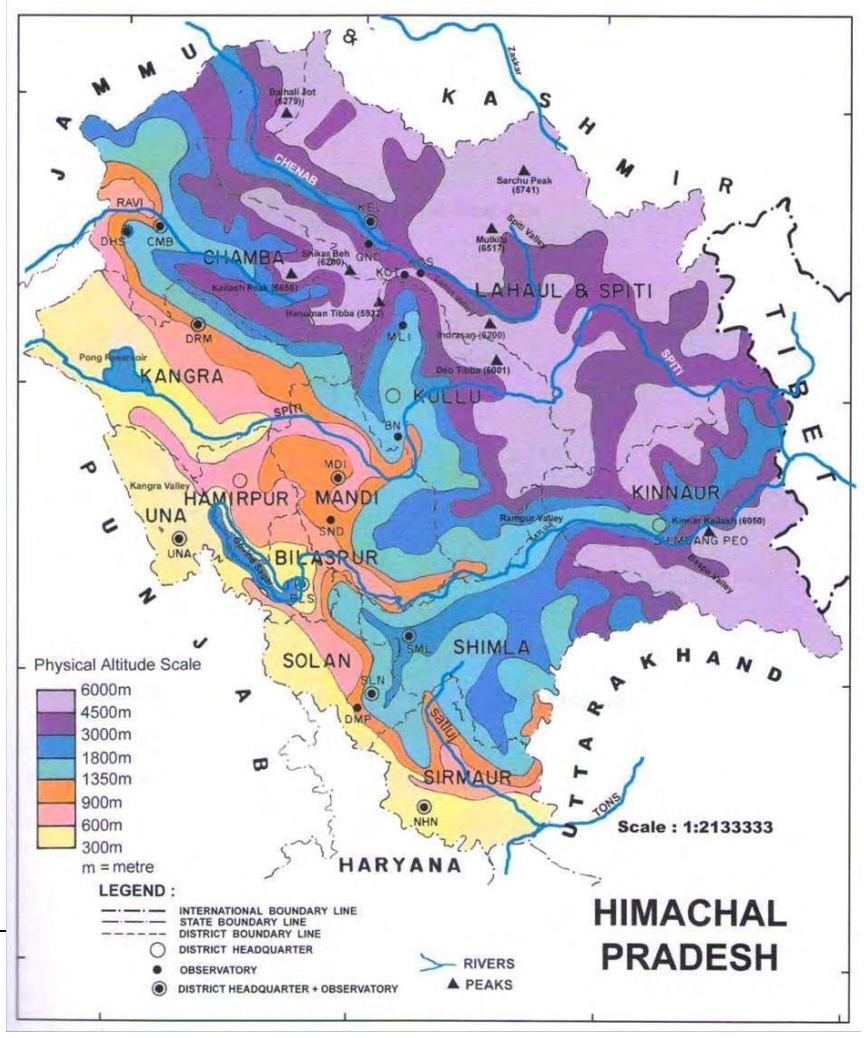
- HIMACHAL PRADESH MAHILA VIKAS PROTSAHAN YOJANA: Under the scheme, a state level award for the persons/Organisation working for the development and empowerment of women in the field of health, education, sports, social services and art and culture, is granted.
- Mata Shabari Mahilla Sashktikarn Yojna: Under this scheme LPG Gas connection is provided to the women who belong to BPL and SC family or whose income does not exceed rupees 35,000 per annum. For the purchase of LPG gas connection subsidy of Rs. 1300/- per beneficiary is provided by the Govt.
- ***Ek Beti Ek Buta scheme has been recently launched by the HP Forest Dept.***

## 5.3 Environmental Baseline

Himachal Pradesh is a mountainous state in northern India known for its forests, rivers, and valleys, archcultural heritage. The Outer and lesser Himalayan watersheds of the state covering 28,970 sq km area are of great national importance, as entire northern India depends largely for water and power produced by runoff from this region.

Himachal is situated in the western Himalayas. Covering an area of 55,673 kilometers (34,594 miles),

Himachal Pradesh is a mountainous state with elevation ranging from about 350 meters (1,148 ft.) to 6,000 meters (19,685 ft.) above the Mean Sea Level. Area-wise, Hamirpur is the smallest district of the Pradesh which covers an area of 1,118 sq.kms (2.01%) and Lahaul&Spiti has the largest area of 13,835 sq.km. (24.85%).
The population of Himachal Pradesh is 68,56,509 as per the Census of India, 2011. In terms of population it accounts for only 0.57% of total country's population. The population of the State increased by 17.53% between the years 1991–




**PIC 2: Elevation Map of HP**

2001 and further increased by 12.81% in 2011.
The mid-Himalayas are fragile ecosystems due to topography and soils as well as because of high intensity rainfall that fall mostly in three months i.e. July, August and September. Long dry spells ranging from 3-4 months before and after the monsoon are also common, which affect the perenniality of the water courses and bring in, ironically, acute water scarcity as well.

### 5.3.1 Geography

The state is bound by Uttar Pradesh on the southeast, Tibet on the east, Punjab on the west and southwest, Haryana on south and Jammu & Kashmir on the north. It is situated in the north-west corner of India, right in the lap of Himalayan ranges. Himachal Pradesh displays prominent features characterized by lofty mountain ranges incised by deeply dissected valleys carved out in slopes of various descriptions. The elevation above mean sea level varies from 320 m in Una District, to 6975 m at Leo Pargil Peak of Kinnaur District. Physiographically, the State can be divided into five distinct parallel zones. From south to north these are:

- **Alluvial Plain:** A limited zone of nearly flat plain developed at the foot hills of Siwalik Range in the vicinity of Indo-Gangetic Alluvium in the south-western and south-eastern fringes of the state with an average altitude of 375 m.
- **Siwalik Foot hills:** It is also known as Sub-Himalaya and is the outer most mountainous zone of **Himachal Himalaya**, separating the state from the plains of Punjab and Haryana. It is 8 km- 50 km wide zone, with altitude ranging from 345 m to 1500 m. This zone contains many prominent longitudinal valleys viz. Una, Sirsa and Poanta duns.
- **Lesser Himalayan Zone:** It is a 65km to 80km wide zone between Sub-Himalaya and Central Himalaya. The altitude of this zone rarely exceeds 3000m.
- **Central Himalayan/Great Himalayan Zone: It comprises a zone of snow-capped** peaks ranging in height from 4000m to 5000m. It separates the Lesser Himalayan zone from the Trans-Himalayan zone.
- **Trans Himalayan/Higher Himalayan Zone:** It is mainly a rain shadow area, having an average width of 40km and height varying from 3000m to 6000m. The mountain ranges in general trend in NW-SE direction.

Table 5-23: Characteristics of the agro climatic zones of HP

| Particulars and Characteristics | ShivalikZone | Mid-Hill Zone | High hill zone | Trans- Himalayan Zone |
|---|---|---|---|---|
| **Altitude** | Up to 800 m | 800m-1,600m | 1,600m-2,700m | 2,700m-3,600m |
| **Type of area** | Valley areas and foothills | Hilly and mountain ranges | Alpine zone | Lahaul Spiti and Kinnaur range |
| **Climatic conditions** | Sub-tropical | Slightly warm temperature | Cool temperature with humidity | Dry and extremely cold conditions |
| **Districts** | Una, Bilaspur, Hamirpur districts and parts of Sirmaur, Kangra, Solan and Chamba districts. | Palampur and Kangra Tehsil of Kangra district, Rampur Tehsil of Shimla district and parts of Mandi, | North – western Himalayan region lying in the state | Kinnaur, Lahaul and Spiti and part of Chamba district. |

| Particulars and Characteristics | ShivalikZone | Mid-Hill Zone | High hill zone | Trans- Himalayan Zone |
|---|---|---|---|---|
| | | Solan, Kullu, Chamba, Bilaspur and Sirmaur district. | | |
| **Rainfall in mm.** | 1,500 | 1,500-3000 | 1,000-1,500 | 500 |
| **% of total geographical area** | 30% | 10% | 25% | 35% |
| **% of total cultivated area** | 55% | 30% | 10% | 5% |
| **Soil types** | Hill soils, mountain, meadow skeletal, tarai | Brown hills | Sub-mountain, mountain skeletal, meadow | Alluvial (Recent), brown hills. |
| **Major Crops** | Rice, Wheat, Sugarcane, Citrus, Mango, Litchi, Guava, deciduous forest, dry deciduous shrubs, Vegetables, oilseeds, Barley. | Rice, Wheat, Arhar, Sesamum, Temperate fruits, Citrus, Vegetables | Maize, Rice, Oilseeds, Pulses, Rajmash, Soybean, Barley, Bee keeping, Apple, Pear, Plum, Peach, Apricot, chestnut, Vegetables. | Barley, Maize, Pulses, Potatoes, Minor millets, Kutheris, Hopes, Kumin, saffron, Apples, Nuts, Dry fruits, Chilgoza, Neoza pine, Cabbage seed, Sugerbeet, Chicory, |

*Source: HPForest Dept., 2013.*

### **5.3.2** Geology

The geological history of Himachal Pradesh goes back to the Archaean – Proterozoic transition although Himalayan mountain building took place only during Cenozoic era. The Himalaya is a classic example of continent to continent collision due to convergent movement of Indian plate towards the Eurasian Plate. It comprise two contrasting tectogene with their own distinctive geological history. The dividing line between these two tectogenes represents a major tectonic discontinuity and is designated by several names. However, it can be collectively called as the Main Central Thrust (MCT), and on either side of this thrust the tectogene display contrasting stratigraphy and tectonic indicating the convergence of two alien blocks. These are the Lesser Himalayan Tectongen and the Tethys Himalayan Tectogene.

Palaeomagnetic data indicate that India, after the separation from other parts of Gondwana super-continent some 130 million years (Ma) ago moved north-eastwards at a velocity of 18-19 cm per year and additionally rotated more than 30° counter clockwise (Molnar & Tapponier, 1975). During this movement oceanic crust of the Tethys Ocean was subducted beneath the Asian southern continental margin, melted at depth and the ascending melts formed the granites of the Trans Himalaya plutonic belt. The actual collision of India and Asia is considered to start between 65-55 Ma ago (Klootwijk et al., 1992; Klootwijk et al., 1994). Based on isotope dating and sedimentological constraints Guillot et al. (2003) estimate the beginning of the collision at 55 ±2 Ma. After the collision Indian continental crust started to subduct below Asia and the northward movement of India slowed down to some 5 cm per year, a velocity that continues up to present. The still ongoing collision causes deformation, crustal thickening and surface uplift. The upper continental crust of India is sheared off and

thrust in south-westward direction along major, several hundreds of meters thick thrust zones propagating insequence from north to south, thus becoming increasingly younger towards the south. Based on the classic book by Gansser (1964) these tectonic zones divide the orogen into five tectonic units (Medlicott and Blanford, 1879/1887), which on the whole correspond with the geomorphological divisions (Srikantia and Bhargava, 1998). The tectonic units from south to north are:- (i) Sub-Himalaya, (ii) Lesser Himalaya (LH), (iii) Higher Himalaya (HH), (iv) Indus Yarlung Suture Zone (IYSZ), (v) Trans Himalaya In Himachal Himalaya only the rock of Sub- Himalaya, Lesser Himalaya and Higher Himalaya are reported.

**Sub-Himalayas**

This unit represents the outermost zone of the mountain belt that rises up just north of the recent Indus-Ganges plains constituting of densely vegetated low-altitude foothills with an average altitude of 900-1500 m. Its southernmost part is known as Siwalik Range. The Sub- Himalaya tectonic unit comprises Tertiary molasse-type sediments, which are over trusted by the Lesser Himalaya (LH) along the Main Boundary Thrust (MBT) and subsequently the unit itself is thrust southwards at the Main Frontal Thrust (MFT) above Holocene sediments of the Indus-Ganges plains .The sedimentary successions are folded and imbricated (Srikantia and Bhargava, 1998). In Himachal Pradesh the lower Eocene to lower Miocene Sirmur Group (Subathu, Dagshai and Kasauli Formations) consisting of foraminiferal limestone, sandstone and mudstone is succeeded by mainly terrigenous clastic sediments of the Middle Miocene to Pleistocene Siwalik Group (Medlicott and Blanford, 1879/1887).

**Lesser Himalayas**

The Lesser Himalaya shows alpine-type mountain ranges with altitudes ranging between 1500 to 5000 m. Due to the position directly south of the main range, this densely vegetated zone benefits from much rain during monsoon. At the northern boundary the Lesser Himalaya tectonic unit is overthrusted by the Higher Himalaya (HH) at the Main Central Thrust (MCT; Heim and Gansser, 1939) and at the southern boundary the LH is thrust above the Sub-Himalaya at the MBT.

The ages of the lithologies range from Precambrian to Eocene with a major depositional break between Middle Cambrian and Eocene. The metamorphic grade is generally low, but can reach lower greenschist conditions in the uppermost nappes (Srikantia and Bhargava, 1998). Within the LH several tectonic units can be distinguished; several nappes are thrust above unmetamorphosed, imbricated, paraautochthonous sedimentary series (Frank et al., 1995; Srikantia and Bhargava, 1998; Vannay and Grasemann, 1998). Four successive para-autochthonous Proterozoic sedimentary megacycles, bounded by unconformities, have been distinguished (Virdi, 1995; Srikantia and Bhargava, 1998): (i) Rampur-Berinag cycle (~ 1800 Ma; Miller et al., 2000) consist of striking ortho-quartzites and slates associated with basic volcanics; (ii) Shali (= Larji, = Deoban) cycle (c. 1400-900 Ma) comprises dolomitic and calcareous stromatolites with very rare siliciclastics; (iii) Simla cycle (c. 900-700) is made of shales

and greywackes with minor carbonates and rare volcanics; the cycle ends with redbeds (Nagthat Formation); (iv) Blaini-Krol-Tal cycle (c. 700 Ma to early Cambrian) shows two diamictite horizons (Blaini Group) followed by black shales and carbonates (Infra Krol Formation) and finally succeeded by dolomites with some siliciclastics. The Proterozoic sedimentary series of the LH represent thick and uniform successions that can be traced for long distances in the Himalaya. For example the Simla Slates can probably be correlated with the Attock - and Hazara Slates west of the syntaxis in Pakistan (Wadia, 1934; Pascoe, 1959; Gansser, 1964). Some lithological, geochemical and geochronological similarities between the Lesser Himalayan Simla and Krol cycles and the Haimanta Group of the HH suggest a correlation and a deposition in the same basin (Virdi, 1995; Frank et al., 1995). Isolated remnants of the Palaeocene to lower Eocene Kakara Formation (Srikantia and Bhargava, 1967), which were deposited during a transgression on the Precambrian to middle Cambrian series, can be found in the southern part of the Lesser Himalaya (Srikantia and Bhargava, 1998).

**Higher Himalayas**

In the general accepted opinion the HH forms the northernmost tectonic unit of Indian continental crust in the Himalayan orogen. The Main Central Thrust marks the southern limit, where the HH is thrust above the LH tectonic unit. The ophiolithic melange of the Indus-Yarlung Suture Zone, which represents remnants of the subducted Neo-Tethys Ocean, forms the northern limit. The Higher Himalaya is divided into 2 subunits: (i) Higher Himalaya Crystalline (HHC), i.e. "Central Gneiss" of Stoliczka (1866) and "Vaikrita Group" of Griesbach (1891), and the (ii) Tethyan Himalaya, i.e. "Tethys Himalaya" of Auden (1935) and "Tibetan Himalaya" of Gansser (1964). The Higher Himalaya Crystalline is located north of the MCT, where it is thrust above the LH tectonic unit. The unit comprises amphibolite grade metasediments of the Vaikrita Group in lower levels with gradually decreasing metamorphic grade towards higher levels into hardly metamorphosed sediments towards the north, the Haimanta Group (Griesbach, 1891; Frank et al., 1995). The boundary between the HHC and the TH is formed by the large normal fault systems of the South Tibetan Detachment Zone (STDZ) and similar faults (Burg et al., 1984; Burchfield et al., 1992). Abundant Early Ordovician high-level intrusions consisting of peraluminous granites with minor associated basic intrusions are restricted to the HHC; they are not found in the LH (Frank et al., 1995). According to Miller et al. (2001) these granites indicate an extensional setting in their geochemistry that fits to the observation of pre-Himalayan deformation in the Pin Valley (Wiesmayr and Grasemann, 2002). Leucogranitic intrusives generated by anatexis during the Tertiary metamorphism are rare and occur near the top of the HHC (Le Fort, 1975; Dèzes, 1999), but may even intrude basal horizons of the Ordovician Ralam Conglomerate in Kumaon (Griesbach, 1891). The term Higher Himalaya Crystalline is somehow misleading, because this unit experienced its main metamorphism together with the TH during Tertiary times, thus as per definition it can not represent the crystalline basement of the TH sediments. In analogue, according to Parrish and Hodges (1996) there is no real basement found for the late Proterozoic sediments in the HH of Nepal. The HH rather constitutes Neoproterozoic to Cambrian metasediments (Vaikrita and Haimanta Groups) below

the TH with continuous sedimentation into the Palaeozoic, apart from a depositional break in upper Cambrian to lower Ordovician time. In places where the contact between Vaikritas and Haimantas is not complicated by faults, the gradual relationship is clearly evident. The Tethyan Himalaya lying north of the HHC comprises nearly continuous sedimentary sequences from Cambrian to Eocene (Hayden, 1904; Heim and Gansser, 1939; Baud et al., 1984). The pronounced depositional gap below the trangressive conglomerates of the Shian Formation from Middle Cambrian to lower Ordovician is associated with an angular unconformity, weak folding and granitic intrusions (Stoliczka, 1866; Fuchs, 1982; Wiesmayr and Grasemann 2002; Miller et al., 2001; Thompson et al., 2001). Marine sedimentation in Zanskar terminated with Eocene nummulitic limestones (Gaetani et al., 1986). In the NW Himalaya the southern boundary of the TH is formed by normal fault systems of the Zanskar Shear Zone (Herren, 1987; Dézes et al., 1999), Sangla Detachment (Vannay and Grasemann, 1998) and the South Tibetan Detachment Zone (STDZ) far to the East (Burg et al., 1984; Burchfield et al., 1992).

**Geological Structural Belts**

The rocks of Himachal Pradesh have been subjected to intense deformation, which, at many places, has disrupted the original stratigraphic position of the various formations. The detailed structure of the same tectonic belt differs from area to area. A brief and generalised description of the principal structural belts are as given below:

**Siwalik Autochthon to Parautochthon Belt**
Comprises the Siwalik Formation folded in open upright to overturned folds. Along the southern limit, the Siwalik has, at places, moved over the alluvium along a thrust, while along the northern boundary it is thrust over by the Lower Tertiary belt. The thrust between the Lower Tertiary and Siwalik is commonly known as the Main Boundary Fault.

**Lower Tertiary Parautochthon Belt with Subsidiary Belt of Shali**
The Lower Tertiary belt is thrust over the Siwalik. On the northeastern side, the Krol, Simla and Shali rocks are thrust over the Lower Tertiary belt. Along the trace of the Main Boundary Fault, between Khadli and Sataun there also occurs a liner belt of the Shali in the form of a tectonically truncated anticline.

**The Simla Group Belt**
Folded in a major synform and an antiform, it occurs as a superficial nappe over the Shali belt. The Lower Tertiary sediments have been involved in a complicated folding in the Bakhalag-Bugher area.

**The Outer Krol Belt Superficial Nappe.**
Bounded by the Krol-Giri synformally folded thrusts, rocks of the Blaini, InfraKrol, Krol and Subathu occur as superficial nappe over the isopic zones of the Lower Tertiary and Simla Group. A major fault at Kandaghat dislocates the Giri Thrust and brings the Shimla Group of rocks to rest over the Infra-Krol. The Subathu rocks, exposed as

window within the Infra-Krol near Solan, are cited as an evidence in favour of allochthonous nature of the Krol Belt.

**The Jaunsar and Inner Krol Belt Superficial Nappe.**
Bounded by the synformally folded Chail-Tons Thrust, it rests over the Simla and Deoban belts.

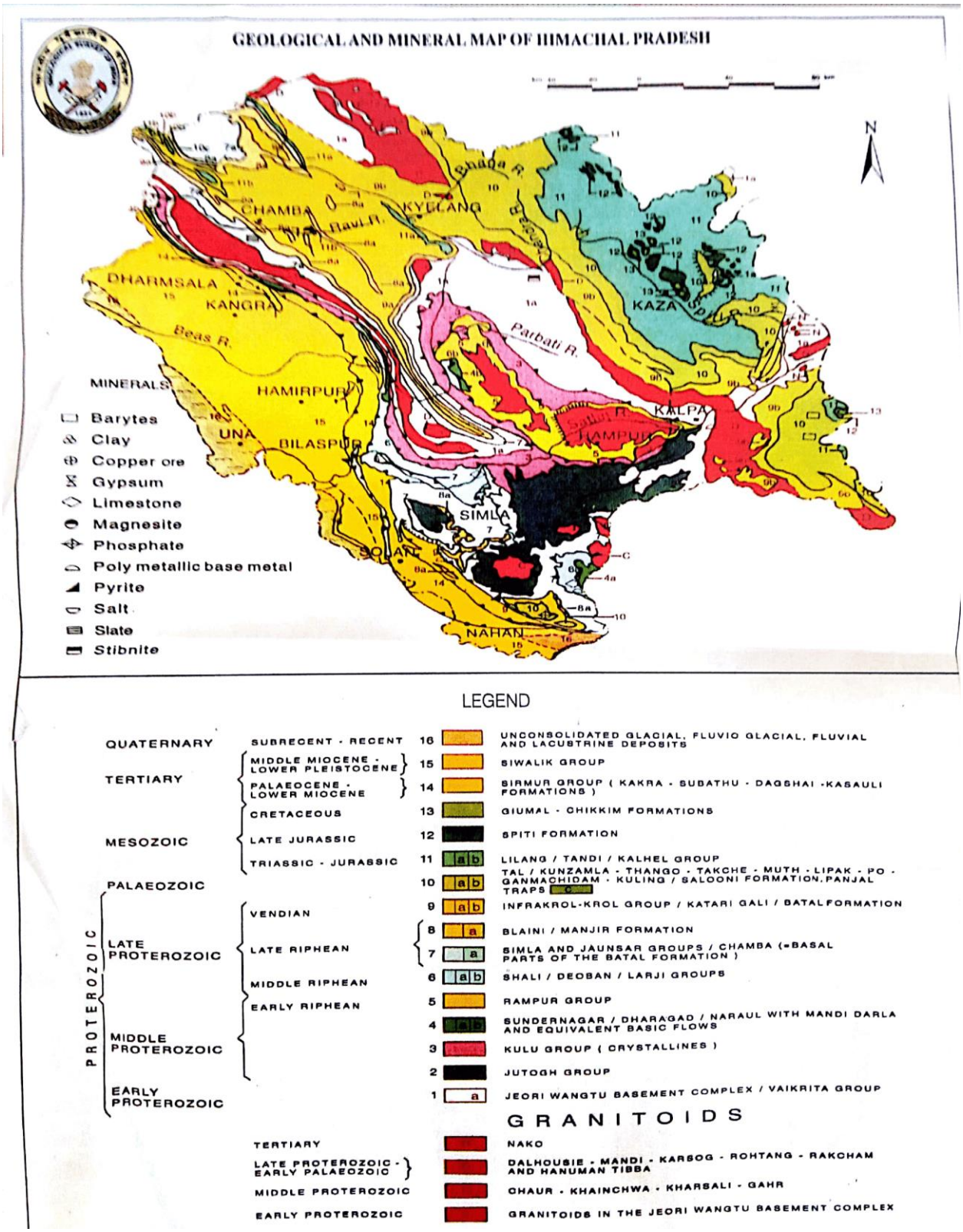
**Rampur Belt**
Rampur Group, folded into a complex antiform, rests over the Larji Formation and below the Kulu Crystallines along thrusts. It is exposed in Kullu Rampur stretch as a window.

**Larji Belt**
Highly folded Larji rocks are exposed as a window within the Rampur window.

**The Crystalline Thrust Sheet of Kullu**
In between the Jaunsar Group (Superficial nappe) and the Jutogh Thrust Sheets, occur the Thrust Sheet of the crystalline of Kullu. From NW to SE along its western contact, it rests over the Siwalik, Subathu, Shali, Simla Groups and the Jaunsar Group and along its eastern contact over the Rampur Group and Larji rocks. South-east of Kadiali, this Thrust Sheet is tectonically overlapped by the Jutogh Thrust Sheet.

**Jutogh Thrust Sheet**
The Jutogh Thrust Sheet rests along the folded Jutogh Thrust over the Blaini Formation, Simla Group, Jaunsar Group and Kullu Formation. In the Simla area it rests over the Jaunsar Group as a klippe. As the higher grade metamorphic rocks occupy the physical top, the structure of the Jutogh (Pilgrim and West, 1928) was interpreted as major recumbent anticlines whose normal limbs have been eroded. The sedimentary structures however indicate it to be largely an upright thrust sheet.

**Vaikrita Thrust Sheet**
The presence of kyanite and sillimanite at the base of the Vaiktria sequence marks the Vaikrita Thrust. From the Sutlej Valley it skirts around the northern limit of the Rampur-Larji window. Towards Karsog, folded into a synform,it swings towards north and possibly links up with the Panjal Thrust. The Chamba, Manjir, Katarigali, Salooni and Spiti Basin rocks rest above the Vaikrita rocks. However it is difficult to summaries the complex geology of Himachal Pradesh in single lithostratigraphic table




**PIC 3: Geological and Minieral map of HP**

### 5.3.3 Environmental hazard

Due to varied topography, relief and climatic conditions with intervention of anthropogenic activities, a number of environmental problems in form of hazards have arisen in the state. Some of these problems are actively operative and others are potential in nature. Important natural and anthropogenic hazards in the state are described below.

**Soil erosion:** Soil erosion/mass wasting is a widespread phenomenon and most common environmental hazard. Its topography, poor physical characters of soils, climatic condition and anthropogenic intervention are the main causes for soil erosion/mass wasting.

**Excessive frost weathering/ scree-talus** menace is prevalent in high altitude tribal ares of Kinnaur, Lahaul and Sipiti and Chamba districts.

**Landslide:** Landslide is the main environmental hazard of entire Kinnaur and Kullu districts, Lahaul division of Lahaul and Spiti district, tribal areas of Chamba district and parts/sections of Kangra, Mandi, Shimla and Sirmaur districts of the state.

**Seismic hazard:** some major earthquakes that took place during last one century have affected the state. The State falls under Zone IV and V of Macro Level Seismic Zones of India. These earthquakes include Kangra (M=8) 1905, Sundernagar (M=7.5) 1906, Mandi (M=5.5) 1930, Chamba (M= 6.5, 6.2 and 5.5) 1945, 1947 and 1950; Kinnaur 1975 (Magnitude 6.2) and Dharamshala (M=5) 1978, (M=5.7) 1986.
Barring Kangra-Chamba belt, which forms a part of active seismic Zone V, the entire state falls in Zone IV indicating moderately prone to seismic hazard.

**Snow avalanche:** Lahaul and Spiti District and parts of Kinnaur and Chamba districts and Marhi-Rohtang pass section of Kullu district are prone to snow avalanche.

**Flash flood/cloud burst/out wash melt water surge:** Parts of Satluj Valley of Kinnaur and Shimla Districts, parts of Pabbar valley, Shimla District, Beas valley of Kullu District and Spiti blockof Lahaul and Spiti District of the state are prone to either flash flood /cloud burst and or out wash melt water surges. Water scarcity, water toxicity, and water logging are the other geohazards of the state.

**Anthropogenic hazard:** Owing to the ongoing developmental activities, laying of communication network, and expansion of inhabitation due to population exodus, the anthropogenic hazards have resulted in aggravating natural hazards resulting in instability of slopes triggering mass movements, excessive removal and active erosion of soils, disruption of water regimes, increase in rate of run and removal of vegetative cover.

The discernible anthropogenic hazards which are responsible for the degradation of the environment in the state are quarrying and mining of construction material in Kangra,

Una, Kulu and Shimla Districts; deforestation and encroachment to the forest land in Shimla, Kinnaur, Solan, Sirmaur, Chamba and Kulu Districts; hydro electric projects in Kinnaur and Mandi Districts; industry and industrial effluents in industrial town ships of Mehatpur(Una), Baddi, Parwanu and Nalagarh (Solan); brick kilns in Una District; tourist inflow and garbage disposal in tourist places of Kullu, Shimla and Kangra Districts.

### 5.3.4 Climate of HP

The term climate is mainly determined by two variables viz. temperature and precipitation. The climate of the state varies from place to place depending on the altitude. It varies from hot and sub-humid tropical (450-900 m) in the southern low tracts, warm and temperate (900-1,800 m), cool and temperate (1,900-2,400 m) and cold alpine and glacial (2,400-4,800 m) in the northern and eastern high mountain ranges. There is a great variation in the climatic conditions of Himachal Pradesh due to extreme variations in elevation (450–6500 meters).The climate varies from hot and sub-humid tropical (450–900 meters) in the southern low tracts, warm and temperate (900–1800 meters), cool and temperate (1900–2400 meters) and cold glacial and alpine (2400–4800 meters) in the northern and eastern high elevated mountain ranges. Broadly the state experiences three marked seasons; hot weather season, cold weather season and rainy season. Evaporation generally exceeds rain fall over a period of six months during October to December and April to mid-June. Summer lasts from mid-April till the end of June and most parts become very hot (except in alpine zone which experience mild summer). July to September is marked by rainy season when monsoon is vigorous in the state. Winter lasts from late November till mid-March when temperature plummets sub-zero. The average rainfall in Himachal Pradesh is 1,111 mm, varying from 450mm in Lahaul and Spiti to over 3,400 mm in Dharamshala, the headquarters of Kangra District. Precipitation declines from west to the east, and south to the north. Winter precipitation occurs as snow at elevations above 1800m. An average of three meters of snow is experienced between December and March. The details of the climatic parameters are provided in the following sections.


**PIC 4: Climatic Classification of HP**

Table 5.24: Minimum and Maximum Temperatures Recorded

| S. No | Centers | Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | January | February | March | April | May | June | July | August | Sept | Oct | Nov | December |
| **Maximum Temperature ($^0$C)** | | | | | | | | | | | | | |
| 1. | **Saloni** | 14.10 | 14.10 | 24.60 | 26.30 | 31.30 | 31.00 | 29.70 | 27.60 | 28.00 | 25.40 | 21.40 | 17.70 |

| S. No | Centers | Months | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | January | February | March | April | May | June | July | August | Sept | Oct | Nov | December |
| 2. | **Dharamshala** | 16.80 | 17.70 | 22.40 | 25.00 | 31.60 | 28.80 | 27.60 | 26.80 | 27.40 | 25.70 | 21.30 | 16.50 |
| 3. | **Kalpa** | 3.60 | 1.90 | 9.70 | 16.60 | 21.70 | 22.30 | 23.60 | 22.50 | 21.30 | 19.20 | 14.00 | 10.20 |
| 4. | **Bhuntar** | 16.60 | 16.70 | 24.40 | 26.90 | 33.10 | 31.90 | 31.50 | 31.00 | 32.00 | 29.10 | 23.60 | 19.30 |
| 5. | **Keylong** | 2.00 | 4.90 | 8.10 | 13.30 | 21.00 | 25.90 | 28.10 | 26.20 | 22.20 | 15.50 | 9.30 | 6.10 |
| 6. | **Sundernagar** | 18.90 | 19.10 | 26.10 | 29.50 | 35.60 | 31.70 | 31.50 | 30.60 | 31.30 | 29.10 | 25.00 | 20.40 |
| 7. | **Shimla** | 12.20 | 12.50 | 19.00 | 21.40 | 26.40 | 24.40 | 23.50 | 22.70 | 23.10 | 20.90 | 18.40 | 15.50 |
| 8. | **Nahan** | 16.30 | 18.50 | 24.80 | 29.60 | 34.40 | 28.80 | 27.40 | 26.90 | 28.20 | 26.00 | 21.90 | 18.00 |
| 9. | **Solan** | 17.70 | 18.00 | 24.20 | 26.90 | 32.20 | 28.80 | 28.30 | 28.30 | 28.00 | 26.20 | 23.50 | 19.90 |
| 10. | **Una** | 18.90 | 22.10 | 30.20 | 34.60 | 40.40 | 36.10 | 34.00 | 33.10 | 33.90 | 30.90 | 26.40 | 22.00 |
| 11. | **Manali** | 8.80 | 9.10 | 17.60 | 20.70 | 25.90 | 25.50 | 25.00 | 23.40 | 23.50 | 21.10 | 15.80 | 15.20 |
| **Minimum Temperature ($^0$C)** | | | | | | | | | | | | | |
| 1. | **Saloni** | 2.00 | 2.40 | 7.10 | 9.40 | 13.70 | 14.90 | 17.30 | 16.70 | 14.30 | 11.90 | 6.10 | 3.20 |
| 2. | **Dharamshala** | 6.00 | 7.20 | 11.70 | 14.10 | 20.00 | 21.20 | 21.40 | 20.60 | 19.90 | 18.00 | 10.00 | 6.80 |
| 3. | **Kalpa** | -5.30 | -4.80 | 0.70 | 3.50 | 8.30 | 12.00 | 14.60 | 13.90 | 9.60 | 6.40 | 0.90 | -1.70 |
| 4. | **Bhuntar** | 0.80 | 4.30 | 7.30 | 10.00 | 12.90 | 19.00 | 20.90 | 20.40 | 16.70 | 13.40 | 4.30 | 1.20 |
| 5. | **Keylong** | -9.90 | -7.30 | -4.40 | 1.00 | 6.10 | 11.30 | 14.00 | 14.30 | 9.00 | 6.00 | -3.00 | -5.70 |
| 6. | **Sundernagar** | 1.80 | 5.90 | 9.10 | 12.10 | 16.50 | 20.70 | 22.00 | 21.90 | 18.30 | 14.70 | 5.30 | 1.70 |
| 7. | **Shimla** | 2.80 | 3.80 | 9.10 | 11.70 | 17.10 | 16.50 | 17.20 | 16.60 | 14.70 | 12.20 | 7.60 | 4.80 |
| 8. | **Nahan** | 4.90 | 7.20 | 11.40 | 16.50 | 21.70 | 18.40 | 18.50 | 18.20 | 17.10 | 14.60 | 12.10 | 5.80 |
| 9. | **Solan** | 1.10 | 4.60 | 8.30 | 11.50 | 15.50 | 18.50 | 19.70 | 19.50 | 15.70 | 12.40 | 4.70 | 2.00 |
| 10. | **Una** | 4.00 | 7.90 | 11.40 | 14.80 | 19.70 | 24.20 | 24.20 | 23.50 | 21.30 | 17.00 | 7.80 | 3.90 |
| 11. | **Manali** | -2.10 | -0.60 | 3.40 | 5.50 | 9.30 | 13.80 | 15.60 | 15.40 | 12.10 | 8.50 | 1.60 | -0.90 |

*Source:Statistical YearBookofHimachalPradesh2013-2014,DES, HP*

### 5.3.5 Rain fall in Different districts of HP

The maximum rainfall was recorded in the kangra district with around 2000 mm and minimum in the Lahaul and Spiti district with around 500 mm. The average rainfall across the state is around 1100-1250 mm.

Table 5.25: District - Wise Rainfall (in mm) During 2013-2017

| DISTRICT | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BILASPUR** | **2013** | 56.2 | 134.3 | 61.5 | 2.1 | 28.8 | 271.1 | 205.2 | 275.1 | 81.2 | 8.5 | 11 | 27.6 | **1162.6** |
| | **2014** | 51.9 | 82.7 | 72.6 | 28.5 | 37.1 | 67.2 | 236.8 | 237.2 | 97 | 6.3 | 0 | 63.9 | **981.2** |
| | **2015** | 64.7 | 82.5 | 196.6 | 63.1 | 28.9 | 84.4 | 294.5 | 280.9 | 57.9 | 14.9 | 2.6 | 31 | **1202** |
| | **2016** | 11.4 | 23 | 78.1 | 3.3 | 87.3 | 176.9 | 168.3 | 397.6 | 90.8 | 9.2 | 0 | 4.5 | **1050.4** |
| | **2017** | 193.8 | 19.9 | 47.9 | 54.3 | 47 | 99.7 | 169.7 | 513.3 | 168.2 | 0.1 | 0.2 | 42.9 | **1357** |
| **CHAMBA** | **2013** | 56.7 | 228.4 | 68.3 | 19.4 | 45.9 | 175.4 | 185.1 | 386.5 | 44 | 19 | 34.2 | 47.6 | **1310.5** |
| | **2014** | 70.6 | 171.1 | 231.6 | 89.5 | 89.6 | 34.4 | 175.3 | 129.1 | 130 | 24.9 | 10.9 | 33.4 | **1190.4** |
| | **2015** | 72.4 | 222.6 | 223.4 | 122.1 | 30.5 | 109 | 302.3 | 199.6 | 152 | 33.1 | 28.1 | 46.3 | **1541.4** |
| | **2016** | 22.7 | 58.9 | 223.7 | 55.6 | 88.8 | 83.6 | 209.5 | 274.7 | 34.8 | 8.5 | 0 | 0.9 | **1061.7** |
| | **2017** | 187.9 | 88.3 | 76.1 | 105.2 | 75.7 | 130.7 | 277.9 | 196.8 | 90.2 | 0 | 2.3 | 69 | **1300.1** |
| **HAMIRPUR** | **2013** | 45.1 | 121.4 | 80.3 | 9.7 | 13.9 | 295 | 441.4 | 280.8 | 73.4 | 24.4 | 12.8 | 29.8 | **1428** |
| | **2014** | 42.1 | 91.7 | 107.4 | 37.3 | 55.5 | 71.4 | 349 | 374.4 | 95.1 | 24 | 0.1 | 55.5 | **1303.5** |
| | **2015** | 79 | 106.9 | 153.4 | 72.5 | 28.4 | 143 | 368.1 | 396 | 83.2 | 15.5 | 8.4 | 28 | **1482.4** |

| DISTRICT | YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV | DEC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2016** | 11.2 | 25.7 | 67.6 | 7.2 | 87.9 | 165 | 275.8 | 469.1 | 86.6 | 0.2 | 0 | 2.5 | **1198.8** |
| | **2017** | 148 | 12.4 | 40.1 | 42.1 | 52.1 | 137.3 | 302.5 | 547 | 87.6 | 0 | 0 | 60.2 | **1429.3** |
| **KANGRA** | **2013** | 52.2 | 121.3 | 72.5 | 28.9 | 26.5 | 370.4 | 666 | 739.6 | 169.4 | 89.4 | 19.8 | 47.5 | **2403.5** |
| | **2014** | 62 | 123.8 | 98 | 52.7 | 45.2 | 100.2 | 449.2 | 386.3 | 119.1 | 38 | 0.7 | 43.8 | **1519** |
| | **2015** | 65.9 | 115.3 | 180.6 | 66.3 | 32.2 | 160.6 | 624.7 | 576.9 | 109.6 | 28.3 | 8.6 | 27.4 | **1996.4** |
| | **2016** | 7.6 | 36.8 | 98.8 | 13.2 | 89.8 | 132.6 | 529.6 | 585.4 | 111.5 | 3.9 | 0 | 3.4 | **1612.6** |
| | **2017** | 114.3 | 30.9 | 36.6 | 45.5 | 54.6 | 220.3 | 637.4 | 636.3 | 134.3 | 2.3 | 0.3 | 80.3 | **1993.1** |
| **KINNAUR** | **2013** | 150.7 | 242.9 | 89.4 | 56.8 | 31.4 | 335.4 | 24 | 24.3 | 76.8 | 5.5 | 8.4 | 9.4 | **1055** |
| | **2014** | 78.1 | 140.7 | 69.5 | 52.9 | 25.6 | 7.3 | 25.9 | 8.6 | 10.2 | 1.4 | 0.2 | 39.3 | **459.7** |
| | **2015** | 67.2 | 166.7 | 228.2 | 32.7 | 44.1 | 44.1 | 35 | 23.3 | 37.8 | 4.5 | 8.9 | 18 | **710.5** |
| | **2016** | 16.1 | 44.3 | 79.2 | 105.2 | 15.2 | 10.1 | 29.8 | 49.2 | 27.2 | 1.7 | 0 | 5 | **383** |
| | **2017** | 135 | 38.6 | 69.5 | 121.1 | 17.4 | 39.4 | 41.9 | 27.5 | 51.6 | 0.1 | 21.5 | 29.9 | **593.5** |
| **KULLU** | **2013** | 110.9 | 274.6 | 117.1 | 40.9 | 41.1 | 155.9 | 214.4 | 205.8 | 63.8 | 10.1 | 21.9 | 35.2 | **1291.7** |
| | **2014** | 83.1 | 150.7 | 204.9 | 88.3 | 114.6 | 50 | 181 | 114.2 | 70.8 | 21.3 | 5.1 | 72.6 | **1156.6** |
| | **2015** | 110.8 | 212.2 | 195 | 113.3 | 47.1 | 91.6 | 235.8 | 108.9 | 62.2 | 15.3 | 26.5 | 34.9 | **1253.6** |
| | **2016** | 37.9 | 74.1 | 186.6 | 92.5 | 57.5 | 58.6 | 185.9 | 282.6 | 36.4 | 4.9 | 0 | 0.1 | **1017.1** |
| | **2017** | 186.8 | 77.6 | 106.9 | 109.2 | 96.5 | 146.1 | 218.9 | 106.2 | 106.4 | 1 | 19 | 44.9 | **1219.5** |
| **LAHAUL & SPITI** | **2013** | 58.4 | 148.9 | 82.3 | 31.8 | 42 | 64.1 | 8.9 | 32.7 | 13.9 | 2.4 | 12.9 | 11.3 | **509.6** |
| | **2014** | 70.6 | 110.9 | 111.1 | 45.7 | 70.8 | 13.2 | 24.7 | 14.6 | 41.4 | 9.5 | 9.5 | 16.6 | **538.6** |
| | **2015** | 53.2 | 194.7 | 182.3 | 104.8 | 74 | 42.7 | 28.6 | 18.7 | 71.7 | 11.6 | 18.3 | 13.9 | **814.5** |
| | **2016** | 28.3 | 27 | 122.7 | 78.5 | 34.8 | 16.5 | 17.9 | 50.2 | 18.2 | 0.7 | 0 | 0 | **394.8** |
| | **2017** | 163.2 | 81.2 | 57.5 | 140 | 41.6 | 62.4 | 19.6 | 29.5 | 26.9 | 0 | 12.7 | 49.6 | **684.2** |
| **MANDI** | **2013** | 62.4 | 142.5 | 71.5 | 29 | 18.7 | 381.9 | 393.5 | 321.4 | 97.8 | 14.1 | 17.6 | 23.2 | **1573.6** |
| | **2014** | 64.1 | 113.2 | 105.9 | 62.1 | 102.9 | 124.7 | 396.9 | 374.6 | 152.1 | 27.5 | 2.3 | 94.4 | **1620.7** |
| | **2015** | 87.5 | 130.2 | 154.4 | 100.1 | 38.8 | 113.4 | 407.5 | 340.9 | 73 | 29.6 | 9.7 | 39.4 | **1524.5** |
| | **2016** | 13.5 | 42.8 | 93.1 | 24.7 | 165.1 | 208.2 | 314.6 | 415.1 | 108.6 | 10.9 | 0 | 0 | **1396.6** |
| | **2017** | 135.3 | 32.2 | 41.1 | 61.2 | 111.1 | 162.6 | 467.8 | 430.7 | 134.7 | 0 | 1.4 | 52 | **1630.1** |
| **SHIMLA** | **2013** | 96.9 | 188.3 | 71.4 | 24.8 | 25.4 | 225.5 | 133.2 | 157.5 | 60 | 21.2 | 9.9 | 12.9 | **1027** |
| | **2014** | 53.3 | 111.5 | 117 | 83.6 | 74.3 | 78.7 | 300.8 | 103.2 | 75.7 | 21.1 | 0.6 | 60.7 | **1080.5** |
| | **2015** | 54.4 | 109.6 | 148.7 | 70.5 | 30.6 | 87.3 | 299.4 | 199.3 | 41.3 | 15.1 | 11.1 | 21.4 | **1088.7** |
| | **2016** | 22.6 | 44 | 103.5 | 43.8 | 77.6 | 113.9 | 225.3 | 280.7 | 29.5 | 6.5 | 0 | 2.8 | **950.2** |
| | **2017** | 119.5 | 19.9 | 59.7 | 77.5 | 118.9 | 146.1 | 189.2 | 183.3 | 126.8 | 0 | 2.4 | 24.8 | **1068.1** |
| **SIRMAUR** | **2013** | 110.8 | 193.3 | 22.8 | 4.8 | 14.2 | 496.7 | 405.3 | 426.9 | 62.1 | 36.4 | 9.4 | 24.8 | **1807.5** |
| | **2014** | 85.2 | 117.3 | 82.6 | 40.2 | 45.9 | 65.5 | 413.5 | 250.7 | 147.9 | 23.8 | 0 | 88.2 | **1360.8** |
| | **2015** | 38.9 | 42.2 | 209.1 | 44.9 | 29.7 | 80.8 | 322.1 | 351.4 | 51.1 | 7.4 | 1 | 8.2 | **1186.8** |
| | **2016** | 1.1 | 27.1 | 49.5 | 11.9 | 42.6 | 146 | 388.9 | 259.4 | 88.7 | 9.4 | 0 | 3.7 | **1028.3** |
| | **2017** | 117.4 | 10.2 | 38.9 | 41.2 | 66.7 | 257.4 | 276.1 | 386.8 | 291.7 | 0 | 0 | 23.4 | **1509.8** |
| **SOLAN** | **2013** | 91 | 184.7 | 60.8 | 4.4 | 21 | 348.9 | 185.4 | 188.3 | 89.6 | 28.7 | 24 | 23.5 | **1250.3** |
| | **2014** | 67 | 99.9 | 121.1 | 62.9 | 71.5 | 125.8 | 354.9 | 157 | 137 | 24.6 | 0 | 122.5 | **1344.2** |
| | **2015** | 64.2 | 76.8 | 254.9 | 84.3 | 22.5 | 81.9 | 432.6 | 251 | 49.2 | 23.3 | 13.1 | 28.4 | **1382.2** |
| | **2016** | 6.4 | 33.2 | 109.6 | 13.2 | 109.9 | 253.4 | 274.6 | 316.5 | 54.4 | 16.9 | 0 | 5.9 | **1194** |
| | **2017** | 252.9 | 10 | 37.8 | 52.2 | 80.1 | 184.1 | 207.5 | 306.7 | 133.6 | 0 | 0.6 | 28.4 | **1293.9** |
| **UNA** | **2013** | 29.6 | 81.9 | 35.4 | 7.5 | 13.2 | 293.2 | 430.4 | 370.6 | 95.5 | 61.1 | 7.8 | 31.9 | **1458.1** |
| | **2014** | 78 | 77.9 | 60.1 | 28 | 35 | 58.8 | 310.5 | 326.7 | 167.5 | 45.7 | 0 | 55.1 | **1243.3** |
| | **2015** | 60.8 | 75.4 | 199.3 | 40.4 | 33.6 | 125.4 | 513.5 | 460.4 | 72.4 | 24.6 | 0 | 16.3 | **1622.1** |
| | **2016** | 10.8 | 27.2 | 72.3 | 1.2 | 96.1 | 165.2 | 212.4 | 321.6 | 120.1 | 7.4 | 0 | 0.8 | **1035.1** |
| | **2017** | 94.2 | 12.2 | 19.6 | 42.5 | 41.2 | 126.7 | 224.7 | 588.9 | 79 | 0 | 0.8 | 40.4 | **1270.2** |

### 5.3.6 Surface Water Resources

Most of the surface water resources of the state flow from perennial rivers which originate from glaciers. The flow in these rivers is further augmented by run-off from the catchment area.The district wise water resources of HP are given in Table below:

The Satluj: The largest river system in the state with a total catchment area of 20,398 sq.km, spread over the districts of Lahaul and Spiti, Kinnaur, Shimla, Solan, and Bilaspur before entering Punjab, it enters the large Bhakra dam.

The Beas: Originally known as the 'Vipasa', this is the second most important river with a catchment area of 13,663 sq.km. It originates at Beas Kund near the Rohtang pass. It flows from North to South west over a distance of 286 km before entering the Pong Reservoir and into Punjab.

There is a network of perennial rivers in Himachal Pradesh, which have glaciers as their sources. Majority of the drainage of the State belongs to Indus River System.

Table 5.26: Water sources of HP (Number of sources)

| District | GroundWater | Surface Water | Rain Water | Traditional Source | Other Conventional Sources |
|---|---|---|---|---|---|
| Bilaspur | 827 | 786 | 0 | 461 | 0 |
| Chamba | 1717 | 2433 | 3 | 2598 | 836 |
| Hamirpur | 1057 | 485 | 0 | 231 | 1 |
| Kangra | 1602 | 1317 | 11 | 1369 | 466 |
| Kullu | 0 | 3392 | 0 | 0 | 0 |
| Lahul & Spiti | 1 | 290 | 0 | 57 | 0 |
| Mandi | 833 | 3924 | 0 | 1483 | 840 |
| Shimla | 233 | 3917 | 5 | 2518 | 9 |
| Sirmour | 644 | 2249 | 0 | 535 | 9 |
| Solan | 344 | 1090 | 0 | 1215 | 316 |
| Una | 832 | 123 | 1 | 21 | 116 |
| **Total** | **8186** | **20223** | **20** | **10512** | **2595** |

*Source:SoER,HimachalPradesh*

### 5.3.7 Rivers

The state is drained by nine river systems. The Satluj, Beas, Ravi, Chenab, Spiti, Parbati, Pabbar, Tons and Giri are the main rivers of Himachal Pradesh. Of these, the Satluj, which rises in the highlands of Tibet, is an antecedent river.

Nearly 17% of the total area of Himachal Pradesh is covered by glaciers. A recent study in 2004 has documented 2,554 glaciers in the state, which are the source of fresh water to the rivers of North India. Bara Shigri is the largest glacier in the State, which is located in the Chandra valley of Lahaul and feeds the Chenab River.The glacier is more

than 25 km long and about 3 km wide. Chandra Nahan, Bhadal, Bhaga, the Lady of Keylong, Mukkila and Hamata are other major glaciers in the state. There are many fresh water lakes in Himachal Pradesh. The Chandra Tal, Suraj Tal, Yonam Tso and Nako Lake are the lakes formed due to damming of glaciers, while the Riwalsar and Renuka lakes are due to damming of river/ stream courses. Besides, Gobindsagar, Pong and Pandoh are the artificial lakes in the state formed due to the construction of dams across Satluj and Beas rivers.

### 5.3.8 Catchment areas of the River System

The states is drained by nine river systems, the catchment area is given in the table below:

Table 5.27: Catchment details of river system of HP

| Sr.no | Name of the riversystem | CatchmentArea(km) | Percentage (%) |
|---|---|---|---|
| 1 | Satluj | 20,398 | 30.69 |
| 2 | Beas | 13,663 | 24.50 |
| 3 | Chenab | 7850 | 14.2 |
| 4 | Yamuna | 5872 | 10.6 |
| 5 | Ravi | 5528 | 9.9 |
| 6 | Indus | 1450 | 2.6 |
| 7 | Markanda | 360 | 0.6 |
| 8 | Ganga | 290 | 0.5 |
| 9 | Pabbar | 262 | 0.5 |
| | **Total** | **55673** | **100** |

### 5.3.9 Lakes

There are a number of small and large lakes in Himachal Pradesh. These are in Kullu (Bhrigu, Dashair, Seruvalsar, and Mantalai), Mandi (Rewalsar, Prashar), Kangra (Dal, Kareri, and Pong Dam), Nako in Kinnaur, Surajtal and Chandertal in Lahul-Spiti, Chamba (Khajiar, Mani Mahesh, Gadhasaru, Gauri Kund, Lam Dal Lake, Mahakali, and Khundi Maral), Renuka in Sirmaur and Chandernaun in Shimla.

Water storage in Himachal Pradesh is estimated at around 14,000 million $m^3$. The two major storages located on the borders of the state are The Gobindsagar Reservoir (Bhakra Dam) in the Satluj with 6,900 million $m^3$ live storage, the Pong Dam located on the border with Punjab in the Beas River with 7,300 million $m^3$ live storage and The Pandoh Dam, a hydroelectric dam on the river Beas upstream of Mandi, has live storage of 18 million $m^3$.

### 5.3.10 Groundwater Resources

The groundwater resources occur mainly in unconsolidated sediments of inter mountain valleys and in the sub mountain tract. Kangra, Una, Hamirpur, Bilaspur, Mandi, Solan and Sirmaur districts, particularly their valley areas depend upon groundwater. The exploitation is done through open wells, tube wells, infiltration

galleries and wells. There is no district notified as critically exploited or over exploited out of 12 districts of Himachal Pradesh.

Table 5.28: Catchment details of river system of HP

| Sno | Components | Resources |
|---|---|---|
| 1. | Total replenishable groundwater resources | 0.036m |
| 2. | Provision for domestic, industrial and other uses | 0.007mha m/yr |
| 3. | Available net groundwater resources for irrigation | 0.029mha m/yr |
| 4. | Net draft | 0.005mha m/yr |
| 5. | Balance groundwater resources for future use | 0.024mha m/yr |
| 6. | Level of groundwater development | 18.18% |
| 7. | Utilizable irrigation potential by groundwater development | 65,500ha |

*Source:Central GroundWater Board, Stateprofile*

### 5.3.11 Water Quality

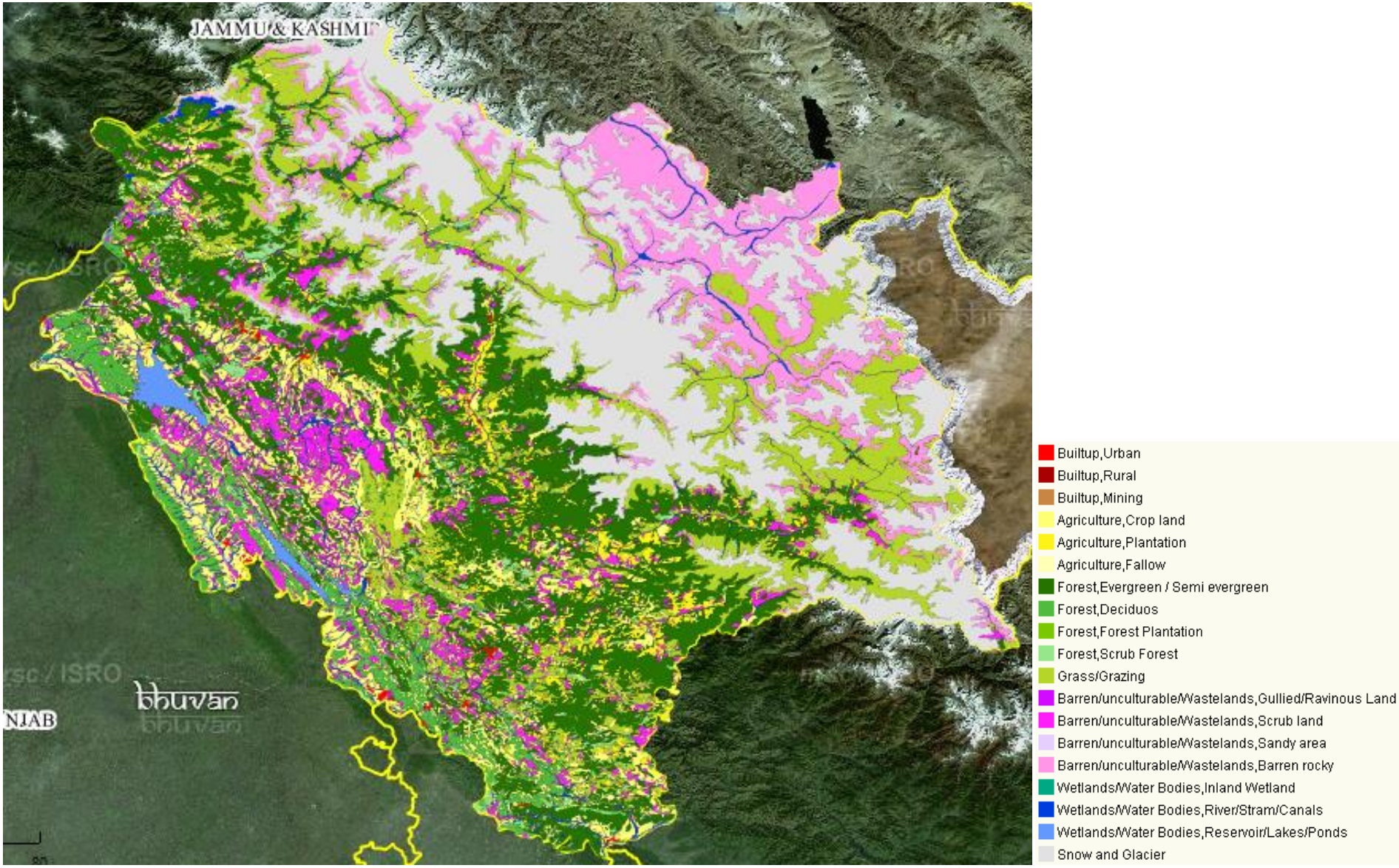
The water quality data of Rivers, Lakes and Groundwater is annexed to this report as Annexure 6.

### 5.3.12 Land Use Pattern

Table 5.29: Land Use Pattern of the State (Area in '000 ha) of HP

| Year/ District | Geographical Area by village papers | Forest land | Misc. Tree crops & Groves (Not included in net area sown) | Permanent pastures & other grazing lands | Culturable waste | Land put to non-agricultural uses | Barren and Un-culturable land | Current Fallows | Other Fallows | Net area sown | Area sown more than once | Total cropped area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bilaspur | 111.8 | 14.0 | 0.2 | 39.6 | 6.1 | 15.8 | 4.4 | 1.5 | 1.0 | 29.2 | 27.7 | 56.9 |
| Chamba | 692.4 | 272.0 | 0.2 | 348.9 | 6.9 | 15.4 | 4.7 | 1.9 | 0.7 | 41.6 | 26.1 | 67.8 |
| Hamirpur | 110.2 | 18.2 | 0.0 | 11.5 | 11.2 | 13.3 | 13.9 | 5.3 | 1.5 | 35.3 | 32.4 | 67.7 |
| Kangra | 577.7 | 232.5 | 8.3 | 87.9 | 28.2 | 77.7 | 14.8 | 11.5 | 1.1 | 115.7 | 97.5 | 213.3 |
| Kinnaur | 624.2 | 38.6 | 0.1 | 322.0 | 3.3 | 117.9 | 132.4 | 1.5 | 0.1 | 8.3 | 2.3 | 10.6 |
| Kullu | 64.2 | 2.5 | 3.8 | 3.9 | 1.3 | 7.9 | 3.2 | 2.6 | 0.5 | 38.5 | 21.1 | 59.6 |
| L&S | 911.2 | 137.4 | 0.1 | 211.5 | 0.6 | 16.9 | 541.3 | 0.1 | 0.0 | 3.4 | 0.1 | 3.5 |
| Mandi | 397.9 | 175.3 | 0.4 | 96.3 | 4.5 | 16.6 | 8.6 | 6.6 | 1.1 | 88.8 | 71.8 | 160.6 |
| Shimla | 525.4 | 149.7 | 8.9 | 235.2 | 13.1 | 19.9 | 11.5 | 16.1 | 5.1 | 65.9 | 20.5 | 86.5 |
| Sirmaur | 224.8 | 48.7 | 35.8 | 59.6 | 11.5 | 10.5 | 8.5 | 4.7 | 5.2 | 40.3 | 35.3 | 75.6 |
| Solan | 180.9 | 20.3 | 0.6 | 77.7 | 15.0 | 13.3 | 10.9 | 2.6 | 2.9 | 37.7 | 24.7 | 62.5 |
| Una | 154.9 | 16.5 | 6.6 | 13.5 | 22.6 | 27.6 | 24.1 | 3.1 | 2.2 | 38.5 | 35.5 | 74.0 |
| **Himachal Pradesh** | **4575.6** | **1125.7** | **64.9** | **1507.5** | **124.1** | **352.7** | **778.5** | **57.5** | **21.3** | **543.4** | **395.3** | **938.6** |
| | | **24%** | **2%** | **33%** | **3%** | **8%** | **17%** | **1%** | **0.5%** | **12%** | **9%** | **21%** |

The Land Use and Land Cover Distribution of the state indicate that 24% of the land area is occupied by Forests. 33% land is occupied by grass and shrubs which acts as pastures. Agricultural land accounts to 13% of the total geographic area of the state. 17% of the land is un-culturable barren land. About 80 percent of this part of Inner Himalayas is under pastures, with cultivated and forested areas only spread over 10 percent of land, and inhabited by transhuman indigenous communities that use these alpine pastures for grazing their livestock.




**PIC 5: Land Use and Land Cover Map of Himachal Pradesh**

### 5.3.13 Forests

The forests of the State have been classified on an ecological basis as laid down by Champion and Seth, and can be broadly classified into Coniferous Forests and broad-leaved Forests. Distribution of various species follows fairly regular altitudinal stratification. The vegetation varies from Dry Scrub Forests at lower altitudes to Alpine Pastures at higher altitudes. In between these two extremes, distinct vegetation zones of Mixed Deciduous Forests, Bamboo, Chil, Oaks, Deodar, Kail, Fir and Spruce, are found. The richness and diversity of flora can be gauged from the fact that, out of total 45,000 species found in the country 3,295 species (7.32%) are reported in the State. More than 95% of the species are endemic to Himachal Pradesh and characteristic of Western Himalayan flora, while about 5% (150 species) are exotic, introduced over the last 150 years.

The total area of Himachal Pradesh is 55,673 sq. km, out of this 66.52% of the area of the state is legally defined as forestland. This already underscores the importance of forest in the lives of people in Himachal Pradesh.

Table 5.30: Forest Cover in Himachal Pradesh (Area in km$^2$)

| District | Geographical Area | Very Dense Forest | Mod. Dense Forest | Open Forest | Total | % of Total Area |
|---|---|---|---|---|---|---|
| Bilaspur | 1167 | 24 | 171 | 167 | 362 | 31% |
| Chamba | 6522 | 853 | 773 | 811 | 2437 | 37% |
| Hamirpur | 1118 | 39 | 91 | 115 | 245 | 22% |
| Kangra | 5739 | 310 | 1221 | 537 | 2068 | 36% |
| Kinnaur | 6401 | 82 | 262 | 260 | 604 | 9% |
| Kullu | 5503 | 586 | 785 | 588 | 1959 | 36% |
| Lahul Spiti | 13841 | 15 | 32 | 148 | 195 | 1% |
| Mandi | 3950 | 373 | 735 | 568 | 1676 | 42% |
| Shimla | 5131 | 739 | 1037 | 616 | 2392 | 47% |
| Sirmaur | 2825 | 130 | 568 | 687 | 1385 | 49% |
| Solan | 1936 | 55 | 404 | 391 | 850 | 44% |
| Una | 1540 | 18 | 302 | 203 | 523 | 34% |
| **Grand Total** | **55673** | **3224** | **6381** | **5091** | **14696** | **26%** |

There are 5 National Parks in Himachal Pradesh 3 in Kullu and 1 each in Sirmour and Lahul Spiti, 26 sanctuaries and 3 Conservation Reserves. The details of National Parks, Sanctuaries and Conservation Reserves are provided in Table 5.11. No activities are planned in this areas.

Table 5.31: Area (Sq.Km.) under National Parks, Sanctuaries & Conservation Reserves

| DISTRICT | NATIONAL PARKS | SANCTUARIES | CONSERVATION RESERVE | Grand Total |
|---|---|---|---|---|
| Bilaspur | - | - | 17 | **17** |
| Chamba | - | 985 | - | **985** |
| Kangra | - | 1190 | - | **1190** |
| Kinnaur | - | 838 | - | **838** |
| Kullu | 1704 | 296 | - | **2001** |
| Mandi | - | 62 | - | **62** |
| Shimla | - | 228 | - | **228** |
| Sirmour | 28 | 59 | - | **87** |
| Solan | - | 47 | 2 | **49** |
| Lahul - Spiti | 675 | 2259 | - | **2934** |
| **Grand Total** | **2407** | **5965** | **19** | **8391** |

### 5.3.14 Participation in forest management for livelihood

Most rural people in HP use significant quantities of forest goods and services, for some of which there is no available substitute, although few people are totally dependent on forest products. However, some local stakeholders are highly dependent upon forest products for much of their livelihood, currently at a subsistence level. In some places there is high potential for building forest - based enterprises in production of forest goods, tourism, etc.

Joint forest management which aims at involving local communities and voluntary agencies in regeneration of degraded forests was initiated by Government of India in 1990. In Himachal Pradesh also, this concept has been adopted by formulating village level forest development committees. With the introduction of the new legislation empowering Panchayati Raj Institutions for forest management, the task of village level committees has been now entrusted to PRIs

Himachal Pradesh has around two decades of experience with the JFM approach. The state government issued the first JFM Notification in 1993 for constitution of Village Forest Development Committees (VFDCs). In 2001, Himachal Pradesh Participator)' Forest Management Rules were issued for registration of Village Forest Development Societies (VFDSs) under the Societies Registration Act. Subsequently - 2002-03 onwards - JFMCs were constituted and federated into FDAs at the Forest Division level with support from NAP. The JFMCs are registered with HPFD as per the provisions of the NAP guidelines, whereas FDAs are registered as Societies. The SFDA was constituted in 2010 in accordance with the central guidelines.

There have been significant efforts to improve people's participation in recent years, notably the spread of nearly 360 Village Forest Development Societies under 'Sanjhi Van

Yojna', HP's programme of Joint Forest Management (JFM). However the FSR identified challenges within the community/ local - level organizations themselves, with relations between them, and with their relations with the HPFD. For example:

- There is a need for greater equity within village institutions, to overcome the tendency towards concentration of powerful groups.
- Given the proliferation of community organizations concerned with forestry (which was not reviewed in a comparative manner until the work of the FSR), there is a need for clarity and coordination concerning their respective rights, responsibilities and objectives, and their relations with each other and with other institutions.
- The sustainability of project - sponsored village forest institutions is under question, which emphasizes the importance of local 'ownership' of the institution.
- There remains a clear need to efficiently delegate regulatory functions to village institutions

Table 5.32: Village Institutions formed under Different Projects in HP

| S.No | Name of Projects/Schemes | Year | Name of Village Institution | No. of Village Institutions | Registered under |
|---|---|---|---|---|---|
| 1 | HP Forestry Project (HPFP) | 1994-2001 | Village Forest Development Committees (VFDCs) | 154 | JFM Notification dated 12.5.1993 |
| 2 | Indo-German Eco-Development Project | 1994-2005 | Village Development Committees (VDCs) | 294 | JFM Notification dated 12.5.1993 |
| 3 | IWD (Kandi) Project | 1993-2005 | Village Development Committees (VDCs) | 137 | Societies of Registration Act 1860 |
| 4 | Sanjhi Van Yojana (SVY) | 1998 - | Village Forest Development Societies (VFDS) | 360 | Societies of Registration Act 1860 |
| 5 | Great Himalayan National Park | 1993 - | Village Eco-Development Committee (VEDCs) | 18 | Director , GHNP |
| 6 | Mid Himalayan Watershed Dev Project | 2005 - | Gram Panchayats | 721 | --- |
| 7 | National Afforestation Project (NAP) | 2010 - | Joint Forest Management Committees (JFMC) | 963 JFMCs | Registered by CFs/DFOs as per the provision laid down in Revised Operational Guidelines, 2009 of NAEB. |
| 8 | Integrated Watershed Management Swan River Project | 2006 - | Project Development Committees | Not available | Societies of Registration Act 1860 |

### 5.3.15 Outturn of Forests

Table 5.33: Outturn of Forests in HP

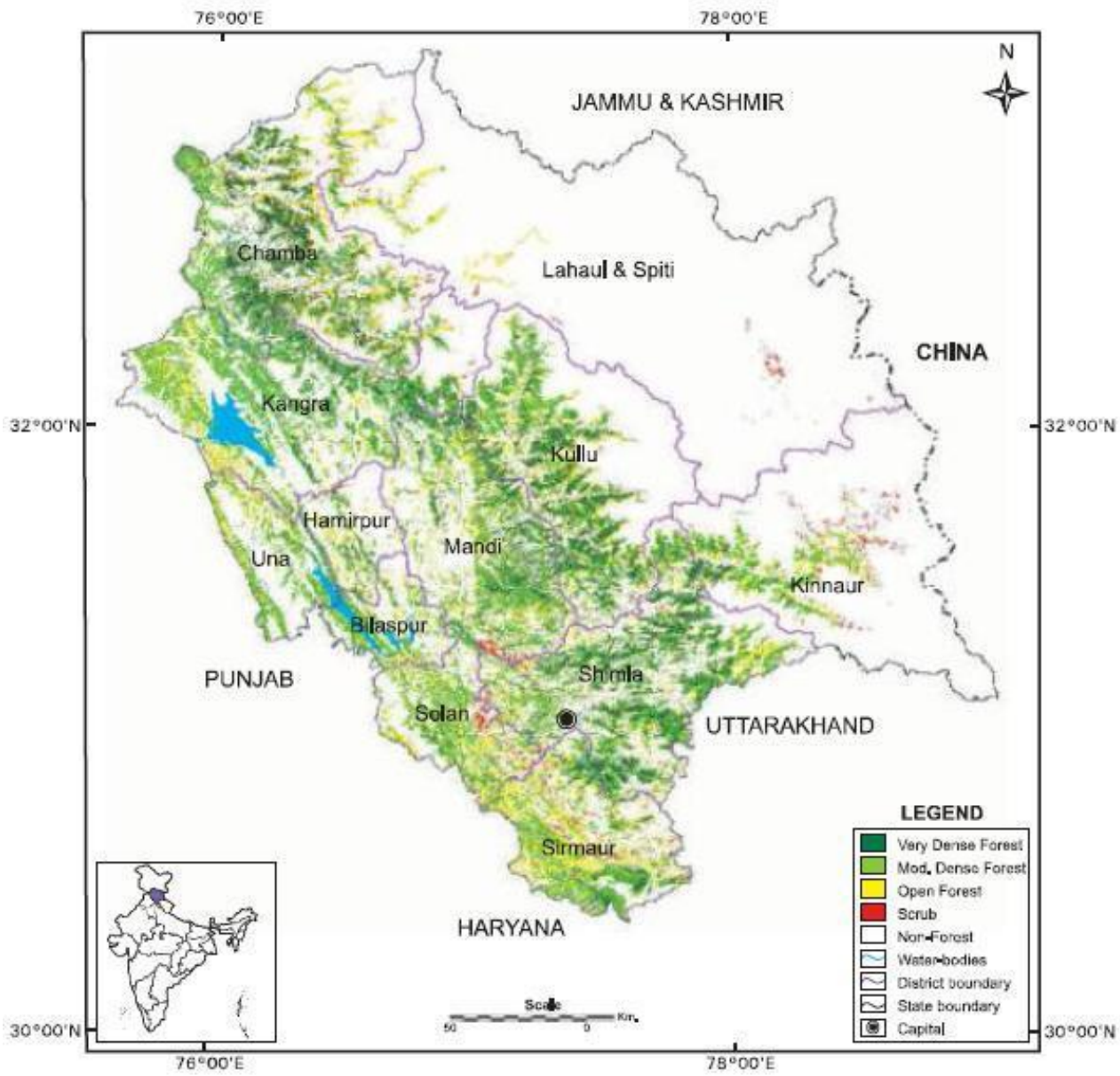
| Name of Produce | Quantity | | Estimated Value (Rs. in lac) | |
|---|---|---|---|---|
| | 2011-12 | 2012-13 | 2011-12 | 2012-13 |
| Timber ($m^3$) | 146057 | 207041 | 36824.72 | 48945.27 |
| Firewood (MT) | 16 | 9 | 1.04 | 0.59 |
| Charcoal (MT) | 2 | 24 | 0.18 | 3.20 |
| Resin (MT) | 5825 | 5577 | 1024.57 | 762.78 |
| Bamboos (ha.) | 675 | 508 | 29.01 | 7.38 |
| Bhabbar Grass (MT) | 524 | 460 | 3.32 | 0.37 |
| Grazing/Fodder (MT) | - | - | 9.47 | 9.18 |
| Medicinal -herbs (MT) | 694 | 253 | 331.90 | 333.23 |
| Other Minor Produce (MT) | - | - | 17.37 | 27.68 |
| Khair (MT) | 971 | 3042 | 419.81 | 1315.08 |
| **Total :** | **-** | **-** | **38661.39** | **51404.76** |

Timber has been the most important and valuable product of the forests. But since last three decades or so the focus on production has shifted to non-timber forest products specially, after 1988 National Forest Policy. The timber production from the forest has declined due to increased emphasis on forest conservation. Himachal Pradesh contribute to around 12% of the total timber production at 272 cum is ranked 2nd in the country only after Uttar Pradesh with 313.13 cum.

Table 5.34: Top 10 Timber producing states in India[5]

| State | 2006-07 | 2007-08 | 2008-09 | 2009-10 | % of total (2009-10) |
|---|---|---|---|---|---|
| Andhra Pradesh | 293.11 | 191.85 | 88.64 | 116.05 | 5% |
| Chhattisgarh | 176.45 | 209.32 | 173.49 | 199.32 | 9% |
| Haryana | 165.73 | 140.76 | 166.66 | 164.12 | 8% |
| **Himachal Pradesh** | **220.82** | **246.97** | **227.98** | **272** | **12%** |
| Jammu & Kashmir | 80.85 | 68.49 | 71.55 | 61.32 | 3% |
| Madhya Pradesh | 313.42 | 372.06 | 336.95 | 143.74 | 7% |
| Maharashtra | 119.12 | 132.61 | 141 | 125.47 | 6% |
| Punjab | 129.06 | 72.33 | 69.76 | 79.58 | 4% |
| Uttar Pradesh | 200.58 | 310.67 | 300.08 | 313.13 | 14% |
| Uttarakhand | 283.08 | 310.58 | 271.62 | 242.62 | 11% |
| West Bengal | 114.59 | 231.58 | 151.12 | 183.4 | 8% |
| Other States | 308.23 | 327.96 | 325.17 | 284.34 | 13% |
| **Total** | **2405.04** | **2615.18** | **2324.02** | **2185.09** | |

[5] www.indiastat.com




**PIC 6 Forest Map of HP**

### 5.3.16 Forest Fires

Forest fires are the main cause of degradation. Very often these fires are natural, accidental and sometimes intentional. In all cases they destroy valuable timber, grazing ground, bio-diversity and wild life. Forest fires are of three kinds, of which crown fires are the most dangerous, followed by ground and surface fires.

The most harmful effect of forest fires is on the ecology of the area concerned. Characteristics of the soil are greatly altered and there is erosion. The micro-climate and the flora and fauna are also adversely affected.

During 1994-95, 1706 forest fires were recorded, involving about six hectares per fire. In 1997-98, there were 67 reported fires, and each fire damaged more than 32 hectares.

The loss per fire can be reduced with the help of good management practices. Intentional fires are a source of fraudulent gains by the local mafia or communities.

Alertness of forest rangers and good intelligence can minimise the number of these fires. At the same time, the genuine needs of the communities and tribes living in or around the forests should be taken note of and alternatives suggested to them for better conservation of forests.

### 5.3.17 Resources and power

The state has implemented a series of development plans based on the utilization of its abundant hydropower potential and mineral and forest resources. Himachal Pradesh produces a significant portion of India's hydroelectric power. Existing hydropower plants include a station on the Ulh River at Jogindarnagar, the massive Bhakra Dam on the Sutlej River, the Pong Dam on the Beas River, and the Giri Dam on the Giri River. Himachal Pradesh also has embarked on joint-venture hydropower projects with the central government, such as the large Nathpa Jhakri project in Shimla district. To combat a serious soil-erosion problem in the Siwaliks and to protect the fragile Himalayan ecosystem, the state has launched a reforestation program. It also has instituted stricter enforcement of environmental laws.

### 5.3.18 Biological Environment

Himachal is said to be the fruit bowl of the country, with orchards being wide spread. Meadows and pastures are also seen clinging to steep slopes.

The southern part of the state, at lower elevations than the north, has both tropical and subtropical dry broad leaf forests and tropical and sub-tropical moist broad leaf

forests. These are represented by north-western thorn scrub forests along the border with Haryana and Uttar Pradesh and by Upper Gangetic Plains moist deciduous forests in the far south-east. Sal and shisham are found here.

The hills contain western Himalayan broad leaf forests and Himalayan sub-tropical pine forests. Various deciduous and ever green oaks live in the broad leaf forests, while chirpine dominates the pine forests. Western Himalayan sub-alpine conifer forests grow near treeline, with species that include East Himalayan fir, West Himalayan spruce, deodar (the state tree), and blue pine.

The upper most elevations have western Himalayan alpine shrub and meadows in the northeast and northwestern Himalayan alpine shrub and meadows in the northwest. Trees are sturdy with a vast network of roots. Alders, birches, rhododendrons and moist alpine shrubs are there as the regional vegetation. The rhododendrons can be seen along the hillsides around Shimla from March to May. The shrub lands and meadows give way to rock and ice around the highest peaks.

Himachal Pradesh has around 463 bird and 359 animal species, including the leopard, snow leopard (the state animal), ghoral, musk deer and western tragopan. It has 2 major national parks and sanctuaries — the largest number in the Himalayan region. The Great Himalayan National Park in Kullu district was created to conserve the flora and fauna of the main Himalayan range, while the Pin Valley National Park to conserve the flora and fauna of the cold desert.

Table 5.35: Type of Flora

| **Type of flora** | **Numbers** |
|---|---|
| FloweringPlants | 3,120 species |
| Conifers | 13 species |
| Pteriophytes | 124 species |
| Orchids | 38 species |

Table 5.36: Flora in different Zones of HP

| **Classification based on latitudinal Zones** | **Type** | **Flora of Himachal Pradesh** |
|---|---|---|
| 1. Lower Motane Zone (up to 1,000 metresabovemsl) | ▪ Trees<br>▪ Shrubs<br>▪ Grasses | Khair,Siris,Kachnar,Semal,Tun,Mango,Behul, Shisha`m, Ritha, Tut, Behera & Chil.<br>Vitex,Munj,Ber,Ipomea,Dodonea, Bamboo.<br>Vetiver,Sanchrus,Munjh. |
| 2. Middle Motane Zone (From 1,000metresto 2,000 metresabove msl) | ▪ Trees<br>▪ Shrubs<br>▪ Grasses | Kunish,<br>Poplar,Willow,Ohi,robinia,Drek,Kail, Chil Toon, Behmi, Chulli, walnut, Khirik.<br>Vitex, Berberis, Carrisa.<br>Lolium,Dactylis,Phleum,Phylaris. |
| 3. Temperate Zone (From | ▪ Trees | Deodar, FirSpruce, Maple,Ash,BhojPatra, |

| Classification based on latitudinal Zones | Type | Flora of Himachal Pradesh |
|---|---|---|
| 2,000metresto 3,000 metresabove msl) | ▪ Shrubs<br>▪ Grasses | HorseChestnut,Alder,Robinia,poplar,Walnut.<br>Berberis.<br>Festuca, Dactylis, Bromus, Lucerne, white Clover, Red Clover, dioscorea. |
| 4. AlpineZone(Above3,000metres abovemsl) | ▪ Trees<br>▪ Shrubs<br>▪ Grasses | Birch, Juniper, Cypress, Willow. Saussurealappa, Cotoneaster microphylla, Artemesia.<br>Festucaarundinacea, Dectylisglomerata. |

5.3.19 Critical Habitat Assessment

Critical habitat is defined as areas with high biodiversity importance or value, including: (a) habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches; (b) habitat of significant importance to endemic or restricted-range species; (c) habitat supporting globally or nationally significant concentrations of migratory or congregatory species; (d) highly threatened or unique ecosystems; (e) ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).

State designated Critical Habitats

The State of Himachal Pradesh has an extensive network of Protected Areas (PA) designated to conserve the total range of wildlife available in the state. These cover all the agro-climatic zones in the state and have significant ecological, geomorphologic and biodiversity value. There are 5 National Parks, 26 Wildlife Sanctuaries and 3 Conservation Reserves. The details of these together with the key vulnerable and endangered faunal biodiversity protected are listed below:

Table 5-37: Protected Areas in HP (Sq km)

| S. No. | Category of Protected Area | Area in Sq. Km |
|---|---|---|
| 1 | National Parks | 2407.28 |
| 2 | Wildlife Sanctuaries | 5964.9731 |
| 3 | Conservation Reserves | 19.17 |
| | **Total** | **8391.4231** |

**Table 5-38: Protected Areas of HP**

| Sl. No. | ProtectedAreas | Notification Date | Area (sq. km) | District (s) | Fauna |
|---|---|---|---|---|---|
| **National Parks** | | | | | |
| 1 | Great Himalayan National Park | 1984 | 905.4 | Kullu | Blue sheep, snowleopard, Himalayan brown bear, |

| Sl. No. | ProtectedAreas | Notification Date | Area (sq. km) | District (s) | Fauna |
|---|---|---|---|---|---|
| | | | | | Himalayantahr, andMuskdeer |
| 2 | PinValley National Park | 1987 | 675.00 | Lahul &Spiti | RedIndian Fox, Tibetan Gazelle, Wooley Hare, Snow Leopard, HimalayanMarmot, Himalayan Mouse-hare, IndianHodgsorisPorcupine, Blue SheepandWolf |
| 3 | Khirganga | 2010 | 705 | Kullu | Snow Leopards, Wild bears, Himalayan brown bear, Himalayantahr, andMuskdeer |
| 4 | Inderkila | 2010 | 94 | Kullu | Tigers, Leopards, Deer |
| 5 | Simbalbara | 2010 | 27.88 | Sirmour | Leopard, Sambhar, Ghoral, Barking Deer, Jackal, Spotted Dear, Wild Boar & Blue Bull. Hornbill, Peafowl, Red Jungle Fowl, Khaleej Pheasant |
| **Wildlife Sanctuaries** | | | | | |
| 1 | Bandli WLS | 1962 | 32.11 | Mandi | HimalayanBlack Bear, commonPalm Civet, BarkingDeer, Goral, Indian hare,Rhesus Macaque. |
| 2 | Chail WLS | 1976 | 16 | Solan | Sambar, Goral, HimalayanBlack Bear, Red Deer, Silver-WhiteOak,BarkingDeer, Common Langur, Leopard, RhesusMacaque, Himalayan Yellow Throated Marten, IndianPorcupine, Giant and Kashmiri Flying Squirrel. |
| 3 | Chandratal WLS | 2007 | 38.56 | Lahul &Spiti | IbexandSnowleopard |
| 4 | Churdhar WLS | 1985 | 55.52 | Sirmaur | HimalayanBlack Bear, BarkingDeer, Musk Deer, CommonLangur andLeopards |
| 5 | Daranghati WLS | 1962 | 171.50 | Shimla | HimalayanBlack Bear, BrownBear, Himalayan Palm Civet, BarkingDeer, Musk Deer, Flying Fox, Goral, IndianHare, StrippedHyena, HimalayanIbex, Leopard, Himalayanyellow throatedMarten, Serow, Blue Sheep, Common giant flyingSquirrel andHimalayanWeasel |
| 6 | Dhauladhar WLS | 1994 | 982.86 | Kangra | Nilgai, Sambar, BarkingDeer, WildBuar, |

| Sl. No. | ProtectedAreas | Notification Date | Area (sq. km) | District (s) | Fauna |
|---|---|---|---|---|---|
| | | | | | ClawlessOtter, andLeapord |
| 7 | Gamgul Siyabehi WLS | 1962 | 108.40 | Chamba | Ibex, bear,langur, leopard, muskdeer, Himalayantahr, Himalayanfox, Himalayan shrew, rhesusmacaque, common giant flying squirrel, Indianbushrate, jackal, barking deer |
| 8 | Kais WLS | 1954 | 12.61 | Kullu | Serow, blueSheep, red Fox, musk deer, Goral, ibex, Leopard, snow Leopard, brownBear, Himalayan black Bear |
| 9 | Kalatop-Khajjiar WLS | 1958 | 17.17 | Chamba | Ibex, deer, black bearsandleopards |
| 10 | Kanawar WLS | 1954 | 107.29 | Kullu | Serow, blueSheep, red Fox, musk deer, Goral, ibex, Leopard, snow Leopard, brownBear, Himalayan black Bear |
| 11 | Khokhan WLS | 1954 | 14.94 | Kullu | Serow, blueSheep, red Fox, musk deer, Goral, ibex, Leopard, snow Leopard, brownBear, Himalayan black Bear |
| 12 | Kibber WLS | 1992 | 2220.12 | Lahul &Spiti | IbexandSnowleopard |
| 13 | Kugti WLS | 1962 | 405.49 | Chamba | Brown bear, Asiaticblackbear, Leopard, HimalayanTahr, Himalayanibex,Goral, CommonLangur, Porcupine |
| 14 | Lippa Asrang WLS | 1692 | 31 | Kinnaur | Yak,Ibex, Leopard, Goral, Blue Sheep, Brown Bear, Musk Deer, Himalayan black Beer |
| 15 | Majathal WLS | 1954 | 30.86 | Solan | Deer, Bear, Cheer pheasant |
| 16 | Manali WLS | 1954 | 29 | Kullu | HimalayanBlack Bear, HimalayanPalm Civet, BarkingDeer, Flying Fox, Goral, IndianHare, StrippedHyena, Leopard, Himalayanyellow throatedMarten, Serow, Kashmirflying Squirrel andHimalayanTahr. |
| 17 | Nargu WLS | 1962 | 132.37 | Mandi | Black Bear, BrownBear, HimalayanPalm Civent, barkingDeer, IndianHare, common Langur, Leopard, RhesusMacaque, Himalayan yellowthroated stoneMarten, |

| Sl. No. | ProtectedAreas | Notification Date | Area (sq. km) | District (s) | Fauna |
|---|---|---|---|---|---|
| | | | | | Indian Porcupine,common giant flyingSquirrel, HimalayanWeasel |
| 18 | Pong Dam Lake WLS | 1982 | 207.59 | Kangra | Nilgai, Sambar, BarkingDeer, WildBuar, ClawlessOtter, andLeapord |
| 19 | Rakchham-Chitkul WLS | 2013 | 304 | Kinnaur | Leopard, Blue Sheep, Goral, Musk Deer, Himalayan and Black Bear |
| 20 | Renuka WLS | 2013 | 4 | Sirmaur | Asiaticlions, spotted deer, liontailed macaques, peacocks, nilgai or large grey Indian antelope, barkingdeer andHimalayan black bears. |
| 21 | Rupi Bhaba WLS | 1982 | 503 | Kinnaur | Serow, blueSheep, red Fox, musk deer, Goral, ibex, Leopard, snow Leopard, brownBear, Himalayan black Bear |
| 22 | Sech Tuan Nala WLS | 1962 | 390.29 | Chamba | Ibex, bear, langur, leopard, muskdeer, Himalayantahr, Himalayanfox, Himalayan shrew, Rhesusmacaque, common giant flying squirrel, Indianbushrate, Jackal, barking deer |
| 23 | Shikari Devi WLS | 1962 | 29.94 | Mandi | Himalayan palm civet, barkingdeer, marten, Indianporcupine, Kashmiri flying squirrel, musk deer, commonlangur, leopard, the common Squirrel, |
| 24 | Shimla Water Catchment WLS | 1958 | 10 | Shimla | Flying Squirrel, commonlangur, Serow, Porcupine, Sambar |
| 25 | Talra WLS | 1962 | 46.48 | Shimla | Flying Squirrel, commonlangur, Serow, Porcupine, Sambar |
| 26 | Tundah WLS | 1962 | 64 | Chamba | Ibex, bear, langur, leopard, muskdeer, Himalayantahr, Himalayanfox, Himalayan shrew, rhesusmacaque, common giant flying squirrel, Indianbushrate, jackal, barking deer |
| **Conservation Reserves** | | | | | |
| 1 | Shilli Conservation Reserve | 1999 | 1.49 | Solan | Black bear, Panther, Barking Deer |
| 2 | Shri Naina Devi Conservation Reserve | 1999 | 17 | Bilaspur | Leopards, Rhesus, Himalayan Yellow Throated Marten, Serow, Porcupine, |

| Sl. No. | ProtectedAreas | Notification Date | Area (sq. km) | District (s) | Fauna |
|---|---|---|---|---|---|
| | | | | | Sambar and Common Giant Flying Squirrel |
| 3 | Darlaghat Conservation Reserve | | 0.67 | Solan | Sambar, wild boar, black bears, Jungle fowls |
| Source: HP Forest Department / https://hpforest.nic.in/ | | | | | |

Critically Endangered Species

As per the Biological Diversity Act, the Ministry of Environment & Forests and Climate Change, Govt. of India in consultation with the Govt. of Himachal Pradesh, has notified eight species of plants and ten species of animals which are on the verge of extinction. The collection and use of these species, living or dead, is prohibited under the Wildlife Protection Act, 1972 unless it is for research, propagation or scientific investigation with the approval of the State Biodiversity Board.

These are as follows:

**Plants**

1. Aconitum deinorrhizum Stapf - Mohra - Ranunculaceae
2. Aconitum heterophyllum Wall - Atis - Ranunculaceae
3. Aconitum violaceum Jacq. Ex Stapf
4. Eremostachys superba Royle ex Benth - Gajar Mula - Lamiaceae
5. Jasminum parkeri Dunn - Dwarf Jasmine - Oleaceae
6. Nardostachys grandiflora DC - Jatamansi - Boraginaceae
7. Dactylorhiza hatagirea D. Don - Salam panja - Orchidaceae
8. Taxus wallichiana Zucc Synonym: Taxus contorta Griff. - Rakhal/Birmi - Taxaceae

**Animals**

1. Murina grisea Peters, 1872
2. Cervus duvaucelii (Cuvier, 1823)
3. Capra faconeri (Wagner)
4. Moschus chrysogaster (Hodgson, 2839)
5. Gyps bengalensis Gmelin - White-rumped vulture - Accipitridae
6. Gyps tenuirostris - Gray Slender billed vulture - Accipitridae
7. Sarcogyps calvus Scopoli - Red-headed vulture - Accipitridae
8. Vanellus gregarious (Pallas, 1771)
9. Cervus elaphus hanguli
10. Capricornis sumatraensis

## Threatened Species of Himachal Pradesh[6]

The threatened species found in Himachal Pradesh include the following:

**Plants**

1. Arnebia benthamii (Wall. ex G.Don) I. M. Johnst – Ratanjot - Boraginaceae
2. Atropa acuminata Royle ex. Lindl - Jharka - Solanaceae
3. Berberis aristata DC – Kashmal - Berberidaceae
4. Betula alnoides Buch.- Ham. ex D.Don - Himalayan birch - Betulaceae
5. Fritillaria roylei Hook - Kakoli/Jangli lasen - Liliaceae
6. Gentiana kurroo Royle - Kutki - Gentianaceae
7. Habenaria edgeworthii Hook. f. ex Collett – Jeevak - Orchidaceae
8. Lilium polyphyllum D. Don - Ksheer kakoli - Liliaceae
9. Malaxis muscifera (Lindl.) Kuntze - Ridhi - Orchidaceae
10. Paris polyphylla Sm. - Dudhia bach - Liliaceae
11. Sinopodophyllum hexandrum (Royle) T.S. Ying – Bankakri - Berberidaceae
12. Skimmia laureola (DC.) Siebold & Zucc. ex Walp. - Ner dhoop - Rutaceae
13. Staphylea emodi Wall. ex Brandis - Himalayan bladdernut/ Nag Danu - Staphyleaceae
14. Swertia chirayita (Roxb. ex Fleming) Karsten - Chiretta/Chirayata - Gentianaceae
15. Trillium govanianum Wall ex D.Don -Himalayan Trillium/Nag chhatri -Melanthiaceae

**Animals**

1. Aquila nipalensis Hodgson - Steppe eagle - Accipitridae
2. Canis lupus chanco Gray - Tibetan wolf - Canidae
3. Capricornis thar Hodgson - Himalayan serow - Bovidae
4. Catreus wallichii Hardwicke - Chir pheasant - Phasianidae
5. Gypaetus barbatus Linnaeus - Bearded vulture - Accipitridae
6. Hemitragus jemlahicus C.H. Smith - Himalayan tahr - Bovidae
7. Moschus chrysogaster Hodgson - Himalayan musk deer - Moschidae
8. Parnassius charltonius - Gray Regal apollo - Papilionidae
9. Parnassius stoliczkanus Felder & Felder - Ladakh banded Apollo - Papilionidae
10. Pucrasia macrolopha Lesson - Koklass pheasant - Phasianidae
11. Tragopan melanocephalus - Gray Western tragopan/Jujurana - Phasianidae
12. Tor putitora Hamilton - Golden Mahseer - Cyprinidae
13. Uncia uncia Schreber - Snow leopard – Felidae

## Internationally Recognised Sites of Biodiversity

1. **UNESCO World Heritage Site**: Himachal has a UNESCO designated World Heritage Site – The Great Himalayan National Park.

2. **Endemic Bird Areas (EBAs) and Important Bird Areas (IBAs):** Himachal Pradesh lies in the Western Himalayas Endemic Bird Area (EBA 128). Eleven species are

6 http://www.hpbiodiversity.gov.in/BMC/Notification_threatened_species.pdf

confined to this EBA (Stattersfield et al. 1998), out of which ten are known to occur in this State with confirmed records. They are: Western Tragopan, Cheer Pheasant, Brook's Leaf Warber (*Phylloscopus subviridis*), Tytler's Leaf Warbler (*Phylloscopus tytleri*), Kashmir Flycatcher (*Ficedula subrubra*) (vagrant), White-cheeked Tit (*Aegithalos leucogenys*, White- throated Tit *Aegithalos niveogularis*, Kashmir Nuthatch (*Sitta cashmirensis*), Spectacled Finch (*Callacanthis burtoni)* and Orange Bullfinch (*Pyrrhula aurantiaca*). These restricted range species are confined to the Western Himalayas of Himachal Pradesh on an elevation between 1,500 to 3,600 m in the Temperate Coniferous/Broadleaf Forest, Sub-alpine Forest and Montane Grassland (Stattersfield et al. 1998).

**3. Important Bird Areas (IBAs):** The Great Himalayan National Park and the Pin Valley National Park have been identified as IBAs, and of the 26 wildlife sanctuaries mentioned above, 24 are IBAs. Two non-protected areas are also considered as IBAs. These include the Sarah Valley in Kangra. Himachal Pradesh is extremely important for the protection of many species of pheasants and forest birds. Its six major forest types have Western Himalayan species, some with significant populations. A total of 390 species of birds have been identified till now from the State (Grimmett and Inskipp 2003). Seven globally threatened species are found in the State. The two vulture and two and eagle species are widely found but the two pheasant species (Cheer Pheasant *Catreus wallichii* and Western Tragopan *Tragopan melanocephalus*) have restricted range, both inaltitude and habitat. The Wood Snipe Gallinago nemoricola classified as Vulnerable (BirdLife International 2001) also had a wide distribution in the Himalayas based on old shooting records (Ali and Ripley 1987). Only few recent records are available after the prohibition of sport-hunting in India. It is reported only from Dhauladhar WLS, but is likely to be found in many more areas.

**4. RAMSAR Sites:** The wetlands Chandertal, Pong dam lake and Renuka wetlands in Himachal Pradesh are recognized as Ramsar sites

**Sacred Groves**

The State has approximately 350 sacred groves documented through various initiatives. An initiatve by HP State Biodiversity Board has detailed records of 253 sacred groves in the distrits of Shimla and Kullu. These groves are locally named *Dev Van* or *Devta Ka Jungle* and have rules such as a prohibition on cutting trees or carrying dry leaves outside the area. These groves, as documented posess a great heritage of diverse gene pool of many forest species with socio religious attachement and play an important role in water conservation. Sacred Groves go hand in hand with temples and are usually managed by the temple committee.

### 5.3.20 Economic Value from NTFP and Medicinal Plants

In Himachal Pradesh about 165 medicinal plant species are traded every year. The state has 24 species which are amongst the most traded 100 plants in India. The total harvest of medicinal plants is more than 2,500 tonnes. The medicinal plant trade in the state is estimated to be of INR 10 crores where the state earns about INR 40 lakhs from issuance of annual export permits and on an average this trade contributes to about INR 14000 annually to the household economy of the collector. There are about 70 pharmaceutical industries operating in the state but obviously the state also certainly caters to the outside demands (HPMPSP, 2006).

## 5.4 Continuity Note

This chapater has collated the environmetnla and social baseline condtions in the proejdt area from the available secondary data. The next chapter lists the project environmental and social risks and impacts, which are the outcome of the analysis of the fieldwork.

# 6. Environmental and Social Risks and Impacts

## 6.1 Introduction

The GoHP has the experience of preparing and implementing the several externally aided projects. These projects too have environmental and social risks and impacts that were mitigated through preparation and implementation of ESMF and ESMPs. These are H.P Mid Himalayan Watershed Development Project (HPMHWDP), Forest for Prosperity Project (FPP), H.P Horticulture Development Project, JICA Project, etc.

### 6.1.1 Summary of Environmental and Social Issues of Previous Projects

The following key environment & social issues are identified from the data sets of Externally Aided Projects (EAPs) such as H.P Mid Himalayan Watershed Development Project (HPMHWDP), Forest for Prosperity Project (FPP), H.P Horticulture Development Project, JICA, etc.

### 6.1.2 Potential Environmental Impacts

- Temporary Mitigable Impacts relating to civil works; impacts on air, water, soil, noise, drainage and aesthetics. It is expected that physical works will be of small scale and minimal.
- In nurseries, use of pesticides against pests and diseases could impact human health, air quality, groundwater, surface water and soil.
- Increased grazing pressure in other areas due to displacement of cattle/livestock from pastures undergoing restoration/ rotation.
- Loss of forestland by converting them to pastures and vice-versa loss of pastures due to plantations.
- Livestock population may increase by assuring enhanced fodder availability, which may be a potential threat to natural areas.
- Shifting of grazing pressure in other areas after closing selected areas for grazing may speed up the degradation of remaining pastures nearby.
- Pine needles from Chir pine areas cause spread of forest fires. No incentives to collect pine needles which are the main causes for spread of ground fires.
- Mechanical Methods adopted for exotic weed management such as 'cut root stock' may not be effective in the long term
- Thinning of forests, reduction in dense forest, reduced capacity for holding soil water, changes in micro-climatic conditions, impacts on biodiversity
- Increased soil erosion, reduced land productivity, high runoff, increased silt load in streams
- Increased incidences of flooding, stream bank erosion, reduced life of hydropower plants in downstream, reduced drinking water supply

- Reduced potential of riverbanks to act as buffers against floods, implications on fisheries, damage to habitat
- Reduction of water holding capacity of soils at root zone
- Steep slopes without adequate protection lead to high runoff and associated soil erosion leading to deteriorating water availability
- Threats to indigenous species, reduced productivity of pastures, loss of grazing areas, fodder, forest cover, reduced production of NTFP
- Poor quality of pastures, depletion of ground flora, added pressures of nomadic communities and grazing rights.
- Allowing of overgrazing and not following rotational grazing, most pastures are facing depletion of soil phosphorus due to overgrazing, thus legumes are unable to form nodules and are depleting
- Forests converted into apple orchards, and there is increased debris, deposition of wastes
- Thinning of forests, removal of deadwood from forests impacting detritus and other decomposers, reduced habitat quality, carrying of head loads of fuel wood by community members.
- Reduction in natural regeneration of species, as some areas are harvested beyond carrying capacity
- Removal of medicinal herbs
- Habitat degradation, reduced productivity of habitats, low natural regeneration, changes in species, impacts on ecosystem processes

### 6.1.3 Potential Social Impacts/risks

- Land loss due to land required for project facilities
- Land under disputes (FRA, etc.) may be used for project facilities
- Vulnerable groups, women and tribals may be excluded from project activities, training and capacity building activities.
- Possibility of Exploitation of labour.
- People from project area may not respond to the project activities and may not participate in the project as they may not understand the social development dimensions.
- The project stakeholders may not be able to understand their roles related to social issues.
- FD and participating line departments capacity issues with regard to people management and community mobilization may affect project outcomes.
- Grievance of project key stakeholders may not be addressed properly.
- Project information may not reach the key stakeholders, thus making them disinterested in participating.
- NTFP collectors, livestock grazers, landless and agriculture producers (Especially women and other vulnerable groups) may get excluded owing to lack of exposure and capacities
- Potential security issues to communities living in the vicinity.

- Conflict with people when areas are closed for grazing.

The above environmental and social risks and impacts were mitigated by the previous projects through preparation and implementation of Environmental and Social Management Framework, Environmental and Social Management Plans, etc.

## 6.2 Risks Identified vis-à-vis ESF under Present Project

### 6.2.1 ESS2 Labor and Working Conditions

Project interventions on soil and water conservation structures, water harvesting and conveyance channels, plantation and nursery development, weed management, as well as rural infrastructure (manually operated pulley ropeways, small footbridges) will involve construction and civil works. These are going to be small scale construction contracts which will not be requiring labor camps as most of the labor is expected to come from nearby areas. Most of these works are going to be located away from habitations. Due to the small nature of the works, and short duration of the contracts, no labor camps are expected. Possible project risks related to labour are working conditions, occupational health and safety, child and forced labor, hazardous labour, gender-based violence, migrant and seasonal labour, management of labor influx, possible accidents or emergencies as well as labor related grievances.

This ESA reveals that the Project will be implemented by 429 direct workers (Responsible Staff), and this number will go up with new recruitment of experts. HPFD does not have any ongoing supply relationship with any primary suppliers. Most of the key materials are going to be procured through small, local contractors. Project will be utilizing largely contract workers who will be employed through small, local contractors. Less than 10% of the contract labor is anticipated from other parts of the state, as well as from Bihar and Nepal. To address any labor related risks and to promote health and safety, Labor Management Procedures (LMP) proportional to the project risks has been prepared, with specific provisions for working conditions, occupational health and safety, child and forced labor, hazardous labour, gender-based violence, migrant and seasonal labour, management of labor influx, possible accidents or emergencies as well as labor focused grievance redress mechanism. The LMP also includes requirements on Environmental, Health and Safety Guidelines (EHSGs) that are included in the standard bidding documents. These works are likely to engage very small share of community labor as well.

Key highlights of the LMP are: application of standard terms & conditions for direct workers from government departments covering remuneration, leave, allowances, medical benefits and grievances; use of written contract agreement for direct workers hired from the market with necessary provisions for health benefits, allowances & leave; designation of SMPU nodal staff for recording and resolving workers grievances; orientation of contractors on prohibition of child, forced labor, health and safety, vulnerable workers and safeguards on migrant workers; maintenance of

information on labor workforce and labor influx; incident and accidental reporting; equal wages and equal opportunities for workers. The LMP includes a dedicated procedure for recording and resolving workers grievances that will be led by a nodal SPMU staff.

More than 95% of the contract labor are going to be men, and women's participation as contract labor or community labor is going to be very low. The team has used the GBV risk assessment tool, secondary research and stakeholder consultations to determine the GBV risks as low. Project implementation staff has adequate capacity to address the low level of GBV risks in the context of proposed project interventions. To mitigate potential risks related to on-site safety and GBV, the PMU will a) conduct sensitization and awareness campaigns for contract workers, community workers and beneficiary communities on safety, harassment, GBV-related issues, legal recourse procedures and mitigation channels; b) Train the project staff to on GBV risk mitigation; c) strengthen the GRM mechanism by establishing multiple channels to initiate a complaint including confidential reporting in local language with safe and ethical documenting of GBV cases; d) include GBV specific commitments in the bidding documents.

Project interventions do not anticipate any community health and safety risks from usage of security personnel, project related traffic and safety concerns, construction of dams as well as handling and usage of any hazardous material. The project interventions on forests, watersheds, water harvesting, land management and climate resilient agriculture are likely to enhance the ecosystem services and not affect them adversely. The ESA mentions potential risks due to i) increased usage of chemical pesticides and fertilizers; ii) labor influx from Bihar and Nep; iii) safety of water harvesting structures; iv) stagnant water. The ESMF provides for specific mitigation measures related to community health and safety such as safety measures provided in IPNMP and ESMP.

### 6.2.2 ESS3 Resource Efficiency and Pollution Prevention and Management

Overall, using efficient irrigation practices, such as drip and sprinkler irrigation and climate smart agricultural practices, better animal husbandry practices, etc. the project will have a positive impact on carbon sequestration and resource efficiency.

The source of GHG emission in the project is due to application of fertilizer, pesticide and compost. The carbon emissions anticipated from annual cropping (agriculture) is 34,517 tCO2eq/year and from fertilizer use is 95,028 tCO2eq/year, however this is less than the emissions without the project scenario as the project will demonstrate and promote climate smart practices that reduce GHGs through reduced chemical fertilizer use and efficient irrigation. The overall GHG balance of the project is negative overall, with an estimated -87,294 tCO2eq/year sequestered because of afforestation and degraded forest restoration activities being undertaken under the project. The net GHG benefit on a per hectare basis for the project area is estimated to

be 0.6 tCO2/ha/year. The details of the GHG estimates are annexed to this report under Annexure 7.

However, risks are anticipated from increased usage of chemical pesticides and fertilizers, as well as generation and improper disposal of construction waste. An Integrated Pest and Nutrient Management Plan (IPNMP) has been prepared to promote safe, effective and environmentally sound pest management in agricultural/ horticultural interventions, to promote use of biological control methods and reduce synthetic chemical pesticides and provision to increase capacity on addressing the same. The IPNMP provides guidance on the proper storage, handling and disposal of pesticides. To address resource efficiency and pollution management across other interventions such as infrastructure, storage and processing an ESMP will provide necessary site-specific guidance to mitigate the potential environmental and social impacts. The IPNMP includes preventative actions and mitigation measures that will be used to address any potential adverse environmental and social risks and impacts, including on occupational health and safety, that is associated with pest management and control.

Principles of resource efficiency will also apply to the construction and fit outs of all infrastructure established for the drying, storage and processing of agricultural raw materials; the reuse of agricultural waste will be considered where feasible; The standard cover the safe disposal of waste from construction, agricultural value chains as well as from irrigation equipment (drip and sprinkler). ESMP provides necessary site specific guidance to mitigate the potential environmental and social impacts due to project other than pesticides use and disposal based on the guidance proposed in the ESMF.

### 6.2.3 ESS4 Community Health and Safety

While the infrastructure works will be near the project communities or will run across community/private areas (water distribution infrastructure etc.), impacts are expected to be small scale and manageable. This ESA assesses that project interventions do not anticipate any community health and safety risks from usage of security personnel, project related traffic and safety concerns, construction of dams as well as handling and usage of any hazardous material. The project interventions on forests, watersheds, water harvesting, land management and climate resilient agriculture are likely to enhance the ecosystem services and not affect them adversely. However, the risks to community health and safety could be due to civil works, use of hazardous materials, traffic and road safety violations, unhygienic conditions related to public health, disruption of ecosystem services, insensitive security personnel, construction of unsafe dams, stagnant water and unsafe water harvesting structures.

This ESA identified the risks that are due to i) increased usage of chemical pesticides and fertilizers; ii) labor influx from Bihar and Nepal; iii) safety of water harvesting

structures; iv) stagnant water. This ESMF, under the Community Health and Safety Guidelines, provides for specific mitigation measures related to community health and safety especially for i) water quality and availability, disease prevention and communicable diseases; ii) general work site related hazards on dust, sound and debris; iii) fencing of water impounding structures and other construction areas, especially those closer to habitations. These mitigation measures are included in LMP, IPNMP and Community Health and Safety Guidelines.

### 6.2.4 ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

HPFD will not be acquiring any private land or will cause any involuntary physical resettlement or relocation. Any intervention or construction activity requiring acquisition of private land and/or physical relocation will fall under the negative list. Project investments on water harvesting, storage and distribution systems will be made on government as well as private land that will be donated voluntarily to the GP, following the due diligence provided under ESS5. The risks due to land donation and restriction on access are impacts on the lives, lands and livelihoods of peoples, especially vulnerable social groups.

The ESA evaluated the project design and assessed potential social impacts and risks arising from voluntary donation and temporary land use restrictions and, prepared an RPF. Infrastructure GPRMPs will be screened for resettlement impacts, suitable mitigation action plans will be prepared and implemented, where applicable.

This ESMF includes a resettlement policy framework (RPF) to address and mitigate any adverse social and economic impacts arising from voluntary land donation, and includes specific screening, documentation and mitigation measures to ensure voluntariness and non-coerciveness of the land donation process.

Investments in new grazing pastures, fodder plots in forest areas and new plantations may involve temporary restrictions that have been agreed and imposed by the communities. Community-imposed use restrictions that may restrict traditional usage, and adversely affect the most vulnerable households. Such investment GPRMPs will be screened for adverse impacts on traditional use and customary rights, and when needed suitable mitigation action plans will be prepared and implemented by the beneficiary groups, GPs and HPFD.

### 6.2.5 ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources

The project aims to increase forest cover and quality within existing forests, improve pasture management in the state and undertake measures that will improve the provision of ecosystem services such as food, freshwater, fodder and medicinal plants but also carbon storage and sequestration and protection from natural hazards.

This ESA has identified impacts on biodiversity due to project activities while identifying critical and natural habitats, species of high conservation value at risk and the provision of ecosystem services. The potential risks to biodiversity and ecosystem services could arise from unmanaged chemical pesticide and fertilizer use and agricultural run-off, use of non-native varieties, habitat and land-use conversion and un-sustainable harvesting of NTFPs.

As a result, the ESMF includes a Biodiversity Management Plan (and a Integrated Pest and Nutrient Management Plan) with key strategies for biodiversity conservation that includes: i) promotion of indigenous species in plantations, fodder plots and nurseries and avoidance of exotic, invasive species; ii) adoption of sustainable harvesting and production of NTFP; iii) updating of peoples biodiversity registers in recently denotified wildlife panchayats and community capacity building; iv) site screening for avoiding critical natural habitats ; vi) negative list to ensure biodiversity conservation, prevent forest fires, habitat fragmentation, land use modifications, and prevent felling of trees.
ESMF includes screening and eligibility checklists to ensure exclusion of activities that would adversely affect biodiversity such as felling of trees, activities causing irreversible impacts to critical and natural habitats, activities causing forest fires, felling of trees without a permit, and activities that are in- consistent with forest working plans or Catchment Area Treatment (CAT) plans. The Integrated Pest and Nutrient Management Plan (IPNMP) will address risks from pesticide and fertilizer use.

### 6.2.6 ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

Tribal communities are dispersed throughout Himachal Pradesh, but they are particularly concentrated in more remote, backward areas of Kinnaur, Chamba, and Lahaul-Spiti districts; which are not included in the project scope. Project investments and interventions will be covering the remaining 10 districts. Indigenous Peoples (scheduled tribes) are dispersed in varying numbers across the ten project districts and the identified Gram Panchayats. Their share in the project areas ranges from 1-25%, however they are largely concentrated around the project districts of Chamba and Kangra; these areas populated by tribals and transhumant nomadic tribes that are traditionally dependent on grazing routes and commons for their livestock-based livelihoods. However, officially notified schedule V areas with significant tribal populations, are not part of the project.

The ESA involved field visits to these tribal areas, and consultations with the target beneficiaries and tribal community leaders especially in Chamba & Mandi. Focused consultations were also held with the transhumant communities, mainly Gaddis and Gujjars. HPFD has also conducted extensive consultations with tribal communities as

part of preparation for the Forests for Prosperity Project. The FPP project preparation exercise, which have also informed the preparation of the ESMF, and especially IPPF.

The IPPF/ Tribal Development Framework (TDF) provides specific measures to ensure socially and culturally compatible consultations with, and participation of the tribal communities in project implementation processes and project benefits. The risk of tribal exclusion from project interventions, investments and institutions is mitigated through: i) screening and documentation of tribal households in GPRMP; ii) prioritized targeting and inclusion in beneficiary lists; iii) consultations with tribal leaders in local language; iv) disaggregated beneficiary tracking v) FPIC (only when applicable); vi) support for-capacity building and convergence, including indigenous knowledge and biodiversity registers. The livestock interventions will be providing targeted project benefits to the transhumant nomadic tribes that are traditionally dependent on grazing and common pastures. The TDF also supports community-identified additional interventions that would be needed to ensure the access of tribal communities to project benefits and preparation of selected TDPs.

Project interventions will not be causing any adverse impacts for the IPs. Project interventions do not involve any land acquisition, involuntary resettlement, physical relocation, or economic displacement that will affect either tribal households or non-tribal households. The planning of GPRMP will involve separate consultations with the tribal households, an intervention in the GPRMP will ensure flow of benefits to the tribal households. Any interventions involving temporary restrictions on land use such as plantations, nurseries, and fodder plots will have to be discussed, agreed with and formally endorsed by the communities, including the tribal households.

### 6.2.7 ESS8 Cultural Heritage

The state has rich cultural heritage such as several pilgrimage sites and places of religious prominence, sacred groves and sacred water sources. This ESA has covered potential for adverse impacts on tangible and intangible cultural heritage in project areas. Project areas and communities are rich in sites of religious and spiritual significance, including sacred groves and sacred water sources.

Tangible and Intangible heritage, if any, would be ascertained through secondary sources as well as through consultation as part of ESA. The ESMF includes specific procedures and mitigation measures related with i) screening an identification of such sites and practices; ii) avoidance of sensitive sites; iii) chance find procedures. The ESMP under this ESMF details these procedures.

## 6.3 Project Impacts Identified during Consultations

The following impacts, both positive and negative were identified during the consultations at Gram Panchayat level.

Positive Impacts (benefits) and Negative (adverse) Impacts due to the project components

| Component | Sub-Component | Environmental Impacts | | Social Impacts | |
|---|---|---|---|---|---|
| | | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** |
| Component 1: Sustainable Land and Water Resource Management | **Biological and Engineering Measures** | | | | |
| | Plantations (a.Conservation plantations; Three tier plantations: trees, shrubs and herbs/grasses, Two tier plantations: Trees and herbs, b. Enrichment plantations; 400, 500, 600, 700, or 800 plants per hectare and c. Plantation along drainage lines; Two tier plantation of Bamboo, water loving species and grasses.) | ▪ Creation of additional green cover<br>▪ Control runoff and soil erosion, thereby reducing losses of water, soil material, organic matter and nutrients.<br>▪ Reduction of pressure on forest<br>▪ Carbon sequestration | ▪ Not envisaged | ▪ enhancement of overall farm productivity<br>▪ improvement in soil fertility through addition of litter and organic matter<br>▪ Production of multiple outputs with protection of the resource base<br>▪ Reduction in incidence of total crop failure | ▪ There may be decrease of grazing land due to closure of some area which have been freshly taken up for plantation. |
| | Lantana eradication | ▪ ecological restoration of weed-free landscapes<br>▪ Reduction in forest fires<br>▪ Reduction of harboring vectors and related health risks | ▪ Aggressive extermination measures usually fail<br>▪ Control measures include fire, mechanical, chemical, biological and combinations may have adverse impact on environment<br>▪ increased regeneration of some species | ▪ livelihood benefits to local communities (handicrafts, paper, furniture)<br>▪ can be digested in anaerobic digester, and Biogas be created<br>▪ Increased growth of grass in cleared areas<br>▪ Would provide opportunity to local community to participate in the project. | ▪ Lantana eradication and management may be very expensive |
| | Contour trenching (for moisture conservation; along with grass seed sowing/ planting, Contour trenches, Grass seeds/seedling sowing/planting) | ▪ Increase infiltration of rain water,<br>▪ reduced runoff,<br>▪ reduced soil loss<br>▪ increased ground water | ▪ Not envisaged | ▪ Increased crop production<br>▪ Increased availability of soil moisture<br>▪ Increased availability of drinking water | ▪ Not envisaged |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | |
|---|---|---|---|---|---|
| | | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** |
| | | level.<br>▪ Enhanced water balance<br>▪ increase in green cover of the area<br>▪ improved soil quality | | ▪ Increased water availability due to rise in ground water table | |
| | Drainage lines Treatment (Dry Stone barriers along with vegetative measures and Crate wire barriers along with vegetative barriers) | ▪ Reduction in over-flooding of downstream areas and reduction in soil erosion<br>▪ Reduction in risks of landslides<br>▪ Enhance the surface water storage capacity. | ▪ Not envisaged | ▪ Improved crop production due to increased productivity of land resulting from reduced soil and fertility loss.<br>▪ Increased agricultural income<br>▪ Reduction in loss of standing crops. | ▪ Not envisaged |
| | Water Harvesting and Irrigation (Renovation and rehabilitation of traditional water sources, Ponds and Tanks; New and Repair of existing non-functional, Gravity Check Dams (Cement Concrete, Masonry, Earthen), Minor Irrigation Schemes; Gravity and Lift) | ▪ Increase infiltration of rain water,<br>▪ reduces runoff,<br>▪ reduces the soil loss | ▪ Not envisaged | ▪ Increased crop production<br>▪ Increased availability of soil moisture<br>▪ Increased availability of drinking water<br>▪ Increased water availability due to rise in ground water table | ▪ Construction of structure may require acquisition small parcels of private land, as the works are small in nature. |
| | Improvement of pastures management | ▪ Reduction in soil erosion due to run-off losses | ▪ Not envisaged | ▪ Increased availability of fodder for livestock<br>▪ Reduction in dependence on forests<br>▪ Improved livestock production | ▪ Not envisaged |
| Component 2: Improved Agricultural Productivity and Value Addition | **Institutional Strengthening** | | | | |
| | Farm Training (Capacity Building, Farming Camps, Livestock Shows, etc.) | ▪ Increased production of organic waste leading to improvement of organic matter content in soil leading to improved fertility. | ▪ Increased environmental pollution during the period of training camps or shows.<br>▪ Introduction of HYV may lead to | ▪ Improved awareness and capacity in use of productive and modern techniques of farming and livestock management and rearing<br>▪ Improved agricultural and livestock production<br>▪ Introduction to and adoption | ▪ Increased influx of rural population in areas where training camps or shows are organized may put pressure on local area and may some time lead to conflicts. |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | |
|---|---|---|---|---|---|
| | | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** |
| | | | increased demand and use of synthetic fertilizers, herbicides, pesticides, and hybrid seeds leading to increased soil degradation and increase in toxic levels in ground water and existing water bodies. | of modern technologies and improved varieties.<br>▪ Improvement in agricultural income and reduction in cost of production. | |
| | **Agriculture** | | | | |
| | Rainfed Crop Demonstration(Rabi)<br>Rainfed Crop Demonstration(Kharif)<br>Rainfed Crop Demonstration PULSES<br>High Value Crops Demonstrations<br>Diversification - Vegetable and Spices<br>Diversification - Medicinal, Aromatic Plants & Floriculture<br>Agro Forestry (notional 100Plts/ha)<br>Homestead Horticulture<br>Pre & Post Harvest Technologies | ▪ Improved soil fertility<br>▪ Reduction in soil degradation due to reduction in use of synthetic fertilizers, insecticides, pesticides and weedicides.<br>▪ Increased green cover due to promotion of agro-forestry | ▪ Not envisaged | ▪ Increased agricultural production and yield<br>▪ Reduction in cost of production of crops due to use of locally produced and available organic and bio fertilizers<br>▪ Increased diversification due to promotion and adoption of medicinal and aromatic plants and floriculture<br>▪ Improved and sustainable farm income | ▪ Some HVY may require extensive use of synthetic fertilizers and insecticides and pesticides leading to increased soil degradation. |
| | **Fodder** | | | | |
| | Manger Construction<br>Fodder Augmentation<br>Fodder Conservation | ▪ Increase in production of organic waste for generation of organic fertilizer<br>▪ Improved opportunity | ▪ Not envisaged | ▪ Improved availability of fodder<br>▪ Reduction in dependence on forests for fodder and grass<br>▪ Self-sufficiency of local areas to meet local demand for fodder | ▪ Not envisaged |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | |
|---|---|---|---|---|---|
| | | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** |
| | | to adopt and use bio-gas<br>▪ Reduction in wastage of fodder<br>▪ Reduction in open grazing | | and reduction in dependence on markets.<br>▪ Improved livestock health | |
| | **Livestock** | | | | |
| | Veterinary Awareness Camps<br>Promotion of Climate Resilient Indigenous Breeds | ▪ The number of unproductive animals will be reduced | ▪ Not envisaged | ▪ Improved livestock health<br>▪ Improved livestock production and productivity<br>▪ Increase in climate resilient indigenous cattle<br>▪ Reduction in cost of production of livestock products<br>▪ Improved health of people consuming livestock products | ▪ Not envisaged |
| | **Tribal Action Plan** | | | | |
| | Training and Exposure Visits<br>Deworming of Flocks<br>Flock Management<br>Genetic Improvement - (Rams, Bucks, etc.) | ▪ Improved livestock management would reduce dependence on forest for fodder<br>▪ Increased green cover | ▪ Not envisaged | ▪ Improved awareness and capacity to adopt improved techniques for livestock rearing and management.<br>▪ Increased livestock production and productivity<br>▪ Improved livestock health<br>▪ Increase in sustainable income from livestock rearing due to diversification. | ▪ Not envisaged |
| | **Agribusinesses** | | | | |
| | Support to Crop Based interventions (Nursery raising, Hydroponics, Protected Agriculture, Mushroom farming, HVC Processing, Floriculture, Apiculture, etc.)<br>Support to Livestock Based Interventions (Goat, Sheep, Dairy, Poultry, Piggery, Fishery, etc.)<br>Support to NTFP Based Interventions | ▪ Increase in green cover of the area.<br>▪ Reduction in area under wastelands/un-productive land | ▪ Not envisaged | ▪ Improved capacity of local community to adopt to diversifying the resource base<br>▪ Improved farm income<br>▪ Improvement in bargaining | ▪ Vested interests among certain individuals may hamper functioning of user groups. |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | |
|---|---|---|---|---|---|
| | | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** | **Positive Impacts (Benefits)** | **Negative (Adverse) Impacts** |
| | Enhancing Market Accessibility (Foot Bridges/ Ropeways/ Other Construction/ Structures, etc.) | | | power of local community.<br>▪ Reduction in transportation costs of farm produce to distant markets<br>▪ Improvement in standards of living of local community<br>▪ Capacity development of local community members in agro-processing and packaging particularly to women may prove beneficial. | |
| Component-3: Institutional Development | **Institutional Development** | | | | |
| | Information, Education & Communication (IEC) (for awareness about the project, access to information, terms of participation and overall transparency among all the stakeholders. This will include preparation of Brochure, Pamphlets, Booklets, Banners, Hoardings, etc.) | ▪ Reduction in forest fires due to increased awareness and lesser dependence on forests lands for livelihood<br>▪ Decrease in environmental pollution | ▪ Not envisaged | ▪ Increased awareness and capacity of local community in use of modern techniques and practices<br>▪ Ease in adoption of high yielding varieties<br>▪ Improved opportunities of employment and in income generating activities for local unemployed youth<br>▪ Formation of common interest groups and user groups shall induce a sense of participation and ownership of assets created.<br>▪ Overall development and sustainability among local rural community<br>▪ Increased capacities of staff and effective deliverability. | ▪ Formation of groups at ward level or village level within Gram Panchayat would prove to be more effective than at GP level due to often huge difference in topographic differences among villages of same Panchayat<br>▪ Trained staff may move out of Project due to better opportunities or superannuation. |
| | Forming and strengthening local institutions (Formation of specific user groups (UGs) and common activity groups (CAGs) for the inclusiveness of vulnerable and disadvantaged groups – women, poor, transhumant, landless, small/ marginal farmers for particular activity as and when activity picks up, Promote and support the federations (of SHGs, CAGs) and Disburse incentive fund to the GPs selected based on their performance against certain select indicators.) | | | | |
| | Human Resource Development (Capacity Building of staff and Community by imparting training, workshops and exposure visits.) | | | | |
| | Knowledge Management (Under this component management of information system will be developed and implemented. This includes an integrated information and knowledge system for effective project implementation, physical and financial monitoring, | | | | |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | |
|---|---|---|---|---|---|
| | | Positive Impacts (Benefits) | Negative (Adverse) Impacts | Positive Impacts (Benefits) | Negative (Adverse) Impacts |
| | assessment of key performance monitoring indicators, and consultancy support to the project.) | Not envisaged | Not envisaged | Better understanding and synergy between the different departments. | May lead to conflict in approach towards a given activity |
| | Convergence To obtain wider impacts through joint strategies/actions and sharing of resources, shared values, responsibilities and gap filling with the ongoing Govt. schemes being implemented in Gram Panchayats (GPs) by various line departments e.g. Rashtriya Krishi Vikas Yojna (RKVY), MGNREGA etc. | | | | |

## 6.4 Continuity Note

Based on the risks and impacts identified through both, desk review and field work analysis, an Environmental and Scoial Management Framework is prepared which sets out the processes and plans to mitigate and manage the risks and impacts, monitor the compliance along with a capacity building plan.

# 7. Environment and Social Mitigation and Management Plan (Environmental Social Management Framework)

## 7.1 Introduction

An Environmental and Social Management Framework (ESMF) is proposed for this Project for the reasons, a) at this point of time, it would not be possible to conduct an environmental and social impact assessment for all the GPRMPs under this project, as the GPRMPs are under identification, b) the identification and implementation of these GPRMPs will take place over a period of time and c) the resulting time lag leads to changes in the environmental and social conditions. For such reasons preparation and implementation of Environmental and Social Management Framework (ESMF) are proposed for this Project. The ESMF have the following sections; some of which are presented in the document and others form separate documents.

1. Participatory Planning for GPRMP – Part of this ESMF
2. Negative List of Activities – Part of this ESMF
3. Screening of GPRMP– Part of this ESMF
4. Analysis of Alternatives – Part of this ESMF
5. Climate Change Considerations – Part of this ESMF
6. Gender Action Plan – Part of this ESMF
7. Grievance Redressal Mechanism – Part of this ESMF
8. Institutional Arrangements – Part of this ESMF
9. Monitoring and Evaluation – Part of this ESMF
10. Capacity Building – Part of this ESMF
11. Budget – Part of this ESMF
12. Environmental and Social Management Plan - Part of this ESMF
13. Labour Management Procedures – Prepared as a separate document
14. Integrated Pest & Nutrient Management (IP&NM) Plan – Prepared as a separate document
15. Community Health and Safety Guidelines – – Prepared as a separate document
16. Biodiversity Management Plan – Prepared as a separate document
17. Tribal Development Framework – Prepared as a separate document
18. Stakeholder Engagement Plan – Prepared as a separate document
19. Resettlement Policy Framework – Prepared as a separate document
20. Environmental and Social Commitment Plan – Prepared as a separate document

## 7.2 Participatory Planning for GPRMP

For this Project, the Gram Panchayat (GP) would be the working unit for the purpose of planning and implementation. Gram Panchayat Resource Management Plan (GPRMP) would be prepared at the ward level initially (each GP consists of 5-8 wards) along with the community by employing participatory planning techniques and PRA (Participatory Rural Appraisal) tools. The wealth ranking of a given ward in that GP will be also done during this process of preparation of GPRMP. Thereafter, compilation of these sub-plans incorporating the problems, solutions and the prioritization generated at the ward level

would be finally compiled at the GP level. The compiled sub-plans of different wards would form the final GPRMP document. This GPRMP would be approved by the Gram Sabha which may reset the priorities and the list of vulnerables. This GPRMP would then be approved by the concerned District Project Officer (DPO). This final GPRMP would be based on realistic solutions, synchronizing with the project activities and investments. All the activities of Component 1 & 2 would also be compiled on annual basis in the GPRMP. This GPRMP would thus provide the year wise financial layouts for a given GP. Compilation of the financial layouts provided in the GPRMP would be the basis of generating the Annual Plan of Operations (APO) by the DPO. Since, the wealth ranking would be an integral part of the GPRMP preparation activities, the same would be conducted for vulnerable also and reflected in the year wise plans in the GPRMP.

The preparation of GPRMP needs robust community consultation with a "bottom-up" participatory planning processes and usage of Participatory Rural Appraisal (PRA). The principles of preparation of GPRMP are enlisted below:

a) **Landscape Planning:** Introduction of the concept of Landscape Planning to the community.
b) **Resource Mapping:** Availability of natural resources in and around villages. Identification of key livelihood of the people and critical resources on which these livelihoods depend. Critical resources may include natural capital, physical capital, financial capital, human capital and social capital.
c) **Problem Analysis:** Vulnerability mapping of natural resources (agriculture, soil, forest, water) and Wealth Ranking and poverty mapping (food security, shelter, employment etc.). Identification of hazards and risk of them happening again, hazard calendar for most frequent hazards can be prepared along with priority ranking of hazards from livelihood perspective of the community in general and disadvantages sections of the society in particular.
d) **Assessment of Risks and Impacts:** The community will assess the risks and impacts related to hazards on resources and vulnerability and resilience of critical livelihood sectors and social groups.
e) **Infrastructure Mapping:** Availability of infrastructure and civic facilities.
f) **Inflow and Outflow Analysis:** Inflow and outflow analysis of various commodities for analysing the economic activities and dependence of the community on external factors
g) **Relationship Mapping:** This requires mapping of relations with various line departments, their perceived importance and availability of their services and identification of partnership of institutions.
h) **Assessment of Solutions/ Opportunities:** This is assessed as perceived by the people. Identification of priority areas for eco-system management. It will include peoples' assessment of need for improvement of existing resource base and development of new resources/ infrastructure including Natural Resources and Man-Made Resources.
i) **Skills and Knowledge Base:** Mapping of the available skills and knowledge base of the people to deliver solutions and use opportunities.

j) **Development of Sub-Plans:** This includes identification of investments, such as water management plans, land management plan, agriculture and animal husbandry interventions, etc. for each ward.
k) **Stakeholder Consultation:** All the stakeholders in the ward are consulted upon and decision on implementation mechanism is made.
l) **GPRMP:** Combining all the Sub-Plans to GPRMP

## 7.3 Negative List of Activities

The Project does not propose to undertake GPRMPs that a) are in contravention of Forest Department Working Plans/ CAT Plans, b) WHO notifications with regard to pesticides, c) cause habitat destruction, d) undermine labour laws, e) are affect the local culture and f) undermine the project objectives. A check list for these is given in the annexures as Annexure 5.

## 7.4 Screening

During the screening, as a first step, the environmental and social impacts are identified through filling in an Environmental Data Sheet and Social Data Sheet (EDS and SDS). The basic objective of the filling in these data sheets is to collect basic information on environmental and social aspects of the proposed GPRMP. Further the ESMF requires that basic environmental and social data pertaining to the proposed GPRMPs be compiled during the field data collection stage. For this purpose, EDS and SDS are formulated for GPRMPs and annexed to this ESMF. The Project Implementing Agencies, fill up these EDS and SDS with the participation of UGs/ CAGs/ Federations duly identifying the environmental and social issues of concern, if any. Supplementary notes on environmental and social concerns will also be added to those EDS and SDS. Initially the Project Implementing Agencies, will do the screening with the participation of UGs/ CAGs/ Federations, through collection of necessary filed data and after an year, the UGs/ CAGs/ Federations will take up this responsibility. These EDS and SDS are attached to the GPRMP proposal/ concept note.

### 7.4.1 Environmental and Social Impacts and Mitigation

After identifying the impacts through review of secondary information, field visits and consultations, the mitigation measures are determined. Based on this, a generic ESMP is developed and the same provided as a separate document. Under this, some generic mitigation measures, are included as guidance. This guidance table also includes information on whether these mitigation measures have to be undertaken in the planning/ design, construction and operation phases. However, each GPRMP needs to incorporate specific mitigation measures in the proposal. These should be added to the generic ESMP by the implementing agencies. For all GPRMPs, the implementing agencies need to ensure that the ESMP is provided as a part of the contract documents to the contractor facilitating its integration into the main works. If the executing agency is UGs/ CAGs/ Federations, then capacity building of UGs/ CAGs/ Federations is of paramount importance.

## 7.5 Analysis of Alternatives

As per the The World Bank[7], alternatives analysis in ESIA is designed to bring environmental and social considerations into the "upstream" stages of development planning—project identification and earlier—as well as the later stages of site selection, design and implementation. In the absence of such consideration, those steps in the project cycle are taken solely on the basis of technical feasibility, economics, and political preferences, and the ESIA for such a project tends to be directed to supporting or affirming a project proposal. At best, ESIA becomes a damage limitation exercise, with the benefits restricted to identification of mitigation measures. Whereas environmental and social analysis at an earlier stage might have revealed another cost-effective way of achieving the same project objectives at lower environmental or social cost (measured either by the severity of the impacts or the costs of measures to mitigate them), the likelihood of finding it late in the process is small. Furthermore, even if such an option were to be found in the project ESIA, it often cannot be implemented without disrupting project preparation in a manner that is so time-consuming and expensive as to be impractical. In a nutshell, the role of analysis of alternatives is to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental and social benefits of the proposed activity, and or through reducing or avoiding potentially significant negative impacts. But the obstacles to the full consideration of alternatives include:

- Technological obstacles, where high costs of a particular technology may prevent it from being considered as a viable option, or the lack of technological development may preclude certain options from consideration;
- Resource availability obstacles, which may limit the range of alternatives in a particular context;
- Political economy or intellectual obstacles, in which barriers may be imposed by groups or individuals, usually holding positions of economic or political power, who wish to advance a particular agenda

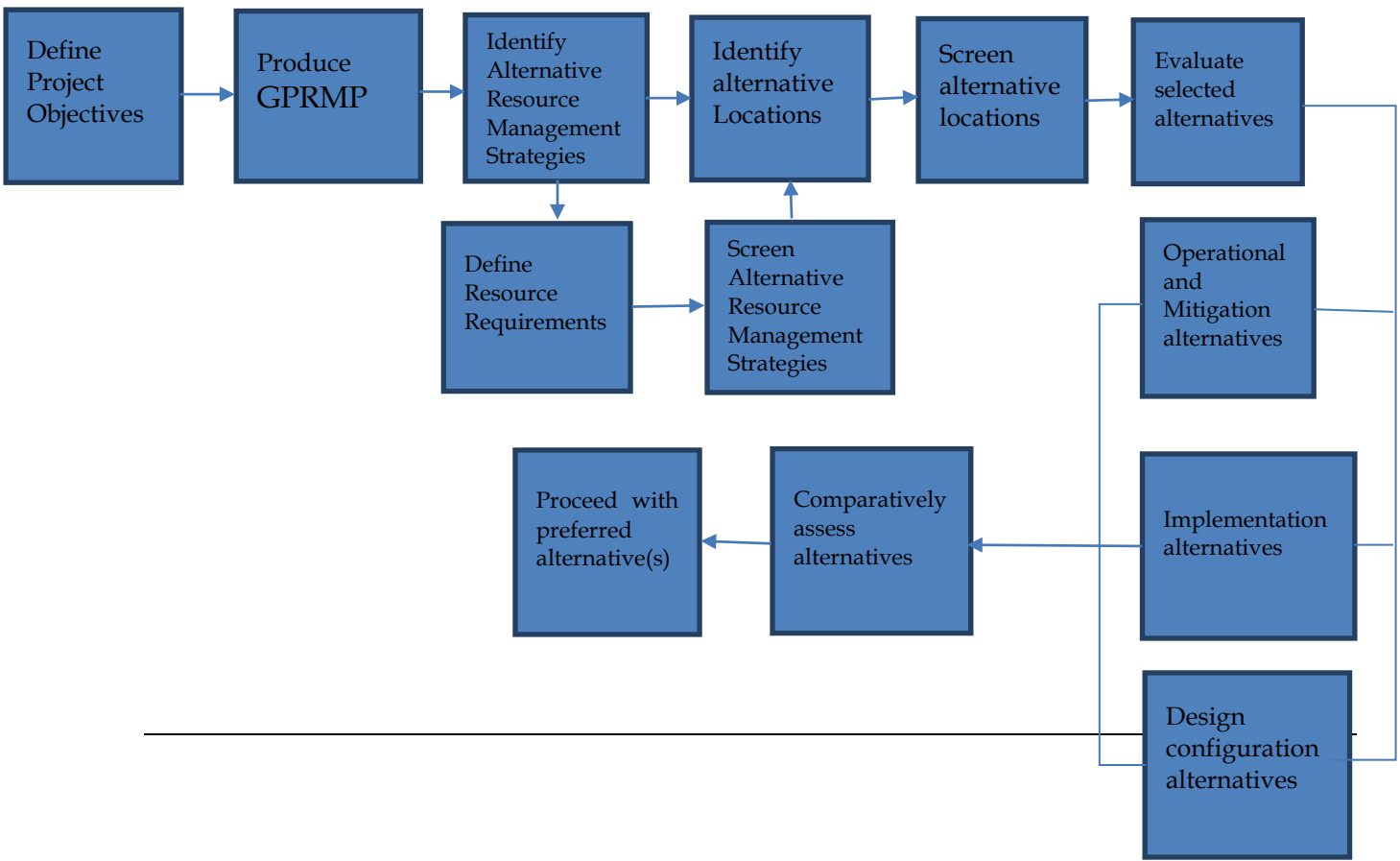
In case of present Project, the GPRMPs are yet to be prepared and the GPRMPs will be prepared at a later stage. For these reasons the following guidelines are given for conducting an Analysis of Alternatives for each of the GPRMPs to be taken up. The following types or categories of alternatives are to be identified for each of the GPRMPs and the optimal alternative be chosen:

1. Activity alternatives: These are sometimes referred to as GPRMP alternatives. Consideration of such alternatives requires a change in the nature of the proposed activity.

[7] http://siteresources.worldbank.org/INTSAFEPOL/1142947-1116495579739/20507390/Update17AnalysisOfAlternativesInEADecember1996.pdf

2. Location alternatives: Location alternatives could be considered for the entire GPRMP or for a component of a GPRMP, for example the location of a water harvesting structure/ processing plant, etc.
3. Process alternatives: The communities should be encouraged to explore all possible alternatives, including the Best Practicable Environmental Option (BPEO).
4. Demand alternatives: Demand alternatives arise when a demand for a certain product or service can be met by some alternative means.
5. Scheduling alternatives: These are sometimes known as sequencing or phasing alternatives include din the GP-RMP.
6. Input alternatives: This involve alternative resources, raw materials, etc. Such alternatives could be incorporated into the project proposal and so be part of the project description, and need not necessarily be evaluated as separate alternatives.
7. Routing alternatives: Consideration of alternative routes generally applies to linear developments such as pipeline routes.
8. Site layout alternatives: Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site.
9. Scale alternatives: In some cases, activities that can be broken down into smaller units can be undertaken on different scales and alternatively smaller units can be combined into one.
10. Design alternatives: Consideration of different designs for aesthetic purposes or different construction materials in an attempt to optimize local benefits and sustainability would constitute design alternatives.

The Analysis of Alternatives for the GPRMPs under the project is shown in the flow chart below:



## 7.6 Climate Change Considerations

### 7.6.1 Climate Change - Likely Impacts

All development has to be climate smart and inclusive. Climate Change is generally referred to as a change in global or regional climate patterns, in particular a change apparent from the mid to late 20thcentury onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels. The potential climate change impacts are diverse, they include;

- Groundwater depletion
- Water shortages
- Salt water intrusion into groundwater supplies in coastal areas
- Increased riparian flooding and erosion
- Increased coastal flooding and erosion
- Increased flash floods
- Increased storm surge hazard
- Increased risk of landslides or mudslides on hazard slopes
- Other associated risks and impacts

Sectors vulnerable to climate risks are agriculture and forestry, energy, infrastructure and building, tourism, etc. Many of GPRMPs under the Project would fall under these sectors, though the Project would not involve only major infrastructure building.

### 7.6.2 Climate Change Adaptation/ Mitigation Actions

The climate change adaptation and mitigation actions are many. All these cannot be undertaken under the present Project. However, the Implementing Agencies and UGs/ CAGs/ Federations are advised to take up these actions under different projects/ programs. It is essential that the adaptation actions are initiated at the earliest in order to offset further irreversible changes in climate.

Climate change adaptation involves, a) adopting policies, b) developing regulation, c) conducting research studies, d) preparing local level plans/ programs and implementing them, e) taking up campaigns, and f) initiating GPRMP specific actions. This requires the involvement of the concerned Gram Panchayats, line departments, UGs/ CAGs/ Federations, consultants and contractors. To start with the project needs a) Climate Risk Profiling, b) GHG Emission Baseline and c) Adoption of resilience and mitigation measures in the investments. Most of this work is done by the Himachal

Pradesh Department of Science, Technology and Environment[8] and Centre on Climate Change[9]under aegis of the Himachal Pradesh State Council for Science Technology & Environment (HIMCOSTE[10]). There a number of publications, research papers and other information and documents available on climate change with HIMCOSTE. Apart from this, HIMCOSTE and its associated agencies does demonstrations and field research on climate change adaptation. The project may consider an association with these agencies to benefit from the research and field work. Below given are various climate change impacts and adaptation/ mitigation actions. These mitigation actions needs to be initiated under the appropriate GPRMPs. The Implementing Agencies and UGs/ CAGs/ Federations needs to ensure their implementation under relevant GPRMPs. The monitoring responsibility rests with the Implementing Agencies and UGs/ CAGs/ Federations and the PMU.

Table 7.1: Climate Change Adaptation/ Mitigation Actions

| **Sector** | **Adaptation/ Mitigation Actions** |
|---|---|
| Agriculture | • Develop new crop types<br>• Enhance seed banks<br>• Avoid monoculture and encourage farmers to plant a variety of heat and drought resistant crops<br>• Avoid tying subsidies or taxes to seeds or type of land<br>• Increase efficiency of irrigation<br>• Disperse information on conservation management practices<br>• Liberalization of agricultural trade<br>• Promote agricultural drought management practices<br>• Land consolidation<br>• Avoid land use change; especially agricultural land |
| Water Resources | • Use river basin planning and coordination<br>• Adopt contingency planning for drought prone areas<br>• Make marginal changes in construction of infrastructure<br>• Make inter basin transfers for responding to regional droughts and other problems of water supply<br>• Avoid inter basin transfers for generation of hydro power<br>• Maintain options to develop new dam sites for irrigation and water supply<br>• Conserve water<br>• Encourage efficient water use<br>• Spread awareness, education; increase voluntary compliance<br>• Introduce market based pricing policies, legal restrictions on water use, rationing of water, or the imposition of water conservation standards on technologies<br>• Allocate water supplies by using market based system, market based allocations are able to respond more rapidly to changing conditions of supply and also tend to lower demand<br>• Control of water pollution |

[8] http://www.hpdest.gov.in/
[9] http://www.hpccc.gov.in/
[10] http://himcoste.hp.gov.in/

| | |
|---|---|
| Forestry | • Enhance forest nurseries and seed banks<br>• Encourage diverse management practices<br>• Encourage participatory forest management; incentives to the communities<br>• Ensure effective timely implementation of CAT plans<br>• Establish flexible criteria for interventions<br>• Restoration of degraded sites<br>• Avoid excessive diversion of forest land for long term<br>• Reduce habitat fragmentation and promote development of migration corridors |
| Bio-Diversity and Eco Systems | • Integrated eco system planning and management<br>• Protect and enhance migration and buffer zones<br>• Enhance methods to protect biodiversity of sites<br>• Preserve vulnerable wetlands<br>• Restrict, avoid interference with sensitive ecosystems |
| Climate Change in general | • Incorporate climate change in long term planning<br>• Inventorize existing practices and decisions used to adapt to different climates<br>• Disaster relief to hazard reduction programs<br>• Provide awareness on climatic variability and change |

Once the Project adapt these, the design needs to incorporate these into the design and the Implementing Agencies and UGs/ CAGs/ Federations needs to ensure that these are followed by the contractors and implemented. The quarterly monitoring reports submitted by the PMU needs to include compliance with the above actions as well.

## 7.7 Environmental and Social Management – Project Cycle

The table below presents the Environmental and Social actions to be taken up during various stages of projects from Pre-planning till Operation and Maintenance.

Table 7.2: Environmental and Social Activities and Responsibilities to be Fulfilled during the Project Cycle

| Phase | ESMF Activity | Objectives | Process | Responsibility | Result |
|---|---|---|---|---|---|
| Preplanning for GPRMP | **Identification of interventions Filling screening formats Conducting socio-economic survey** | To collect basic information on environmental and social aspects of the GPRMP. | The ESMF requires that basic environmental and social data pertaining to the proposed GPRMP be compiled at the field data collection stage. For this purpose, a simple Environmental and Social Screening Format and a simple Socio-Economic Survey (SES) Format were formulated for GPRMPs. The Screening Format and SES Format are furnished as annexure1. The Implementing Agencies and UGs/ CAGs/ Federations fill up these with the facilitation support of the APO Staff duly identifying the environmental and issues of concern. Supplementary notes on environmental and social concerns to be added to these formats. | Implementing Agencies and UGs/ CAGs/ Federations | Screening Formats and SES Formats filled in and attached with the GPRMP |
| Planning for GPRMP | **Preparation** Environmental and Social Management Plans for GPRMP | To consult the ESMP and compile the relevant Management Measures for integration into GPRMP. | For all GPRMPs the relevant provisions in the ESMP will attached as specific ESMP. | Implementing Agencies and UGs/ CAGs/ Federations | ESMP is customized |
| Planning for GPRMP | **Appraisal** Environmental and Social appraisal of the GPRMP | To ensure that relevant environmental and social issues have been identified and appropriate mitigation measures have been incorporated into the GPRMP | There shall be no separate environmental/ Social appraisal but environmental/ social aspects shall be included in the normal appraisal and evaluation process for the proposed GPRMP, based on the screening and socio-economic survey included in the GPRMP. All these GPRMPs need to follow the mitigation measures detailed in the ESMF and the ESMP. | Environmental Expert and Social Expert of DPO | Environmental and social appraisal of the project is made and approval of proposed GPRMP, with decision to (i) accept GPRMP as submitted, or (ii) accept GPRMP with modification suggested in the environmental/ social |

Table 7.2: Environmental and Social Activities and Responsibilities to be Fulfilled during the Project Cycle

| Phase | ESMF Activity | Objectives | Process | Responsibility | Result |
|---|---|---|---|---|---|
| | | | | | appraisal. |
| Procurement for GPRMP | **Bidding and Contract Documents** Incorporation of Environmental and Social mitigation measures given in GPRMP in the Bidding Documents | To ensure that the environmental and social mitigation measures as given in GPRMP to be implemented by contractor that are in the contract documents. | The prescribed environmental and social mitigation measures as given in GPRMP (construction stage measures and all those to be implemented by contractor) as identified will be included in the contract documents. | Implementing Agencies and UGs/ CAGs/ Federations | Contract documents include environmental and social mitigation measures to be implemented by contractor/ UGs/ CAGs. |
| Implementation of GPRMP | **Implementation** Environmental and social mitigation measures implementation prescribed in GPRMP | To ensure that the prescribed environmental and social mitigation measures given in GPRMP (including construction stage) are implemented. | The prescribed environmental and social mitigation measures as adopted from ESMP and prescribed in GPRMP (including construction stage measures) as identified through the environmental and social appraisal process are adequately implemented by the contractor/ UGs/ CAGs and other responsible agencies. | Implementing Agencies and UGs/ CAGs | Environmental and Social mitigation measures are implemented as per ESMP. ESMF is complied with. |
| Implementation of GPRMP | **Supervision, Monitoring and Evaluation** Environmental supervision, monitoring and evaluation IEC and capacity building on environmental and social issues. | To ensure that environmental and social mitigation measures are implemented as intended. | Monitoring of indictors as given in ESMF will be conducted as per project monitoring protocol given in ESMF. Supervision will be conducted by the designated environmental and social experts of the PMU for all the GPRMPs with the active participation of UGs/ CAGs. All GPRMPs will be monitored. Capacity building and IEC activities are undertaken to enable effective implementation of the ESMF including assessment procedures, supervision, monitoring, etc. as well as for UGs/ CAGs and community awareness and sensitization. | Implementing Agencies and UGs/ CAGs | The Implementing Agencies/ UGs/ CAGs will submit quarterly monitoring reports and periodic environmental and social supervision reports and Training and IEC activity reports to Bank through PMU. |

Table 7.2: Environmental and Social Activities and Responsibilities to be Fulfilled during the Project Cycle

| Phase | ESMF Activity | Objectives | Process | Responsibility | Result |
|---|---|---|---|---|---|
| Implementation of GPRMP | **Implementation Completion** Preparation of Implementation Completion Report for environmental and social mitigation measures under the GPRMP | To ensure that the implementation of environmental and social mitigation measures and management is completed as per GPRMP and ESMP. | Implementation Completion Report (ICR) for GRPMP will need to include an Environmental Compliance Certificate and Social Compliance Certificate given by the UGs/ CAGs indicating that the mitigation measures identified in the appraisal and incorporated in the GPRMP and ESMP (including construction stage) have been implemented. | Implementing Agencies and UGs/ CAGs | ICR with environmental and social compliance information. |
| Operation and Maintenance of GPRMP | **Operation and Maintenance** Environmental and Social mitigation and management measures | To ensure that environmental and social aspects are integrated in the O&M phase. | The Implementing Agencies/ UGs/ CAGs and the PMU takes up all the environmental and social mitigation and management measures as given in the ESMF | Implementing Agencies and UGs/ CAGs | O&M phase environmental and social mitigation and management measures implemented. |

# 8. Specific Mitigation Plans

The following specific mitigation plans which are a part of the ESA and ESMF are prepared:

1. Labour Management Procedures – Prepared as a separate document
2. Integrated Pest & Nutrient Management (IP&NM) Plan – Prepared as a separate document
3. Community Health and Safety Guidelines – Prepared as a separate document
4. Biodiversity Management Plan – Prepared as a separate document
5. Tribal Development Framework– Prepared as a separate document
6. Gender Action Plan – Part of this document
7. Stakeholder Engagement Plan – Prepared as a separate document
8. Resettlement Policy Framework – Prepared as a separate document
9. Environmental and Social Management Plan – Annexed to this report as Annexure 8

# 9. Gender Strategy and Action Plan

## 9.1 Introduction

HP is among India's leading States on gender equality and social development. It has the highest female labor force participation rate in the country (although this has declined since 2005) primarily in agricultural self-employment which remains the mainstay of the state's largely rural economy.

**Women are predominantly engaged in agriculture and post-harvest activities, driven by male out-migration**. The percentage of women agriculture workers is relatively high in HP at 83 percent (2011) compared to other states in India. Further the compound growth rate for female cultivators (1981 – 2001) has increased in HP and is one of the highest in the country at 1.00811. Households in Himachal experience significant rates of semi-permanent, male-dominated, and remittance-based migration12. The state economy is largely agrarian and consequently almost 90 percent of the tasks related to agriculture in Himachal, specifically sowing, irrigation, using fertilizers, reaping, livestock management and post-harvest activities are carried out by women13. Challenges posed by changing climatic conditions, low levels of irrigation, dwindling agriculture productivity and its impact on agriculture and agri-based livelihoods are likely to impact income levels of women cultivators more prominently as compared to men. In addition, women (small and marginal) farmers in the state also face barriers in accessing post-harvest equipment, demonstrations on agriculture technology and micro irrigation interventions

## 9.2 Project Summary

The project development objective (PDO) is to improve upstream eco-system management and increase agricultural water productivity in selected Gram Panchayats of the State of Himachal Pradesh. The project will be implemented in 428 selected GPs in 32 Development Blocks of the ten districts of Shimla, Solan, Sirmour, Bilaspur, Hamirpur, Mandi, Kullu, Chamba, Kangra & Una. The project area shall be covering three out of the four major agro-climatic zones of the State namely Shivalik hills, Mid-hills & the High hills. The key stakeholder beneficiaries of the project include Gram Panchayats, farmers, groups cooperatives including women groups, pastoralists and transhumant. Women, the poor and scheduled population comprises the vulnerable/ disadvantaged section of the local communities. Several

1. Agriculture Census, 2001 and 2011
2. NSS 2007-2008
3. Approach Paper to the Eleventh Five Year Plan
4. Department of Agriculture, Government of Himachal Pradesh

backward Gram Panchayats shall be included in the Project area. The stakeholders are primarily engaged in agriculture and horticulture with supplementation from livestock-based activities. The transhumant includes Gaddis & Gujjars who are totally dependent on forest for rearing their livestock.

*Component 1 (Sustainable land and water management)* will support a) establishment hydrological monitoring stations; b) preparation of Gram Panchayat Resource Management Plans (GP-RMPs); c) Soil and water conservation measures including afforestation, check dams, bunds water harvesting structures, drainage line treatments, gully plugging; d) Plantations, e) Pasture management with rotational grazing, fodder delineated forest, introduction of voluntary systems of rotational grazing in young forest; e) Development of high-quality seed stands f) construction of centralized seed center and climate-controlled seed bank; g) Nursery development h) Forest fire prevention and suppression measures. i) Innovative silviculture pilots and j) operation, maintenance and investment fund (OMIF). *Component 2 (Improved Agricultural Productivity and Value Addition)* will support interventions on a) water harvesting, storage, and distribution infrastructure, small pond excavation, community tank renovation, roof rain-water tanks, traditional irrigation channels, and gravity and lift intake and distribution structures; b) on farm adoption of Climate Smart Technologies; c) "last-mile" market access infrastructure such as footbridges and manually operated, ropeways (but not roads or investments requiring land acquisition); d) matching grants to individual farmers and farmer groups for essential productive assets. *Component 3 (Institutional Capacity Building for Integrated Watershed Management)* will support institutional assessments, functional reviews, institutional strengthening, institutional reforms, change management, capacity building interventions that would enable adoption of more holistic approach towards integrated watershed management, climate change, climate resilient and resource efficient agriculture, including information technology strategy. *Component 4 (project management)* will support key project staff, monitoring and evaluation, grievance redress mechanisms, ESF implementation, overall capacity building, project communication etc.

## 9.3 **Consultations with Women**

The Environment and Social Assessment (ESA) and ESMF preparation exercise conducted by the HPFD involved participatory approaches, especially consultations, public meetings, focus group discussions, and in-depth interviews with the key project stakeholders. This included potential project beneficiaries and residents in project GPs, farmers and livestock rearers, Gram Panchayat representatives and officials, pastoralists and transhumant (Gaddis and Gujjars), as well as Women's self-help groups. These consultations also included disadvantaged and vulnerable population groups, especially landless and marginal farmers, women headed households, scheduled caste households, tribal households.

Women are among the primary stakeholders of the project. The project will be implemented in 428 selected GPs in 32 Development Blocks of the ten districts of

Shimla, Solan, Sirmour, Bilaspur, Hamirpur, Mandi, Kullu, Chamba, Kangra & Una. The project area shall be covering three out of the four major agro-climatic zones of the State namely Shivalik hills, Mid-hills & the High hills. The key stakeholder beneficiaries of the project include Gram Panchayats, farmers, groups cooperatives including women groups, pastoralists and transhumant. Women, the poor and scheduled population comprises the vulnerable/ disadvantaged section of the local communities. Several backward Gram Panchayats shall be included in the Project area. The stakeholders are primarily engaged in agriculture and horticulture with supplementation from livestock-based activities. The transhumant includes Gaddis & Gujjars who are totally dependent on forest for rearing their livestock.

## 9.4 **Gender Strategy**

Women, including active women farmers, women livestock rearers, women headed households and women leaders of self-help groups and PRIs, will be key stakeholders and beneficiaries of the project. This will include women from vulnerable/ disadvantaged sections of the local communities, including from scheduled caste, scheduled tribe and transhumant households. They will benefit from improved access to irrigation water, climate smart extension services, and markets as well as the future reductions in land degradation. Women, and the community at large, will also benefit from employment opportunities in nursery and plantation activities and the development of high value agricultural value chains and Non-timber Forest Products (NTFPs).

Overall, women engaged in agriculture development are key to improving and would need to be engaged in project activities. The project will have potentially significant impact on promoting gender inclusiveness through engagement of active women farmers and women's groups in postharvest management and processing which traditionally employ a higher proportion of female labor. As women farmers are key project stakeholders and carry the risk being excluded, the actions proposed in the table above, aim to mainstream gender issues and concerns in all interventions at every stage, across all institutions and processes. Further, the Stakeholder Engagement Plan identifies women farmers, women-headed households and women's groups as key stakeholders and positively affected project beneficiaries.

The GP-RMPs through a participatory process led jointly by the HPFD, Gram Panchayats and community user groups and will ensure the active inclusion of women and disadvantaged groups. Agriculture extension officers and social extension officers will undergo training to effectively understand and adapt the specific needs of women cultivators in GP-RMPs. As a part of the participatory rural appraisal (PRA) exercise, the preparation of GP-RMPs will take active steps to include interventions suggested by women's federations and community-based organizations with active participation from women.

The value-chain scoping exercise will identify the barriers experienced by small and marginal farmers, predominantly women, in accessing climate smart agriculture

technologies, agriculture inputs such as high-value seeds, post-harvest equipment and subsidies and identify potentially viable clusters of producers based on economic geography. The interventions will focus on: (a) improving the service delivery mechanism of on-farm and off-farm activities to women cultivators through training and capacity building of agriculture extension officers and social extension officers; (b) undertaking demonstrations of agriculture technology and conducting farmer field schools to cater to the needs of women (small and marginal) cultivators and (c) generating awareness through interactive communication campaigns targeting women (small and marginal) cultivators.

The list of project investments will include a subset of activities which are predominantly carried out by women. These include diversification of crops to high-value vegetables, livestock-based activities for small and large ruminants, livestock mangers and post-harvest interventions such as maize chaffing. To incentivize uptake of technologies/innovations under these activities among women cultivators, the project will subsidize the beneficiary contribution for individual women cultivators and women's groups. User groups formed to manage resources under agriculture extension services will have active participation from women including appointing women in decision-making roles such as treasurers.

The matching grant for individual and farmer groups will target small-holder farmers, vulnerable farmers, and marginal farmers, including active women farmers. To ensure women participate in extension trainings and access additional technical support to develop grant proposals, female facilitators will also be hired and trained to provide additional training and support to women-only groups.

The project would ensure targeting and inclusion of the key vulnerable groups especially the landless, agriculture labor, nomadic tribes, and women headed households from SC/ST households within the planning and implementation processes and community institutions. Such vulnerable households will be identified and targeted in the village planning exercise as well as in beneficiary selection for individual and group assets, formation of beneficiary groups, livelihood support interventions, dedicated consultations and identification of special measures for such vulnerable households.

Through the Gender Action Plan, Women farmers/land owners, workers, women headed households and community leaders will be supported by range of actions, especially systematic identification and participation in village plans, beneficiary group leadership, training programs, subproject and investment planning and in targeted beneficiary lists.

The existing cadre of largely women social mobilisers will be provided training support to implement dedicated interventions for women and special vulnerable groups. Convergence with existing state level schemes for skill and enterprise development and financial inclusion will be supported. Special pilot interventions in partnership with resource agencies will be explored.

The key gender actions are summarized in the table below.

Table 9.1: Key Gender Actions

| Project Component | Gender Actions |
|---|---|
| Component 1: Sustainable Land and Water Resource Management | • The main implementers and beneficiaries will be HPFD staff and relevant community organizations, including women's groups.<br>• Agriculture extension officers and social extension officers will undergo training to effectively understand and adapt the specific needs of women cultivators in GP-RMPs.<br>• As a part of the participatory rural appraisal (PRA) exercise, the preparation of GP-RMPs will take active steps to include interventions suggested by women's federations and community-based organizations with active participation from women. |
| Component 2: Improved Agricultural Productivity and Value Addition | • The list of project interventions investments will include a subset of activities which are predominantly carried out by women. These include diversification of crops to high-value vegetables, livestock-based activities for small and large ruminants, livestock mangers and post-harvest interventions such as maize chaffing.<br>• To incentivize uptake of technologies/innovations under these activities among women cultivators, the project will subsidize the beneficiary contribution for individual women cultivators and women's groups.<br>• User groups formed to manage resources under agriculture extension services will have active participation from women including appointing women in decision-making roles such as treasurers.<br>• The matching grant instrument will subsidize essential productive assets (in addition to the on-farm irrigation equipment under the previous sub-component) to individual farmers, specifically active women farmers and women-headed households. |

## 9.5 Gender-based violence: Potential Risks and Mitigation Measures

Based on extensive consultations with stakeholders including women's groups, civil society organizations, administrative/field officials, secondary research and the GBV risk assessment tool, the GBV risk rating at appraisal stage is 'Low'. Project interventions involve minor civil works, engagement of contract labor will be on a small-scale and restricted to activities planned primarily under forest management. No labor camps are expected to be supported under the project and most of the works will be carried out by community members in target Gram Panchayats. Based on extensive consultations with stakeholders including women's groups, civil society organizations, administrative/field officials, secondary research and the GBV risk assessment tool, the GBV risk rating at appraisal stage is 'Low'. The ESA notes that the Government of HP is well-placed to address GBV related risks in the context of proposed project interventions.

To mitigate potential risks related to on-site safety and GBV, the PMU will a) conduct sensitization and awareness drives for contract workers, community laborers and communities on safety, harassment, GBV-related issues, legal recourse

procedures and mitigation channels in collaboration with the police and health departments; b) sensitize the SMS (Social) at PMU and Experts at DPO and APO levels on specific aspects of GBV risk mitigation; c) strengthen the GRM mechanism by establishing multiple channels to initiate a complaint including confidential reporting in local language with safe and ethical documenting of GBV cases and d) engage efficiently with CBOs in the project area to ensure a strong support mechanism; and e) incorporate code of conduct on GBV in bidding documents, as needed.

## 9.6 **Implementation Arrangements**

The Himachal Pradesh Forest Department is the main implementing agency for the HPIDP project. A PMU will be established under the HPFD along with divisional offices to oversee project activities at the District level. Social Expert in the State PMU will be responsible for implementing the gender action plan, through the cadre of Social Extension Officers posted in the block offices. The state Social Expert will be engaging gender consultants and resource persons to build the capacity of the social mobilisers as well as community leaders of the village federations, SHGs and the PRIs.

The project will seek to leverage existing programs (e.g. KVK) and public sector providers such as the extension and research systems and agreements will be reach between agencies to this effect. Activities at the village level will be implemented by the GPs to promote direct community/ beneficiary participation.

## 9.7 **Monitoring**

The proposed gender actions will be monitored against the following indicators introduced in the Results Framework:

- Share of participating farmers adopting climate smart practices that are female (Percentage) (30) - This indicator will measure the closure of a key gender gap related to technology adoption.
- Share of participating female farmers who give a rating of "Satisfied" or above on process and realized benefits of project interventions (Percentage) (75)
- Percentage of women signatories engaged in approving GP-RMPs (Percentage) (30) - These indicators will measure the closure of a gender gap related to women's roles as planners and decision-makers related to natural resources in their communities. Percentage of women signatories will be monitored for every targeted GP. "GP-RMP" refers to the Gram Panchayat Resource Management Plan, which will be the primary planning process used to inform project investments.
- Farmers reached with agricultural extension or training – Female (Number) (3000)
- Farmers adopting improved agricultural technology - Female (CRI, Number) (3000)

- Share of user groups for agriculture extension services with female treasurers (Percentage) (30) - This is a gender indicator to track the closure of a key gender gap related to women's leadership.

Other indicator will measure the closure of a key gender gap related to technology adoption.

# 10. Grievance Redress Mechanism (GRM)

## 10.1 Objective of the GRM

The Project will establish a Grievance Redress Mechanism (GRM) which will be implemented with the aim to respond to queries or clarifications about the project, resolve problems with implementation and addressing complaints and grievances. The GRM will focus on corrective actions that can be implemented quickly and at a relatively low cost to resolve identified implementation concerns, before they escalate to the point of harm or conflict. GRM will serve as a channel for early warning, helping to target supervision to where it is most needed and identify systemic issues.

The GRM will directly focus on and seek to resolve complaints (and requests for information or clarification) that pertain to outputs, activities and processes undertaken by the Project, i.e., those which (i) are described in the Project Implementation Plan; (ii) are funded through the Project (including counterpart funds); and (iii) are carried out by staff or consultants of the organization, or by their partners and sub-contractors, directly or indirectly supporting the project. It is envisaged that such cases would fall under (but are not limited to) the following categories:

- request for information, comment or suggestion, e.g., request for clarification as to the delay in reimbursing expenses of participants in a given training event;
- violation of rights or non-performance of obligations, e.g., complaint by consultant or firm whose contract is suspended as a result of presumed poor performance or non-delivery of agreed-upon outputs;
- grievances or offenses involving a violation of law, e.g., allegations of corruption; and
- complaints against project staff, members of project committees, consultants, and sub-contractors involved in project implementation

## 10.2 Project Grievance Redress Mechanism

### 10.2.1 Institutional Structure

The Project will establish a Grievance Redress Mechanism (GRM) with the aim to respond to queries or clarifications or complaints about the project and address complaints/concerns and grievances of the stakeholders. The GRM will focus on corrective actions that can be implemented quickly and at a relatively low cost to resolve identified implementation concerns. GRM will also serve as a channel for early warning, helping to target supervision to where it is most needed and identify systemic issues. The institutional arrangement for the GRM will be established as following:

a) Project Grievance Officer. The Executive Director of the HPFD will be the ex-officio, senior most official to act as the Grievance Officer for the whole project. The ED will hold quarterly reviews of the functioning of the GRM.
b) State level Grievance Officer. Social Expert.
c) District level Grievance Officer. The District Project Officer (DPO) will be the nodal Grievance Officer at the District Level responsible for receiving, tracking and resolving grievances from the stakeholders
d) Status of Grievances received and resolved will be tracked through the project MIS as well as monthly progress reports from the Districts and Blocks.
e) HPFD will be issuing an office order and necessary notifications to establish and operationalize the GRM for the project.

### 10.2.2 Grievance Channels

Project beneficiaries and stakeholders will be able to submit their grievances, feedback and inquiries to the Project through multiple channels that are summarized below.

a) State Government Portal: The existing mechanism of State Government portal for citizen's grievances and enquires will also cover the Project. HPFD receives regular inputs from this portal on grievances that are to be addressed by the HPFD.

b) Project specific Portal: Project will maintain a portal with dedicated mechanisms for receiving stakeholder grievances. All grievances, feedback and queries received through the project portal will be collated and compiled by the State Social Expert and included in the progress report. The portal will also provide relevant information on the multiple channels that can be used for submitting grievances to the project.

c) Grievance Registers: Grievance Registers will be maintained at District/Block levels to record, track and report on the inflow of stakeholder grievances, enquiries and feedback. The Grievance Registers will help with monitoring and evaluation of the functioning of GRMS.

### 10.2.3 Grievance Process

All grievances, enquires and feedback received through the multiple channels will be tracked through a grievance log that would be maintained through the MIS. Grievances will be directed to the competent nodal grievance officer at the state, district, and block levels for resolution, with recommended timelines. The concerned Grievance Officer will be responding to the grievance/query through phone calls, meetings and letters, in order to resolve the issues. If needed site visits will be undertaken to appraise the exact nature of the stakeholder concerns. The Complainant will be made part of the grievance resolution process, and kept updated of the resolution process through phone calls and formal letters.

Information material on GRM will also inform the stakeholders about grievance escalation hierarchy that would help the complainant to escalate any unresolved issues to higher level officers, as well as the existing state level GRM channels of government portal and grievance committee chaired by the district collectors. The grievance redress process will be a continuous, transparent and participatory process that would be an integral part of the project's accountability and governance agenda.

### 10.2.4 GRM Monitoring and Reporting

The functioning of the GRM will be monitored by the Social Expert in the SPMU and the ED. Status and function of the GRM will be documented and shared by the Social Expert in the SPMU through periodic reports and review meetings. GRMs will also be tracked through the project MIS. Regular GRM Review Meetings will held chaired by the ED, and convened by the Social Expert of the SPMU. The Social Expert will be responsible for presenting status of all matters/ grievances received during the last quarter/month, and the action taken to resolve them. The GRM mechanism will be notified to the public and stakeholders within the 1st 6 months of project effectiveness. The project website will be posting the status of the GRM status periodically on the website of the project.

### 10.2.5 Grievance Redress for Labour, Tribals, etc.

The Grievance Redress arrangements given in this chapter are applicable for the whole project. However, there are specific Grievance Redress requirements given under Labour Management Procedure (LMP), Resettlement Policy Framework (RPF) and Indigenous People Planning Framework / Tribal Development Framework (IPPF/ TDF), which are applicable to the grievances under those plans.

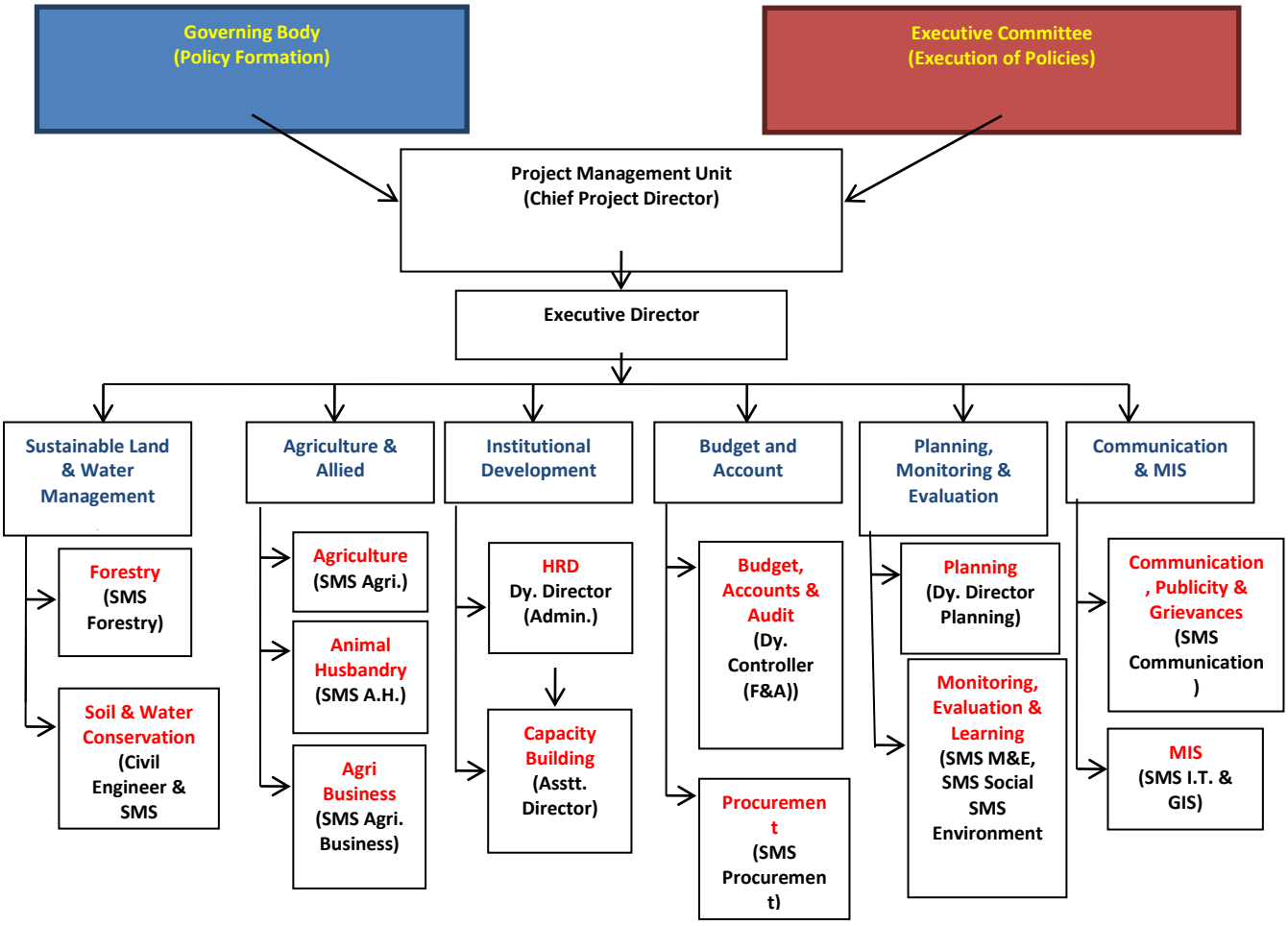
### 10.2.6 Grievance Redress Service of The World Bank

In addition to seeking to resolve their grievances through the GRM established at the government level, "communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project such as this operation may also submit complaints to the Grievance Redress Service (GRS) established by the World Bank. The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may also submit their complaint to the WB's independent Inspection Panel, after having brought the complaint to the World Bank's attention through its GRS. Information on how to submit complaints to the World Bank's Grievance Redress Service is available athttp://www.worldbank.org/GRS. Information on how to submit complaints to the World Bank Inspection Panel is available atwww.inspectionpanel.org.

# 11. Implementation Arrangements

## 11.1 Project Implementation Arrangements

The Project will leverage the State's broad-based experience and expand it to the relatively newer areas of labor and working conditions, stakeholder engagement and community health and safety. The ESA has noted the presence of basic safeguard capacity with the HPFD, and has recommended institutional capacity building measures for HPFD and other line departments such as animal husbandry, agriculture, horticulture and rural development. ESF implementation will involve 1 Social and 1 Environment Specialist along with 1 support staff for each in the State level PMU, and these state experts will be supported by short term consultants and resource persons for implementing the ESF. Implementation of ESF interventions in the project GPs will be carried out by the social (52 no) and forestry extension officers (52). The overall project implementation arrangement at PMU is given below:

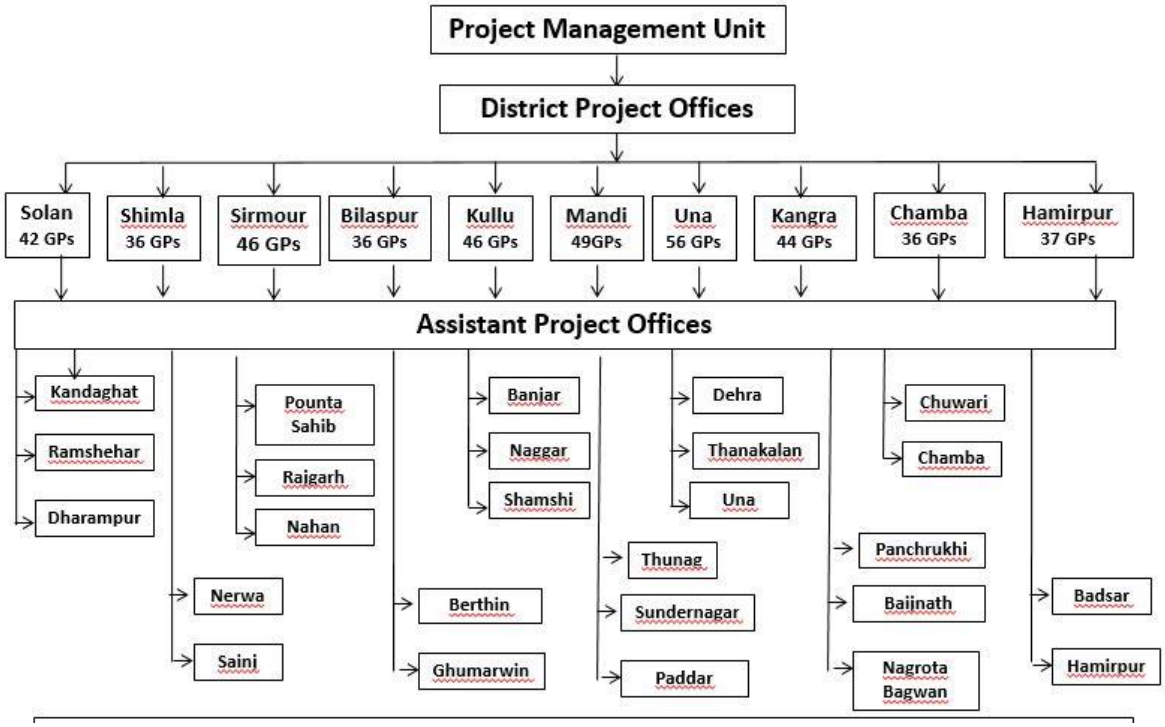



The following implementation arrangements are proposed to be in place for implementing the environmental and social aspects and monitoring the same.

Table 11-1: Project Implementation Arrangement

| Level | Environment & Social Implementation and Monitoring Arrangements | Responsibility |
|---|---|---|
| PMU | Subject Matter Specialist – Environmental (SMS-E) - 1<br>Subject Matter Specialist – Social (SMS-S)- 1<br>Environmental Extension Officer (EEO) - 1<br>Social Extension Officer (SEO) – 1 | Overall responsibility for the entire project on environmental and social safeguards, gender and social development issues. Guidance to DPOs and APOs<br>Monitoring and Evaluation<br>Training and Capacity Building<br>GRM<br>Reporting |
| DPO | District Project Officer (DPO) – 10 | Overall responsibility for the project at DPO level on environmental and social safeguards and social development issues as link between PMU and APOs.<br>Support in preparation of GPRMPs<br>Guidance to APOs<br>Training and Capacity building<br>Monitoring and Evaluation<br>GRM<br>Reporting |
| APO | Forest Extension Officers (FEOs) – 52<br>Social Extension Officers (SEOs) – 52 | Screening, GPRMP Preparation Support, ESMP Implementation, Community mobilization, engagement and participation, Monitoring, grievances, reporting, etc. |

The overall district level arrangements are given below:



### 11.1.1 Implementation Arrangements for Labour, Tribals, etc.

The Implementation arrangements given in this chapter are applicable for the whole project. However, there are specific responsibilities allocated to the Project Responsible Staff, as per the requirements of Labour Management Procedures (LMP), Resettlement Policy Framework (RPF) and Indigenous People Planning Framework / Tribal Development Framework (IPPF/ TDF), which are applicable to the implementation of those plans.

# 12. Monitoring, Evaluation and Reporting

## 12.1 Introduction

The ESMF requires detailed supervision, monitoring and evaluation of the impact of the project on environmental and social aspects. In order to carry out this, Project will have specific arrangements made at PMU, DPO and APO level as mentioned above. This includes continuation of appointed Environmental and Social Subject Matter Specialists for the project period at PMU level. Further the project will have one District Project Officer in each District to guide the APOs on environmental and social matters related to project components, DPO will guide the APOs on how to implement the ESMF and ESMP. At the APO level there will be two Forest Extension Officers and two Social Extension Officers. They will oversee the implementation of the provisions of ESMF and ESMP. The PMU level SMS-E and SMS-S and the EEO and SEO at the PMU will train the FEOs and SEOs in the ESMF and ESMP implementation. In addition several orientations and trainings are proposed as a part of this ESMF to build their capacity.

The PMU will be in charge of implementing the ESMF. The SMS-E and SMS-S will guide and oversee ESMF implementation and will be supported at field level by the staff of DPOs and APOs and their staff. Further the Project will incorporate the provisions of this ESMF as actionable points in the Project Implementation Plan or other similar document prepared for the project. The SMS-E and SMS-S will oversee the application of these provisions and guide the process, while at the same time building the capacity of the DPOs, APOs and their staff.

The following provisions include the arrangements made for the effective implementation of the ESMF:

## 12.2 ESMF supervision

All the GPRMPs will be visited at regular intervals by SMS-E, SMS-S, EEO and SEO at PMU to check if all environmental and social safeguard requirements are met and to identify any issues that need to be addressed. PMU would submit Half-Yearly (every 15th July and 15th January) progress reports to **The World Bank on environmental and social safeguards implementation.**

On Half-Yearly basis, the PMU will prepare a report of the environmental and social safeguards status in the project districts including data and analysis of relevant parameters as given below:

### 12.2.1 Environmental Indicators

- Changes in Groundwater Table
- Surface Water Quality
- Soil Quality

- Survival of plantations (%)
- Instances of archeological chance finds
- Instances of Pest and Disease attacks
- Reduction in pest and disease attacks
- Number of Farmers using bio-pesticides
- Reduction in water usage for Agriculture and Horticulture
- Produce per unit of water used
- Number of climate resilient varieties used
- Number of communities taking up conservation and source sustainability activities
- Any induced impacts/activities arising from undertaking the project financed investments such as demand for (a) rural/feeder roads, (b) change in agriculture crops, due to increase availability of water and support services
- Number of trainings organized and type of trainings

12.2.2 Social Indicators

- Number of grievances registered and resolved
- Number of court cases
- Number of women members in UGs/CAGs/ Federations
- Number of trainings held
- Number of women trained
- Income restoration of communities
- Livelihood Enhancement
- Land holding status
- Literacy
- Housing
- Ownership of household assets

This report also should give a listing of relevant new legislation and regulations that have a bearing on the environmental and social performance of the project and will be submitted to The World Bank. The ESMF will be suitably revised as and when required by the PMU.

## 12.3 Monitoring Plan

Given in the table below are indicators for project interventions, for which monitoring need to be taken up by PMU and the DPO/APO in a regular manner.

Table 12.1: Monitoring Indicators

| Monitoring Indicators | Frequency | Agency |
|---|---|---|
| **Environmental** | | |

| | | |
|---|---|---|
| • Changes in Groundwater Table<br>• Surface Water Quality<br>• Soil Quality<br>• Survival of plantations (%)<br>• Instances of archeological chance finds<br>• Instances of Pest and Disease attacks<br>• Reduction in pest and disease attacks<br>• Number of Farmers using bio-pesticides<br>• Reduction in water usage for Agriculture and Horticulture<br>• Produce per unit of water used<br>• Number of climate resilient varieties used<br>• Number of communities taking up conservation and source sustainability activities<br>• Any induced impacts/activities arising from undertaking the project financed investments such as demand for (a) rural/feeder roads, (b) change in agriculture crops, due to increase availability of water and support services | • Concurrent Monitoring by PMU and DPO offices<br>• Environmental and Social Monitoring and Evaluation of sampled GPRMPs by Independent Consultants during 3rd and 5th year.<br>• Half Yearly Reports by PMU | • PMU guiding the collection of information on indicators<br>• DPO with APO collecting information at field level<br>• Implementing Agencies/ Departments for department specific information |
| • Social | | |
| • Number of grievances registered and resolved<br>• Number of court cases<br>• Number of women members in UGs/ CAGs/ Federations<br>• Number of women trained<br>• Income restoration measures taken up with communities<br>• Livelihood Enhancement Activities undertaken<br>• Change in Incomes and their patterns<br>• Change in Land holding status<br>• Change in Income from Forests<br>• Changes in occupations<br>• Housing status<br>• Ownership of household assets<br>• Introduction of new species<br>• Introduction of new breeds of livestock<br>• Yield of crops<br>• Incomes from project activities | • Concurrent Monitoring by PMU and DPO offices<br>• Environmental and Social Monitoring and Evaluation of sampled GPRMPs by Independent Consultants during 3rd and 5th year.<br>• Half-Yearly Reports by PMU | • PMU guiding the collection of information on indicators<br>• DPO with APO collecting information at field level<br>• Implementing Agencies/ Departments for department specific information |
| **Other** | | |

| | | |
|---|---|---|
| • No. of training programs conducted<br>• No. of personnel trained<br>• Achievement of learning objectives<br>• Extent of application of methods, tools and techniques learnt during training | • Concurrent Monitoring by PMU and DPO offices<br>• Environmental and Social Monitoring and Evaluation of sampled GPRMPs by Independent Consultants during 3rd and 5th year<br>• Half-Yearly Reports by PMU | • PMU guiding the collection of information on indicators<br>• DPO with APO collecting information at field level<br>• Implementing Agencies/ Departments for department specific information<br>• State Forest Training Institute, Chail & Sundernagar |

## 12.4 Environmental and Social Monitoring at 3rd and 5th Year

The concurrent internal environmental and social monitoring will be done as part of the regular monitoring by the PMU and DPO and APO level implementing agencies. However, project will appoint Independent Environmental and Social Monitoring and Evaluation Consultants to do the environmental and social monitoring and evaluation at the beginning of 3rd and 5th year of project implementation.

The core objective of Monitoring and Evaluation by Independent Consultants is to review the ESMF compliance in project implementation and for corrective actions. The other objectives are:

- To review and verify compliance with ESMF during project planning and implementation.
- To assess the individual and cumulative impacts of the GPRMPs and how the project area is sensitive to the project activities.
- To assess the effectiveness of implementation of ESMF in the GPRMP activities and reporting any gaps.
- To review and verify how well the environmental and social management systems are performing and how well the environmental and social management plans are being implemented.
- To identify and document best practices in environment and social safeguards compliance.
- To assess institutional and administrative effectiveness and make recommendations on improving ESMF compliance performance.
- To make recommendations to improve ESMF implementation.

# 13. Capacity Building Strategy

## 13.1 Introduction

The Project will give its staff and the participating communities some exposure to the Environmental and social safeguards issues. But the interactions with them reveal that, this mere exposure is not enough for conducting screening, preparing and implementing environmental and social management plans, and monitoring. They need to have awareness, sensitivity, skills and hands-on experience regarding the social aspects of GPRMPs planning and implementation.

For seamless adaption of the environmental and social principles and safeguards by all the implementing partners, awareness creation and capacity building becomes necessary. The capacity building activities may be taken up by State Forest Training Institute at Chail & Sundernagar, other specialist institutions, consultants, etc. to deliver trainings to project stakeholders on environmental and social safeguards and their management. The specialized agencies would be provided flexibility to bring in expert resource from the market to augment their own capacities. The project will provide additional support to bolster the existing capacities of these institutions to deliver trainings on environmental and social safeguards, participatory approaches and inclusion.

This capacity building and IEC strategy has been outlined as part of this ESMF developed for the project aims at building environmental and social awareness and management capacity in the project administration structure as well as in the intended target communities. Capacity building for environmental and social management will be integrated with overall capacity building component of the project.

### 13.1.1 Objectives

The objectives of the capacity building initiatives are:

- To build and strengthen the capability of Project's PMU, DPOs and APOs staff, participating implementing agencies, to integrate sound environmental and social management into GPRMP implementation.
- To orient the Project staff, participating implementing agencies and communities to the requirements of the project's ESMF.

### 13.1.2 Approach

Systematic capacity building initiatives need to be introduced only after completion of Training Needs Assessment. All the trained staff and master trainers developed for different training components will in turn conduct onsite or offsite trainings (at district, block or GP levels) depending on training requirement. However, since capacity building goes beyond mere imparting training, institutionalization of best practices becomes a prerequisite for improved GPRMP environment and social

management. The training outcomes like trainees' understanding of the training content, achievement of learning objectives, application of methods, tools and techniques learnt during training, etc. will need to be monitored. This will be done through periodic tracking of learning outcomes.

#### 13.1.3 Training Providers

In view of the specialized training and capacity building envisaged under the ESMF of the project, it is necessary to identify nodal training institutes that will work closely with PMU for conceptualizing, designing and conducting training programs on the ESMF. The State forest training institute may conduct these trainings and will partner with other state based institutes and universities, autonomous institutions, etc. for conducting these specialized trainings.

### 13.2 Details of Training Programs

#### 13.2.1 T1. Orientation/ Learning Training Programs

**Purpose of the training:**

- To orient the project staff at the project launch towards the environmental and social issues of the project
- To orient the project staff about the ESMF and its importance, provision and implications. There after annual orientation cum experience sharing and learning training programs will be conducted.
- To re-orient the project staff on the ESMF and to share their experiences in implementing the ESMF
- To draw lessons learnt during the implementing the ESMF and to incorporate them into the ESMF revision.

**Participants:** All Key officials of the project including PMU, DPOs, APOs, participating implementing agencies, NGOs and members of community institutions. PMU will be responsible for selection of suitable candidates for the training, and the expense will be borne from the overall project capacity building budget and will be completed in the first year of the project.

#### 13.2.2 T2. Training on the ESMF and ESMP

**Purpose of the training:**

- To equip with knowledge and skills necessary for undertaking environmental and social screening and appraisal as per the requirements of the ESMF and preparation of management/ mitigation plans
- To prepare for undertaking periodic supervision of implementation of environmental and social management/ mitigation plans and performance of GPRMPs
- To apply community led system for Environmental and Social Monitoring

**Participants:** Key officials of the project including PMU, participating implementing agencies, NGOs and members of community institutions –UGs/ CAGs/ Federations. PMU will be responsible for selection of suitable candidates for the training, and the expense will be borne by the overall project capacity building budget and will be conducting as and when required in the first 3 years of the project. The initial ESMF training to key project implementers will be completed within the first 6 months of the project initiation.

13.2.3 T3. Training on Environmental and Social Management

**Purpose of the training:**

- To equip with knowledge and skills necessary for meaningful participation in the social appraisal as per the requirements of the ESMF and ESMP
- To prepare for planning and monitoring implementation of environmental and social mitigation/ management measures identified through the appraisal process
- To equip with skills necessary for Community Based Environmental and Social Monitoring

**13.3** Participants**: NGOs, Participating Agencies Staff, GP Representatives, Ugs/ CAGS/ Federations Representatives.**

The DPO office will be responsible for selection of suitable candidates for the training, and the expense will be borne by the overall project capacity building budget.

Table 13.1: List of Training Programs

| **List of Training Programs** | | |
|---|---|---|
| S. No. | Topics | Number of Trainings |
| 1 | T1 – Orientation and Learning Training | 5 |
| 1 | T1 – Environmental and Social Management Framework | 10 |
| 2 | T3 – Environmental and Social Management | 20 |
| | Total | 35 |

About 20 to 30 trainees would participate in each of the training programs. It is intended that these trained persons will in turn provide onsite training to Participating Agencies ' Staff, NGOs, resource persons, etc. onsite at district/ block level.

## 13.4 Training Budget

The total estimated cost of training on Environmental and Social Management for members of Project, Participating Agencies' Staff, NGOs, etc. under the proposed Project is presented in the table below:

Table 13.2: Training Budget

| **Training Budget** | | | | |
|---|---|---|---|---|
| S. No. | Training | No. of Programs | Estimated Unit Cost in Rs. | Total Cost In Rs. |
| 1 | T1 | 5 | 2,00,000 | 10,00,000 |
| 2 | T2 | 10 | 2,00,000 | 20,00,000 |
| 3 | T3 | 20 | 2,00,000 | 40,00,000 |
| 4 | Workshops (State) | 5 | 200000 | 10,00,000 |
| 5 | Workshops (District) | 10 | 1,00,000 | 10,00,000 |
| 6 | Provision for other Training, Expenses, etc. | | | 10,00,000 |
| 7 | Total | | | 1 Crore |

# 14. Budget

## 14.1 Introduction

The total administrative budget for environmental and social management activities under the proposed Project has been worked out as Rs. 15.48 Crore. The cost of implementing the proposed mitigation measures is not included in this costing. The cost of mitigating environmental and social impacts need to be included in the respective GPRMPs' budgets. The detailed breakup of the administrative budget is presented in the table below.

Table 14.1: Total administrative budget for environmental and social management activities

| S No. | Activity | Amount in Rs. Crores |
|---|---|---|
| 1 | SMS-E, SMS-S, EEO and SEOs (53) - this cost is borne by overall project budget for hiring persons for these positions | 6.33 |
| 2 | Training and workshops (as estimated) | 1.00 |
| 3 | External Independent Monitoring and Evaluation consultants during 3rd and 5th year | 1.00 |
| 4 | Preparation of specific environmental and social related community awareness materials @ 1 lakh per district for 10 districts and 5 lakh at state level | 0.15 |
| 5 | TDF Implementation Cost | 7.00 |
| | **Total** | **Rs. 15.48 Crores** |

## 14.2 Means of Disclosure

This Final ESA, ESMF, ESMP along with RPF and the TDF are disclosed on the project website along with the Hindi translation of the executive summaries. The documents along with the executive summaries in Hindi, will be kept at the PMU, DPOs and APOs Offices and District Collector's Office, for interested persons to read and copy. This will be made available at the Gram Panchayat Offices of the concerned villages.

# 15. Annexures

## 15.1 Annexure 1: Screening Formats

### C. Environment Screening

**Part 1: Environmental Data Sheet**

| | | |
|---|---|---|
| | Date of Screening: | |
| | Name of Gram Panchayat | |
| 1. | List of activities to be supported under the plan: | |
| 2. | Area of GP (ha) | |
| 3. | Forest Area<br><br>Status<br><br><br>Key Tree Species selected for afforestation<br><br>Current use of forest for any livelihood activity<br><br>Area infested by exotic/noxious weeds | _____ Ha<br><br>☐ Degraded ☐ VDF ☐ MDF ☐ Open Forest<br><br>_____:<br><br>_____<br><br>_____ Ha |
| 4. | Pasture Land<br>Season when fodder is available<br>Livestock numbers | _____ Ha<br>_____ No #<br>_____ No # |
| 5. | Forest Fire Vulnerability<br>Forest fire incidences | _____<br>_____ No #/ year |
| 6. | Availability of NTFPs, MAPs and minor forest produce<br>Key NTFP species:<br>Quantity harvested each season (species-wise): | |
| 7. | Presence of Forest nursery, or nearest nursery site | _____ No # and area (ha)<br><br>Annual production capacity (saplings/year): |
| 8. | Existing Forest management plan for the selected forest area in the GP | _____ (name of working plans/ management plans etc.) |
| 9. | Are any civil works proposed as part of the project in this plan? | |
| 10. | Are there any religious sites, culturally important sites in the project activity area? If yes, please give details (name, distance from project site). | |

**Part 2: Eligibility Screening**

| S No | **Activities listed below will NOT be eligible for support under the proposed project** | **Confirmation that the activity is NOT part of the project (please tick)** |
|---|---|---|
| 1. | Activities that are not consistent with the Forest Working plans/ CAT plans of the area | |
| 2. | Activity that involves construction of check dam > 6 m height | |
| 3. | Activities that promote or involve procurement of pesticides that falls in WHO classes IA, IB, or II. | |
| 4. | Activities that involve large-scale clearing of land, dredging of water bodies, undercutting of slopes, replacement of natural vegetation, habitat destruction, etc., that may cause permanent, irreversible impacts. | |
| 5. | Any activity that has a significant potential of causing forest fires. | |
| 6. | Any activity that involves child labour (persons under | |

| | | |
|---|---|---|
| | 14 years of age in any activity and persons above 14 years and under 18 years of age in hazardous activities). | |
| 7. | Activities that would adversely affect places of cultural significance and protected historical/archaeological assets (both natural and human-made). | |
| 8. | Activities that involve felling of trees without a permit. | |
| 9. | Activities that involve NTFP/MAP harvesting without approvals/permits | |
| 10. | Any activity that is not consistent with the project description at time of project negotiations, unless subsequently agreed to with the Bank along with the appropriate level of environmental safeguards management. | |
| 11. | Activities which require land acquisition. | |
| 12. | Activities which put permanent restrictions on access/ usage of resources. | |

**Part 3: Legal and Regulatory Requirements Checklist**

| **Legal and Regulatory Requirement** | **Applicability to the project** | **Compliance (in case it is applicable)** |
|---|---|---|
| Consent for Establishment and Consent for Operation from the HP Pollution Control Board in case of NTFP/MAP processing activities | ☐ Applicable to activities under the project<br>☐ Not Applicable to activities under the project | If Applicable,<br>☐Consent Taken<br>☐Consent not taken<br>Consent will be taken by _____date |
| Permit for transit of NTFP/MAP in case of NTFP/MAP marketing and processing activities | ☐ Applicable to activities under the project<br>☐ Not Applicable to activities under the project | If Applicable,<br>☐Consent Taken<br>☐Consent not taken<br>Consent will be taken by _____date |
| Permit for tree felling from the HP Forest Department in case any activity involves felling of trees | ☐ Applicable to activities under the project<br>☐ Not Applicable to activities under the project | If Applicable,<br>☐Consent Taken<br>☐Consent not taken<br>Consent will be taken by _____date |
| Permit for ground water extraction from the HP Ground Water Authority in case any activity requires groundwater extraction (if required) | ☐ Applicable to activities under the project<br>☐ Not Applicable to activities under the project | If Applicable,<br>☐Consent Taken<br>☐Consent not taken<br>Consent will be taken by _____date |
| | | |

**D. Social Screening**

1. Land Requirement

| Details | Unit | Quantity | Classification/Category/ Details | Present Uses and Users |
|---|---|---|---|---|
| Government Land | | | | |
| Private Land (Donated) | | | | |
| Forest Land | | | | |
| Title Holder | | | | |
| Non-titleholders (Encroacher) | | | | |
| Non-titleholders (Squatter) | | | | |
| People losing livelihoods/ access due to loss of Govt. Lands to Project | | | | |

2. Common Property Resources Affected: (Please give each type by number)

| Type | Unit | Quantity |
|---|---|---|
| | Number | |
| | Number | |
| | Number | |
| | Number | |
| | Number | |

**Other**

| Question | Yes | No | Details |
|---|---|---|---|
| **Legal/ Disputes** | | | |
| Does this land comes under FRA in terms of unsettled claims? | | | If YES, please choose any other piece of land |
| Does this land comes under High Court Order for Eviction of Encroachments? | | | If YES, please choose any other piece of land |
| Is this land been encroached? | | | If YES, please choose any other piece of land |
| Does this land comes under any kind of dispute from forest dwellers? | | | If YES, please choose any other piece of land |
| **Access/ Use Restrictions on Land** | | | |
| Does this land fall in or restricts access of communities to their conserved areas, sacred groves, with no other accessible routes available? | | | If YES, please choose any other piece of land |
| Does this land impact anyone adversely? | | | If YES, please choose any other piece of land |
| Does this land impacts anyone's access to resources? | | | If YES, please choose any other piece of land |
| Does the proposed activities use land that is under Customary Ownership? | | | If YES, please choose any other piece of land |
| **Tribal Related** | | | |
| Are there any tribal in the Gram Panchayat where | | | Please collect the details of the tribals using |

| | | | |
|---|---|---|---|
| the GP-RMP is proposed? | | | the Socio-Economic Survey format and refer to TDF. |
| Are these trials consulted during the preparation of GP-RMP | | | If NO, please give reasons |
| Are these tribal part of the beneficiaries? | | | If NO, please give reasons |
| **Labour** | | | |
| Is labour required for implementing this GP-RMP? | | | If YES, please give a) approximate number of labour and b) duration of their requirement. |
| Can the labour requirement be met with local labour? | | | If No, please give details from where the labour will be brought. |
| **Cultural Heritage** | | | |
| Please give details of the cultural heritage of the area ? | | | Give full details |
| Will the proposed activities disturb/ adversely impact the cultural heritage of the area ? | | | If YES, please give the details. |
| **Vulnerable & Disadvantage groups** | | | |
| Please list the vulnerable/ disadvantaged groups in the GP. | | | Please give full details |
| Have they been consulted in preparation of GP-RMP ? | | | If No, please give reasons as to why they are not consulted. |
| Will they be part of the beneficiaries under the GP-RMP ? | | | If No, please give reasons |
| **Community Health and Safety** | | | |
| Will the proposed activities affect the community health and safety? | | | If YES, please give details. |

**Screening checklists filled by:**
Name: _____
Designation: _____
Date: _____

**Screening checklists verified by:**
Name: _____
Designation: _____
Date: _____

**c. Socio-economic Survey Format**

| | | | |
|---|---|---|---|
| 1 | Name of the Head of the Household | | |
| 2 | Social Category | 1. SC 2. ST 3. OBC 4. General 5. Others (specify)…… | |
| 4 | Family Pattern | 1. Joint 2. Nuclear 3. Single 4. Extended | |
| 5 | Size of Family | 1. Small (2-4) 2. Medium (5-7) 3. Large (Above 7) | |
| 6 | Mother Tongue | Specify | |
| 7 | Native Place | | |

8. Household Assets (Please Record Numbers)

| TV | Heater | Cycle | Two wheeler | Four Wheeler | Mob. Phone | Refrigerator | Other |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

9. Live Stock Assets (Please Record Numbers)

| Classification | Cows | Buffaloes | Sheep | Goats | Poultry | Others |
|---|---|---|---|---|---|---|
| Give Number | | | | | | |

10. Access to Utility (1-Yes/ 2-No)

| Electricity | water supply Source | Own water sources, well, tube well | Separate Bath, Toilet | Kitchen |
|---|---|---|---|---|
| | | | | |

11. Type of fuel used for cooking: (1-Yes/ 2-No)

| Firewood in village | Firewood in forest | Bio gas | Kerosene | Gas (LPG) | Charcoal | Others |
|---|---|---|---|---|---|---|
| | | | | | | |

12. Kindly indicate the consumption/expenditure on different items

| S.No | Particulars | Monthly Expenditure in Rs. | Rank them from highest to lowest |
|---|---|---|---|
| 1. | Food | | |
| 2. | Agriculture | | |
| 3. | Housing | | |
| 4. | Cooking Fuel | | |
| 5. | Clothing | | |
| 6. | Health | | |
| 7. | Education | | |
| 8. | Local transport | | |
| 9. | Communication | | |
| 10. | Social functions | | |
| 11. | Leisure | | |
| 12. | vehicle maintenance | | |
| 13. | out station travel | | |
| 14. | Loan Repayment | | |
| 15. | Others | | |

13. Health and Sanitation

| | | | |
|---|---|---|---|
| 1 | Do you have a latrine in your house? | 1 – Yes; 2 – No; 3 – Using community toilet; 4-Outside (open place) | |
| 2 | Do you and your family members use it? | 1. Yes (All of us always regularly)<br>2. Yes (Some of us, but irregular)<br>3. No. | |
| 3 | Do you wash your hands with soap after defection? | 1. Yes (All of us always regularly)<br>2. Yes (Some of us, but irregular)<br>3. No. | |
| 4 | Which is the nearest formal medical facility available? | PHC – 1; CHC- 2; District Hospital – 3; Private clinic – 4; Private Hospital – 5; Others – 6 | |
| 5 | Have you heard about HIV/AIDS: | Yes 1; No – 2 | |
| 6 | If yes, what is the source? | Newspaper – 1; TV- 2; radio- 3; NGO camp– 4; Govt. camp – 5; | |

14. Details of Family Members (fill appropriate code)

| S.No | Name of the Person | Relationship with Head of the Household | Sex (M/F) | Age | Marital Status | Educational Qualification | Employment Status | Reason for not working | Occupation | | Professional Skills | Monthly Income | | Vulnerable | Beneficiary of Govt. Scheme |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Primary | Subsidiary | | Primary | Subsidiary | | |
| | | | | | | | | | | | | | | | |
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Marital Status: 1-Married; 2-Unmarried; 3-Divorcee; 4-Separate; 5-Widowed
Educational Qualification: 1 – illiterate; 2 – Informal education; 3 – Class1–3; 4 – Class4–6; 5 – Class7–9; 6 – Class10; 7 – Class11–12; 8 – Graduate and above; 9 – Professional; 99 – not applicable [not of school going age]
Employment Status: Yes1; No 2
Reason for not working: No work available-1; Seasonal inactivity-2; Household family duties-3; Old/Young-4; Handicapped-5; Others-6 (Specify)_____
Occupation : 1 – Housewife; 2 – Retired/Old age; 3 – Farmer;/Tiller; 4 – Agriculture labour; 5 – Skilled labour /e.g. Carpenter, Plumber, Driver, Mason, etc; 6 – Unskilled labour/e.g. Construction labourer, Loader, House help/ House maid, Caretaker; Watchman, etc; 7 – Traditional Artisan; 8 – Services e.g. Barber; Milkman, Dhobi; Cobbler; etc; 9 – Petty shop; 10 – Vendor; 11 – Business;(e.g., Shop–owner); 12 – Collection of NTFP and MFP; 13 – Government service; 14 – Private service; 15 – Others_____ ; 99 – Not Applicable;
Professional Skills: Computer-1, typing-2, construction-3, mechanics-4, carpentry-5, driving-6, others (specify) ……7
Vulnerable: 1 – Visual; 2 – Hearing/and/ or speech; 3 – Orthopaedic; 4 – Mentally ill; 5 – Mentally retarded; 6 – Cerebral Palsy; 7 – HIV; AIDS; 8 – Widowed; 9 – Separated; 10 – Old age; 11 – Destitute; 12 – Orphaned; 13 – Trans-sexual; 14 – Chronically ill; 15 – Any other [specify] _____

## 15.2 Annexure 2: FGD cum Community Consultation Checklist

**Background Information**

| | | | |
|---|---|---|---|
| 1. | **Community Consultation Date** | | |
| 2. | **Village** | | |
| 3. | **Gram Panchayat** | | |
| 4. | **Block** | | |
| 5. | **District** | | |
| 6. | **Sub-Catchment** | | |
| 7. | **Division – Range** | | |
| 8. | **Community Consultation Venue** | | |
| 9. | **Stakeholder Group** | | |
| 10. | **Number of persons attending the Consultation** | Male: Female: (Attach Attendance Sheet) | |
| 11. | **Timing** | Start Time | |
| | | End Time | |
| 12. | **Moderator** | | |
| 13. | **Documenter** | | |

## Introduction: About Project: Introducing Project Components

Please give your views on the Positive Impacts (benefits) and Negative (adverse) Impacts due to the project components given below:

| Component | Sub-Component | Environmental Impacts | | Social Impacts | | Remarks |
|---|---|---|---|---|---|---|
| | | Positive Impacts (Benefits) | Negative (Adverse) Impacts | Positive Impacts (Benefits) | Negative (Adverse) Impacts | |
| | | | | | | |
| Component 1: Sustainable Land and Water Resource Management | **Biological and Engineering Measures** | | | | | |
| | Plantations (a.Conservation plantations; Three tier plantations: trees, shrubs and herbs/grasses, Two tier plantations: Trees and herbs, b. Enrichment plantations; 400, 500, 600, 700, or 800 plants per hectare and c. Plantation along drainage lines; Two tier plantation of Bamboo, water loving species and grasses.) | | | | | |
| | Lantana eradication | | | | | |
| | Contour trenching (for moisture conservation; along with grass seed sowing/ planting, Contour trenches, Grass seeds/seedling sowing/planting) | | | | | |
| | Drainage lines Treatment (Dry Stone barriers along with vegetative measures and Crate wire barriers along with vegetative barriers) | | | | | |
| | Water Harvesting and Irrigation (Renovation and rehabilitation of traditional water sources, Ponds and Tanks; New and Repair of existing non-functional, Gravity Check Dams (Cement Concrete, Masonry, Earthen), Minor Irrigation Schemes; Gravity and Lift) | | | | | |
| | Improvement of pastures management | | | | | |
| Component 2: | **Institutional Strengthening** | | | | | |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | | Remarks |
|---|---|---|---|---|---|---|
| | | Positive Impacts (Benefits) | Negative (Adverse) Impacts | Positive Impacts (Benefits) | Negative (Adverse) Impacts | |
| | | | | | | |
| Improved Agricultural Productivity and Value Addition | Farm Training (Capacity Building, Farming Camps, Livestock Shows, etc.) | | | | | |
| | **Agriculture** | | | | | |
| | Rainfed Crop Demonstration(Rabi) | | | | | |
| | Rainfed Crop Demonstration(Kharif) | | | | | |
| | Rainfed Crop Demonstration PULSES | | | | | |
| | High Value Crops Demonstrations | | | | | |
| | Diversification - Vegetable and Spices | | | | | |
| | Diversification - Medicinal, Aromatic Plants & Floriculture | | | | | |
| | Promotion of Organic farming - | | | | | |
| | Agro Forestry (notional 100Plts/ha) | | | | | |
| | Homestead Horticulture | | | | | |
| | Pre & Post Harvest Technologies | | | | | |
| | **Fodder** | | | | | |
| | Manger Construction | | | | | |
| | Fodder Augmentation | | | | | |
| | Fodder Conservation | | | | | |
| | **Livestock** | | | | | |
| | Veterinary Awareness Camps | | | | | |
| | Promotion of Climate Resilient Indigenous Breeds | | | | | |
| | **Tribal Action Plan** | | | | | |
| | Training and Exposure Visits | | | | | |
| | Deworming of Flocks | | | | | |
| | Flock Management | | | | | |
| | Genetic Improvement - (Rams, Bucks, etc.) | | | | | |
| | **Agribusinesses** | | | | | |
| | Support to Crop Based Interventions (Nursery raising, Hydroponics, Protected Agriculture, Mushroom farming, HVC Processing, | | | | | |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | | Remarks |
|---|---|---|---|---|---|---|
| | | Positive Impacts (Benefits) | Negative (Adverse) Impacts | Positive Impacts (Benefits) | Negative (Adverse) Impacts | |
| | | | | | | |
| | Floriculture, Apiculture, etc.) | | | | | |
| | Support to Livestock Based Interventions (Goat, Sheep, Dairy, Poultry, Piggery, Fishery, etc.) | | | | | |
| | Support to NTFP Based interventions | | | | | |
| | Enhancing Market Accessibility (Foot Bridges/ Ropeways etc.) | | | | | |
| Component-3: Institutional Development | Information, Education & Communication (IEC) (for awareness about the project, access to information, terms of participation and overall transparency among all the stakeholders. This will include preparation of Brochure, Pamphlets, Booklets, Banners, Hoardings, etc.) | | | | | |
| | Forming and strengthening local institutions (Formation of specific user groups (UGs) and common activity groups (CAGs) for the inclusiveness of vulnerable and disadvantaged groups – women, poor, transhumant, landless, small/ marginal farmers for particular activity as and when activity picks up, Promote and support the federations (of SHGs, CAGs) and Disburse incentive fund to the GPs selected based on their performance against certain select indicators.) | | | | | |
| | Human Resource Development (Capacity Building of staff and Community by imparting training, workshops and exposure visits.) | | | | | |
| | Knowledge Management (Under this component management of information system will be developed and implemented. | | | | | |

| Component | Sub-Component | Environmental Impacts | | Social Impacts | | Remarks |
|---|---|---|---|---|---|---|
| | | Positive Impacts (Benefits) | Negative (Adverse) Impacts | Positive Impacts (Benefits) | Negative (Adverse) Impacts | |
| | | | | | | |
| | This includes an integrated information and knowledge system for effective project implementation, physical and financial monitoring, assessment of key performance monitoring indicators, and consultancy support to the project.) | | | | | |
| | Convergence: To obtain wider impacts through joint strategies/actions and sharing of resources, shared values, responsibilities and gap filling with the ongoing Govt. schemes being implemented in Gram Panchayats (GPs) by various line departments e.g. Rashtriya Krishi Vikas Yojna (RKVY), MGNREGA etc. | | | | | |

**A. Agriculture**

1. What are the major crops cultivated in the village?

2. Where is the produce sold?

3. Has anyone in the community used e-NAM for selling their produce in the market? – YES / NO
4. Where do you store the produce?

5. Is this storage facility owned by Govt. or Private? – GOVT. / PRIVATE
   5.1. How Far is the Storage Facility from the village?
   5.2. What are the charges for storage the produce?
6. Where do you get the seeds?
7. What are the pesticides do you use?

8. What fertilizers do you use?

9. Are the traditional varieties of crops still being used? - YES / NO
   CROPS -
10. Do you use any mechanized agricultural implements? – YES / NO
    10.1. Plz. Name the implements

    10.2. Purpose

    10.3. Crop

11. Has the department conducted any extension / training program or exposure visit or demonstration in the village regarding climate resilient or rainfed cropping?

    11.1. What was the kind of the program that was conducted?

    11.2. For which crops was the program conducted?

    11.3. When was this program conducted?

12. Where do you get the information regarding the cropping / technology / methods etc – Source?

13. Is there any agro-processing industry nearby? – YES / NO
    13.1. Name
    13.2. Location/Distance
    13.3. Public / Private

**B. Pesticide Use**

14. Do you use any pesticides? – YES / NO
15. What pesticides are used in farming?

16. Are you aware about the process /methods to use these pesticides? – YES / NO

17. How did you come to know about the methods/process/precautions in use of pesticides?
    17.1. Department Other villagers Shop keepers others
18. If by the department when was the training held?
    18.1. Where was such training held?
19. Has there been any instance or mishap due to mishandling of pesticides? – YES / NO
20. Has there been any change in productivity due to excessive use of pesticides? – YES / NO
21. How is the excess pesticide / left over disposed? –

**C. Livestock Rearing**

22. What are the types of livestock reared by the people in the village?

23. Are they indigenous / desi or crossbred? – INDIGENOUS or DESI / CROSSBRED
24. How do you get the vaccination / deworming done?

25. Is the livestock product used for selling or self-consumption? – SELF CONSUMPTION / SELLING
    25.1. Which livestock products are sold by the people of the community?

    25.2. To whom is it sold

    25.3. What are the average prices of the livestock product sold?

26. What are the sources of feed/fodder for the different livestock reared?
27. Is the feed / fodder easily available? – YES / NO
28. Do you get sufficient fodder from forest/pastures? – YES / NO
29. If the fodder from forest/pasture is not sufficient, then where do you get extra fodder?

30. Is there a veterinary hospital / doctor available nearby? – YES / NO
31. If yes, whether it is a government facility? – YES / NO
    31.1. Where is the facility located?
    31.2. How much time does it take to reach the facility or the doctor?
32. Has there been any incidence of epidemic in recent past? – YES / NO
33. What would you do in case the livestock requires treatment?

34. Has any veterinary health check-up camp organized by the govt. department? – YES / NO
    34.1. If yes when was it held?
    34.2. Where was it held
35. Does the veterinary doctor visit the village regularly? – YES / NO

**D. Water Resources**

36. What are the sources of drinking water available to the community – Lakes / Ponds, Rivers, Canals, Wells, Hand pumps, PWS
37. Where is the source of drinking water located?
38. Is the water from the source sufficient to meet the demands of all the people in the village? – YES / NO
39. Are there any conflicts due to water shortage or during collection during peak summers? – YES / NO

40. What are the sources of irrigation water available to the community? River, canals, check dams, wells, tube wells, rainfed agriculture
41. Are their families in the village which are fully dependent on rainfed agriculture – Yes / No
    - 41.1. If yes, How many such families are there in the village?
    - 41.2. What crops do they grow?
    - 41.3. How do they manage during peak summers?

42. Does anyone in the village have developed water harvesting structures – ponds / check dams to ensure water supply during lean season? – YES / NO

43. Is there a pond / lake or other water harvesting structure developed by the department in or around the village? – YES / NO
    - 43.1. Where is it located
    - 43.2. Does everyone in the village get sufficient water from these sources – YES / NO
    - 43.3. Has there been any incidence of conflicts among the community over the use of this water? – YES / NO

**E. NTFPs**

44. How many of you go to collect NTFP from the Forests?
45. What are the major NTFPs you collect from the Forest?
46. Are there any storage facilities for these NTFP?
47. Who provides these storage facilities?
48. Is there a Processing unit nearby? – YES / NO
49. Is this processing facility owned by Govt. / Private? – GOVT. / PRIVATE
50. What sort of processing is done to the NTFPs before sale?

51. Where do you sell the NTFPs?
52. Are there any markets nearby for selling the NTFPs? – YES / NO
53. Do you Face any Problems in Collecting NTFP? – YES / NO
    - 53.1. What Kind of Problems?

54. How can these Problems be resolved?

**F. Participation and Management**

55. Do you have JFMC / VFDS / SHGs/ UGs Other Societies in your village? (Note the names of the these societies)
56. How many of you are members of these societies?
57. Are the meetings of these societies conducted regularly? - YES / NO
58. Are these societies relevant to your community? – YES / NO
    HOW –

59. When was the last Micro-plan/ VDP prepared in the village?

60. Did the community participate in the preparation of the Plans / Micro-plans? – YES / NO
61. What are the Plans / Micro-Plans prepared in which community has participated?

62. Who was responsible agency / department for which these plans were prepared?

63. What is the role of community in deciding upon the activities to be taken up under these plans?

**G. Access and Benefit Sharing - Fodder and Timber**

64. Is the timber you get under Timber Distribution System sufficient to your needs? – YES / NO
65. What do you do when timber is not sufficient?

66. Is lantana a problem in the forest nearby? – YES / NO
67. What steps can be taken to eradicate lantana from forests?

68. Are there any other invasive species which is a problem in the forest nearby? – YES / NO
NAME -

**H. Cultural Sites**

69. Are there any sacred places in the village or nearby forests? – YES / NO

NAME LOCATION DISTANCE

70. Do you visit these places regularly? – YES / NO
71. For what reasons do you visit these places?

72. Do others/ outsiders/ tourists visit these places? – YES / NO
    72.1. Who are they?

**I. Employment and Livelihoods Activities**

73. Has any government department provided you any skill development training? – YES / NO
74. Name the departments which have provided these trainings?

75. What was the training about?

76. How many members of the community participated in such trainings?

77. Did the community benefit from these trainings? – YES / NO

78. What kind of trainings would benefit you?

79. Have you received any training on less water demanding crops and cropping methods? – YES / NO
    79.1. Who gave this training? Any demonstrations done on this? Are you practicing these?

**J. Migration**

80. Do the community members migrate to other places? – YES / NO
81. Do only the earning member migrate or the entire family? – EARNING MEMBER ONLY / ENTIRE FAMILY / MALE MEMBERS ONLY / FEMALE MEMBERS ONLY
82. For what reasons do they migrate?

83. For How long do they migrate?

84. Those who migrate face any problems at the migrated locations? – YES / NO

85. Conflicts of migrants with local community? YES / NO

**K. Barriers to access – Structural/ Institutional**

86. Does the forest department collect any fees for collection/ transportation of NTFPs from forest? - YES / NO
87. Does the forest department/ other departments confiscate the NTFP collected? – YES / NO

88. Any other barriers that the community faces?

**L. Resource Conflicts among Communities**

89. Are the resources from forest sufficient for all? – YES / NO
90. What happens when the resources are not sufficient to all?

91. Are there any conflicts within your community with regard to forest resources? – YES / NO
    91.1. What kind of conflicts are these?

    91.2. How do your resolve them?

    91.3. Do you seek any other help to resolve these conflicts?

92. Are there any conflicts with other communities with regard to forest resources? – YES / NO
    92.1. What kind of conflicts are these?

    92.2. How do your resolve them?

    92.3. Do you seek any other help to resolve these conflicts? – YES / NO

93. Are there any conflicts with Transhumants/ Nomads with regard to forest resources? – YES / NO
    93.1. What kind of conflicts are these?

    93.2. How do you resolve them?

    93.3. Do you seek any other help to resolve these conflicts? – YES / NO

**M. Gender Related**

94. What are activities delegated to women by community?

95. Does the community allow women to participate in community meetings? – YES / NO

96. Does the community consult women in making decisions for the community? – YES / NO

97. Are there any societies/ groups exclusively for women in the community? – YES /NO
NAME –

98. Does the community consult these societies/ groups in matters related to community? - YES / NO

**N. Grievance Redressal Mechanisms - Options available, Usage, satisfaction**

99. What are the Grievance Redress options available with the community for government Department related issues?

100. Did your community ever had any grievance related to any department? – YES / NO
101. What were the grievances?

102. Which of the options did the community use for addressing these grievances?

103. Is the community satisfied with the redressal / resolutions? – YES / NO
104. How fast is this grievance redressal?
105. Are you aware of the e-samadhan of the state? – YES / NO
106. Have you ever registered a complaint on e-samadhan? – YES / NO
107. What was the result?

**O. Environment**

108. Plz. Classify the seasons and their months of occurrence
    108.1. Summers
    108.2. Winters
    108.3. Monsoon
    108.4. Spring
    108.5. Autumn
109. Have you observed any changes in environment over last 10/25/50 years or more? – Yes / No
    If yes
    109.1. What changes have you observed in climatic conditions? Plz. Describe

    109.2. Rainfall Pattern

    109.3. Extreme Heat

    109.4. Extreme Cold

    109.5. Has this climate change affected your life – yes / No

    109.6. How has your life changed due the change in climate – plz. Describe

    109.7. What adaptive measures do you use to cope up with climate change? what are they?

    109.8. Did you participate in any awareness or training program conducted on this? - YES / NO
    109.9. Who conducted this?

110. Do you observe any soil degradation / erosion in and around the village? – YES / NO
    110.1. What is the reason for this?

    110.2. What steps are taken to prevent this - by you?

    110.3. What steps are taken to prevent this - by govt. department?

111. Were there any plantations carried out by the department over previous years? – YES / NO
    111.1. When was that
    111.2. LOCATION
112. Has the forest cover of the area increased or decreased over past 10/25/50 years – Yes / No
    112.1. Increased Decreased
113. Has the availability of Water changed over past 10/25/50 years – yes / No
    113.1. Increased Decreased

**P. Project Impacts and Expectations**

114. What do you perceive as the likely Impacts of the project, both positive and negative?

115. What are your expectations from the Project?

116. What role could the community play in the project operations/ implementation?

117. How do you propose O&M of assets created by project?

**Q. Any Other**

118. Please suggest if there are any important issues to be considered by the project

### 15.2.1 Format for Attendance Sheet for FGDs

**District:** **Block:**
**Gram Panchayat** **Village:**
**Venue:**
**Date:** **Start Time:** **End Time:**

| S. No. | Name, Address and Contact Details | Occupation | Signature |
|---|---|---|---|
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**Signatures**
**Moderator:** **Reporter:**

## 15.3 Annexure 3: List of Stakeholder Consultations

| Date | Activity | District | GP |
|---|---|---|---|
| 25/09/19 | Travel | Mandi | |
| 26/09/19 | FGD | Kullu | Bandrol, Talogi |
| 27/09/19 | FGD | Kullu | Bajaura |
| 27/09/19 | Travel | Mandi | |
| 28/09/19 | FGD | Mandi | Kathog, Tikker |
| 28/09/19 | Travel | Chamba | |
| 29/09/19 | FGD | Chamba | Banet, Kudnu |
| 30/09/19 | Travel | Una | |
| 30/09/19 | FGD | Una | Beriyan |
| 01/10/19 | FGD | Una | Kharyalta, Sohari |
| 01/10/19 | Travel | Bilaspur | |
| 02/10/19 | FGD | Bilaspur | Malraon, Doodiyan |
| 03/10/19 | FGD | Bilaspur | Padyalag |
| 03/10/19 | FGD | Hamirpur | Taal |
| 04/10/19 | FGD | Hamirpur | Mehal |
| 04/10/19 | Travel | Shimla | |
| 05/10/19 | FGD | Shimla | Bagri, Mundu |
| 05/10/19 | Travel | Solan | |
| 06/10/19 | FGD | Solan | Jhajha, Dangeel |
| 07/10/19 | FGD | Solan | Hinner |

## 15.4 Annexure 4: List of blocks

| List of Development Blocks under Project | | | |
|---|---|---|---|
| **S. No.** | **District** | **Block** | **GP** |
| 1 | Shimla | Theog | 16 |
| 2 | | Chopal | 20 |
| 3 | Solan | Solan | 4 |
| 4 | | Kandaghat | 8 |
| 5 | | Dharmpur | 19 |
| 6 | | Nalagarh | 11 |
| 7 | Sirmour | Nahan | 5 |
| 8 | | Paonta | 21 |
| 9 | | Sanghrah | 12 |
| 10 | | Pachhad | 2 |
| 11 | | Rajgarh | 6 |
| 12 | Bilaspur | Jhanduta | 18 |
| 13 | | Ghumarwin | 18 |
| 14 | Kullu | Banjar | 14 |
| 15 | | Kullu | 19 |
| 16 | | Naggar | 13 |
| 17 | Chamba | Chamba | 19 |
| 18 | | Bhatiyat | 17 |
| 19 | Kangra | Baijnath | 13 |
| 20 | | Nagrota Bagwan | 14 |
| 21 | | Panchrukhi | 8 |
| 22 | | Sulah | 9 |
| 23 | | Dehra | 10 |
| 24 | | Pragpur | 10 |
| 25 | Una | Una | 16 |
| 26 | | Bangna | 20 |
| 27 | Mandi | Seraj | 16 |
| 28 | | Drang | 15 |
| 29 | | Sunder Nagar | 9 |
| 30 | | Balh | 9 |
| 31 | Hamirpur | Bijhri | 19 |
| 32 | | Bhoranj | 18 |
| **Total** | | | **428** |

## 15.5 Annexure 5: Negative List of Activities not to be taken up by Project

| S. No, | Activities listed below are not eligible for support under the Project |
|---|---|
| 1 | Activities that are not consistent with the Forest Working plans/ CAT plans of the area |
| 2 | Activity that involves construction of check dams of more than 6 m height |
| 3 | Activities that promote or involve procurement of pesticides that falls in WHO classes IA, IB, or II. |
| 4 | Activities that involve large-scale clearing of land, dredging of water bodies, undercutting of slopes, replacement of natural vegetation, habitat destruction, etc., that may cause permanent, irreversible impacts. |
| 5 | Any activity that has a significant potential of causing forest fires. |
| 6 | Any activity that involves child labour (persons under 14 years of age in any activity and persons above 14 years and under 18 years of age in hazardous activities). |
| 7 | Activities that would adversely affect places of cultural significance and protected historical/archeological assets (both natural and human-made). |
| 8 | Activities that involve felling of trees without a permit. |
| 9 | Activities that involve NTFP/MAP harvesting without approvals/permits. |
| 10 | Any activity that is not consistent with the project description at time of project negotiations, unless subsequently agreed to with the Bank along with the appropriate level of environmental safeguards management. |
| 11 | Activities which require land acquisition. |
| 12 | Activities which put permanent restrictions on access/ usage of resources. |

## 15.6 Annexure 6: Water quality data of Rivers, Lakes and Groundwater

## WATER QUALITY DATA 2016 | CPCB ENVIS

### Table - 22.10: Water Quality of ground water in Himachal Pradesh - 2016

| Station code | Station Name | State Name | Temperature °C | | pH | | Conductivity (µmhos/cm) | | B.O.D. (mg/l) | | Nitrate-N + Nitrite-N (mg/l) | | Fecal Coli form (MPN/100ml) | | Total Coli form (MPN/100ml) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | min | max | min | max | min | max | min | max | min | max | min | max | min | max |
| Water quality criteria | | | | | 6.5-8.5 | | | | <3 mg/l | | | | <2500MPN/100ml | | <5000MPN/100ml | |
| 1555 | AT KALA AMB, H.P | HIMACHAL PRADESH | 22 | 22 | 7.4 | 7.6 | 743 | 840 | 0.1 | 0.1 | 0.3 | 0.5 | | | 3.7 | 3.7 |
| 1556 | AT PAONTA SAHIB, H.P | HIMACHAL PRADESH | 21 | 21 | 7.1 | 7.7 | 780 | 910 | 0.1 | 0.1 | 0.3 | 0.6 | | | | |
| 1558 | AT BADDI, H.P | HIMACHAL PRADESH | 17.6 | 19.5 | 8 | 8.6 | 826 | 1236 | 0.1 | 0.1 | 0 | 16.9 | | | | |
| 1560 | AT NALAGARH, H.P | HIMACHAL PRADESH | 16 | 18.9 | 8 | 8.6 | 469 | 1963 | 0.1 | 0.1 | 0 | 4.4 | | | 3.7 | 3.7 |
| 1559 | AT BAROTIWALA, H.P | HIMACHAL PRADESH | 21.2 | 21.2 | 7.9 | 7.9 | 748 | 748 | 0.6 | 0.6 | 0 | 0 | | | 5.5 | 5.5 |
| 1561 | AT DAMTAL, H.P | HIMACHAL PRADESH | 17 | 17 | 7.2 | 7.7 | 478 | 716 | 0.1 | 0.2 | 0 | 0 | | | | |
| 1562 | AT UNA, H.P | HIMACHAL PRADESH | 14 | 14 | 7.5 | 7.8 | 725 | 1067 | 0.1 | 0.4 | 0.1 | 0.2 | | | 2 | 2 |
| 1872 | SHIMLA D/S OF MSW DUMPING SIOT | HIMACHAL PRADESH | 9 | 20 | 6.8 | 8.4 | 409 | 686 | 2.6 | 18 | 0 | 12.3 | 3.6 | 40 | 22 | 220 |
| 1873 | DHARAMSHALA KANGRA D/S OF MSW DUMPING SIOT | HIMACHAL PRADESH | 18 | 18 | 6.3 | 7.8 | 249 | 312 | 0.2 | 0.4 | 0.1 | 0.2 | | | | |
| 1874 | SOLAN-D/S OF MSW DUMPING SIOT- | HIMACHAL PRADESH | | | 7.4 | 8.7 | 103 | 679 | 0.1 | 1.2 | 0 | 4.6 | | | 12 | 26 |
| 1877 | BADDI INDUSTRIAL AREA | HIMACHAL PRADESH | 18 | 20.2 | 7.5 | 8 | 803 | 829 | 0.1 | 0.6 | 0 | 13.8 | | | | |
| 1878 | BAROTIWALA INDUSTRIAL AREA | HIMACHAL PRADESH | 18.5 | 19.8 | 7.4 | 8.1 | 681 | 1862 | 0.1 | 0.2 | 0 | 15.6 | | | | |
| 1879 | NALAGARH INDUSTRIAL AREA | HIMACHAL PRADESH | 21 | 21 | 7.8 | 7.8 | 761 | 761 | 0.2 | 0.2 | 0 | 0 | | | | |
| 1880 | KALA AMB INDUSTRIAL AREA | HIMACHAL PRADESH | 22 | 22 | 7.5 | 7.7 | 710 | 944 | 0.1 | 0.1 | 0.5 | 0.6 | 2 | 2 | 4 | 4 |
| 1881 | PAONTA SAHIB INDUSTRIAL AREA | HIMACHAL PRADESH | 23 | 23 | 7.7 | 7.8 | 460 | 975 | 0.1 | 0.1 | 0.6 | 0.7 | 2 | 2 | 4 | 4 |
| 1882 | MEHATPUR INDUSTRIAL AREA | HIMACHAL PRADESH | 14 | 14 | 7.2 | 7.7 | 475 | 938 | 0.2 | 0.5 | 0 | 0.1 | | | 3.6 | 3.6 |
| 1883 | UNA INDUSTRIAL AREA | HIMACHAL PRADESH | 14 | 18 | 7.5 | 7.5 | 919 | 932 | 0.2 | 0.2 | 0 | 0.2 | | | 3.7 | 3.7 |
| 2628 | HAND PUMP AT SHAMSHI | HIMACHAL PRADESH | 11.5 | 19 | 6.9 | 7.5 | 372 | 785 | | | 0.3 | 4.6 | | | | |
| 2630 | HAND PUMP AT HAMIRPUR TOWN | HIMACHAL PRADESH | | | 7.4 | 7.8 | 821 | 1072 | 0.2 | 0.3 | 0.2 | 0.2 | | | | |
| 2631 | HAND PUMP AT NADAUN TOWN | HIMACHAL PRADESH | | | 7 | 7.2 | 856 | 1080 | 0.2 | 0.3 | 0.1 | 0.1 | | | | |
| 2632 | HAND PUMP AT BILASPUR TOWN | HIMACHAL PRADESH | 17 | 22 | 7.4 | 7.8 | 925 | 1027 | | | 0.1 | 0.5 | | | | |
| 2633 | HAND PUMP AT RECONGPEO | HIMACHAL PRADESH | | | 6.8 | 6.8 | 1032 | 1032 | | | 0.1 | 0.1 | | | | |
| 2634 | HAND PUMP AT SHIMLA | HIMACHAL PRADESH | 6 | 7 | 7.9 | 8.1 | 236 | 347 | 0.1 | 0.1 | 0 | 0 | | | | |
| 2635 | HAND PUMP AT KANGRA TEMPLE/ TOWN | HIMACHAL PRADESH | 18 | 18 | 7.4 | 7.4 | 754 | 754 | 0.8 | 0.8 | 0.2 | 0.2 | | | | |
| 2637 | HAND PUMP AT JWALAJI TEMPLE | HIMACHAL PRADESH | 19 | 20 | 7.8 | 7.8 | 1285 | 1435 | 0.1 | 0.2 | 0 | 0.1 | | | | |
| 2638 | HAND PUMP AT CHINTPURNI TEMPLE/ TOWN | HIMACHAL PRADESH | 16 | 20 | 7.7 | 8 | 626 | 1290 | 0.1 | 0.2 | 0 | 0.1 | | | | |
| 2639 | HAND PUMP AT CHAMUNDA DEVI TEMPLE/ TOWN | HIMACHAL PRADESH | 20 | 20 | 7.2 | 7.7 | 141 | 183 | 0.1 | 0.2 | 0.1 | 0.3 | | | 3.7 | 3.7 |

## WATER QUALITY DATA 2016 | CPCB ENVIS

| Station code | Station Name | State Name | Temperature °C | | pH | | Conductivity (µmhos/cm) | | B.O.D. (mg/l) | | Nitrate-N + Nitrite-N (mg/l) | | Faecal Coli form (MPN/100ml) | | Total Coli form (MPN/100ml) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | min | max | min | max | min | max | min | max | min | max | min | max | min | max |
| Water quality criteria | | | | | 6.5-8.5 | | | | <3 mg/l | | | | <2500MPN/100ml | | <5000MPN/100ml | |
| 2640 | HAND PUMP AT SANSARPUR TERRACE IA | HIMACHAL PRADESH | 17 | 19 | 7.5 | 7.9 | 376 | 425 | 0.1 | 0.1 | 0.1 | 0.1 | | | | |
| 2641 | HAND PUMP AT CHAMBA TOWN | HIMACHAL PRADESH | 16 | 18 | 7.4 | 7.4 | 708 | 924 | 0.1 | 0.3 | 0 | 0.2 | | | 3.6 | 3.6 |
| 2642 | HAND PUMP AT DALHOUSIE TOWN | HIMACHAL PRADESH | 15 | 16 | 7.1 | 8.3 | 192 | 453 | 0.1 | 0.2 | 0 | 0.1 | | | | |
| 2645 | HAND PUMP AT NAHAN | HIMACHAL PRADESH | 25 | 25 | 7.9 | 8 | 720 | 1194 | 0.1 | 0.2 | 0.7 | 0.7 | 2 | 2 | 4 | 4 |
| 2646 | HAND PUMP AT KALA AMB | HIMACHAL PRADESH | 26 | 26 | 7.4 | 8 | 922 | 1320 | 0.1 | 0.6 | 0.6 | 0.8 | 3.6 | 3.6 | 6 | 6 |
| 2647 | HAND PUMP AT TAHLIWAL IA | HIMACHAL PRADESH | 14 | 20 | 7.5 | 7.5 | 775 | 910 | 0.1 | 0.1 | 0 | 0.1 | | | 3.7 | 3.7 |
| 2648 | HAND PUMP AT KEYLONG | HIMACHAL PRADESH | 18 | 18 | 7.9 | 7.9 | 447 | 447 | | | 0.1 | 0.1 | | | | |

## WATER QUALITY DATA 2016 | CPCB ENVIS

**Table - 19.9: Water quality of Lakes in Himachal Pradesh - 2016**

| Station code | Station Name | Type of Water Body | State Name | Temperature °C | | | Dissolved oxygen (mg/l) | | | pH | | | Conductivity (µmhos/cm) | | | B.O.D. (mg/l) | | | Nitrate-N + Nitrite-N (mg/l) | | | Faecal Coli form (MPN/100ml) | | | Total Coli form (MPN/100ml) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | min | max | mean | min | max | mean | min | max | mean | min | max | mean | min | max | mean | min | max | mean | min | max | mean | min | max | mean |
| Water quality criteria | | | | | | | >4 mg/l | | | 6.5-8.5 | | | | | | <3 mg/l | | | | | | <2500MPN/100ml | | | <5000MPN/100ml | | |
| 1291 | GOBINDSAGAR LAKE AT BILASPUR | LAKE | HIMACHAL PRADESH | 9.6 | 23 | 16.1 | 8.3 | 9.9 | 8.8 | 6.4 | 8.7 | 7.6 | 213 | 328 | 269 | 0.1 | 0.4 | 0.3 | 0 | 1.1 | 0.3 | 21 | 170 | 71 | 110 | 1600 | 575 |
| 1292 | PONGDAM LAKE AT PONG VILLAGE | LAKE | HIMACHAL PRADESH | 16 | 19 | 17.6 | 6.9 | 8.3 | 7.6 | 7.5 | 8.7 | 8.1 | 178 | 277 | 223 | 0.2 | 3 | 0.7 | 0 | 0.2 | 0.1 | 9 | 17 | 14 | 110 | 350 | 245 |
| 1429 | RENUKA LAKE , 35 KM FROM PATNA SAHIB NORTH | LAKE | HIMACHAL PRADESH | 13 | 30 | 22.2 | 4.9 | 6.9 | 6.2 | 7.1 | 8.3 | 8 | 570 | 814 | 693 | 1 | 2.4 | 1.8 | 0.2 | 0.8 | 0.5 | 20 | 26 | 22 | 40 | 49 | 45 |
| 2649 | RIWALSAR LAKE | LAKE | HIMACHAL PRADESH | 10 | 28 | 20.8 | 2 | 7.2 | 4.9 | 6.5 | 7.8 | 7.3 | 250 | 356 | 303 | 0.5 | 22 | 8.4 | 0.1 | 1.6 | 0.6 | 63 | 220 | 138 | 540 | 1600 | 1253 |
| 2650 | KHAZIAR LAKE | LAKE | HIMACHAL PRADESH | 11 | 22 | 15.7 | 5.8 | 7.4 | 6.4 | 6.6 | 8 | 7.3 | 54 | 150 | 88 | 1 | 90 | 27.3 | 0 | 0.3 | 0.1 | 17 | 170 | 63 | 500 | 1600 | 998 |

## Chemical Quality Data

**Sampling in : 2017/May**

**State : Himachal Pradesh**

**District : KANGRA**

**Tahsil : HARCHAKIAN**

**Block : HARCHAKIAN**

| Site Name | Sample Id by lab | pH | Electrical Conductivity µS/cm at 25°C | Concentration (mg/l) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Calcium | Magnesium | Carbonate | Bicarbonate | Chloride | Nitrate | Flouride | Sulphate | Sodium | Pottasium |
| Rait | May2017 | 8.34 | 380.00 | 44.00 | 7.35 | 12.00 | 84.00 | 43.00 | 38.00 | 0.21 | 15.00 | 24.00 | 5.00 |
| Chakban Ambari | May2017 | 8.17 | 92.00 | 28.00 | 0.00 | - | 71.00 | 14.00 | 19.00 | 0.00 | 5.00 | 14.00 | 2.20 |
| Thirtynine Mile | May2017 | 8.50 | 235.00 | 24.00 | 17.00 | 23.00 | 107.00 | 7.10 | 5.35 | 0.08 | - | 5.50 | 2.00 |

**Tahsil : KANGRA**

**Block : KANGRA**

| Site Name | Sample Id by lab | pH | Electrical Conductivity µS/cm at 25°C | Concentration (mg/l) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Calcium | Magnesium | Carbonate | Bicarbonate | Chloride | Nitrate | Flouride | Sulphate | Sodium | Pottasium |
| Nagrota | May2017 | 8.45 | 274.00 | 32.00 | 12.00 | 12.00 | 84.00 | 71.00 | 0.22 | 0.00 | 5.00 | 30.00 | 2.80 |
| Manjgram | May2017 | 8.40 | 262.00 | 32.00 | 10.00 | 23.00 | 72.00 | 14.00 | 3.69 | 0.00 | 22.00 | 11.00 | 2.20 |

**Tahsil : TEHSIL 4 (BAIJNATH)**

**Block : TEHSIL 4 (BAIJNATH)**

Himachal Pradesh / KANGRA / TEHSIL 4 (BAIJNATH) / TEHSIL 4 (BAIJNATH)

| Site Name | Sample Id by lab | pH | Electrical Conductivity µS/cm at 25°C | Concentration (mg/l) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Calcium | Magnesium | Carbonate | Bicarbonate | Chloride | Nitrate | Flouride | Sulphate | Sodium | Pottasium |
| Pandtehr | May2017 | 8.08 | 185.00 | 20.00 | 0.00 | - | 71.00 | 14.00 | 17.00 | 0.32 | - | 18.00 | 4.00 |
| Paprola | May2017 | 7.80 | 77.00 | 12.00 | 5.00 | - | 35.00 | 7.10 | 5.20 | 0.00 | - | 5.50 | 0.80 |

**District : SIRMAUR**

**Tahsil : NAHAN**

**Block : NAHAN**

| Site Name | Sample Id by lab | pH | Electrical Conductivity µS/cm at 25°C | Concentration (mg/l) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Calcium | Magnesium | Carbonate | Bicarbonate | Chloride | Nitrate | Flouride | Sulphate | Sodium | Pottasium |
| Shambuwala | May2017 | 8.20 | 185.00 | 22.00 | 9.00 | - | 92.00 | 7.10 | 4.80 | 0.16 | 10.00 | 5.20 | 0.80 |

**Tahsil : PAONTA SAHIB**

**Block : PAONTA SAHIB**

| Site Name | Sample Id by lab | pH | Electrical Conductivity µS/cm at 25°C | Concentration (mg/l) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Calcium | Magnesium | Carbonate | Bicarbonate | Chloride | Nitrate | Flouride | Sulphate | Sodium | Pottasium |
| Khodawala | May2017 | 8.64 | 315.00 | 16.00 | 13.00 | 12.00 | 159.00 | 11.00 | 0.87 | 0.22 | 6.00 | 35.00 | 2.50 |
| Kolar | May2017 | 8.30 | 385.00 | 44.00 | 15.00 | 6.00 | 116.00 | 11.00 | 31.00 | 0.08 | 48.00 | 14.00 | 1.00 |
| Akkawala | May2017 | 8.45 | 2.78 | 28.00 | 15.00 | 23.00 | 107.00 | 11.00 | 3.40 | - | 30.00 | 20.00 | 3.70 |

**District : SOLAN**

**Tahsil : NALAGARH**

**Block : NALAGARH**

Himachal Pradesh / SOLAN / NALAGARH / NALAGARH

| Site Name | Sample Id by lab | pH | Electrical Conductivity µS/cm at 25°C | Concentration (mg/l) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Calcium | Magnesium | Carbonate | Bicarbonate | Chloride | Nitrate | Flouride | Sulphate | Sodium | Pottasium |
| Barotiwala | May2017 | 8.45 | 240.00 | 20.00 | 10.00 | 12.00 | 96.00 | 7.10 | 8.00 | 0.07 | 24.00 | 22.00 | 2.20 |
| Khera-chak | May2017 | 7.98 | 1305.00 | 92.00 | 29.00 | - | 84.00 | 213.00 | 160.00 | 0.24 | 122.00 | 123.00 | 12.00 |
| Dhabota | May2017 | 8.48 | 580.00 | 32.00 | 19.00 | 23.00 | 107.00 | 57.00 | 45.00 | 0.22 | 50.00 | 63.00 | 1.80 |
| Mahadev | May2017 | 8.52 | 305.00 | 28.00 | 2.00 | 12.00 | 96.00 | 14.00 | 16.00 | 0.10 | 25.00 | 36.00 | 1.40 |
| Phalahi | May2017 | 8.32 | 600.00 | 48.00 | 24.00 | 12.00 | 84.00 | 50.00 | 115.00 | 0.16 | 44.00 | 37.00 | 2.30 |
| Panjahra | May2017 | 8.40 | 270.00 | 28.00 | 7.00 | 12.00 | 84.00 | 14.00 | 19.00 | 0.18 | 30.00 | 26.00 | 1.40 |
| Barun | May2017 | 8.48 | 265.00 | 24.00 | 10.00 | 47.00 | 48.00 | 14.00 | 19.00 | 0.11 | - | 24.00 | 1.70 |
| Bhagheri | May2017 | 8.50 | 295.00 | 24.00 | 10.00 | 23.00 | 84.00 | 14.00 | 24.00 | 0.01 | 22.00 | 33.00 | 0.90 |
| Jagatpur | May2017 | 8.50 | 335.00 | 24.00 | 7.00 | 35.00 | 96.00 | 14.00 | 17.00 | 0.29 | 8.00 | 40.00 | 3.10 |
| BHATOLI | May2017 | 8.42 | 315.00 | 28.00 | 10.00 | 23.00 | 84.00 | 14.00 | 38.00 | 0.33 | - | 23.00 | 1.70 |

## Chemical Quality Data May 2016

## Annexure-VI

Sampling in **2016/May**
State **Himachal Pradesh**

| District | HAMIRPUR | EC µS/cm at 25°C | Calcium (mg/l) | Magnesium (mg/l) | Carbonate (mg/l) | Bi Carbonate (mg/l) | Chloride (mg/l) | Nitrate (mg/l) | Flouride (mg/l) | Sulphate (mg/l) | Sodium (mg/l) | Potassium (mg/l) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bijari | May2016 | 331.00 | 49.00 | 20.00 | 25.00 | 90.00 | 50.00 | 13.00 | 0.02 | 37.00 | 17.00 | 1.00 |
| Galore | May2016 | 304.00 | 49.00 | 15.00 | 25.00 | 103.00 | 43.00 | 11.00 | 0.06 | 0.00 | 11.00 | 3.00 |
| Kangu | May2016 | 400.00 | 78.00 | 13.00 | 25.00 | 154.00 | 28.00 | 6.81 | 0.12 | 49.00 | 8.90 | 3.70 |
| Bagnalla | May2016 | 363.00 | 41.00 | 18.00 | 38.00 | 115.00 | 43.00 | 12.00 | 0.08 | 0.00 | 20.00 | 2.00 |
| **District** | **KANGRA** | | | | | | | | | | | |
| Bharoli | May2016 | 567.00 | 29.00 | 34.00 | 13.00 | 148.00 | 74.00 | 11.00 | 0.40 | 46.00 | 39.00 | 2.60 |
| Jwalaji | May2016 | 531.00 | 16.00 | 21.00 | 13.00 | 173.00 | 60.00 | 12.00 | 0.26 | 42.00 | 76.00 | 1.50 |
| Dehra Gopipur | May2016 | 468.00 | 29.00 | 26.00 | 19.00 | 122.00 | 53.00 | 30.00 | 0.00 | 18.00 | 35.00 | 1.20 |
| Jagir | May2016 | 860.00 | 33.00 | 20.00 | 25.00 | 128.00 | 191.00 | 12.00 | 0.00 | 0.00 | 122.00 | 6.50 |
| Rait | May2016 | 468.00 | 44.00 | 13.00 | 19.00 | 167.00 | 21.00 | 12.00 | 0.39 | 27.00 | 17.00 | 5.00 |
| Chakban Amba | May2016 | 100.00 | 16.00 | 7.54 | 0.00 | 26.00 | 21.00 | 3.68 | 0.08 | 0.00 | 4.50 | 1.20 |
| Thirtynine Mile | May2016 | 369.00 | 33.00 | 18.00 | 19.00 | 167.00 | 21.00 | 6.00 | 0.32 | 0.00 | 18.00 | 1.94 |
| Barota | May2016 | 354.00 | 25.00 | 22.00 | 38.00 | 77.00 | 35.00 | 0.00 | 0.02 | 19.00 | 15.00 | 6.00 |
| Olherian | May2016 | 998.00 | 62.00 | 32.00 | 88.00 | 282.00 | 71.00 | 26.00 | 0.35 | 38.00 | 59.00 | 104.00 |
| Kathgarh | May2016 | 765.00 | 41.00 | 50.00 | 76.00 | 295.00 | 43.00 | 18.00 | 0.40 | 0.00 | 41.00 | 36.00 |
| Andaura | May2016 | 381.00 | 28.00 | 25.00 | 50.00 | 128.00 | 28.00 | 0.00 | 0.19 | 0.00 | 33.00 | 1.40 |
| Channaur | May2016 | 595.00 | 37.00 | 27.00 | 25.00 | 295.00 | 35.00 | 22.00 | 0.31 | 0.00 | 66.00 | 1.00 |
| Bharmar | May2016 | 250.00 | 29.00 | 10.00 | 19.00 | 103.00 | 14.00 | 5.00 | 0.36 | 0.00 | 10.00 | 1.00 |
| Bhalad | May2016 | 496.00 | 29.00 | 27.00 | 25.00 | 141.00 | 57.00 | 21.00 | 0.16 | 24.00 | 48.00 | 1.60 |
| Mohtli | May2016 | 353.00 | 33.00 | 13.00 | 38.00 | 64.00 | 57.00 | 15.00 | 0.13 | 0.00 | 30.00 | 1.70 |
| Bandh | may 2016 | 312.00 | 33.00 | 10.00 | 6.30 | 148.00 | 28.00 | 0.00 | 0.13 | 0.00 | 21.00 | 0.80 |
| Takipur | may 2016 | 279.00 | 27.00 | 15.00 | 10.00 | 96.00 | 35.00 | 7.32 | 0.25 | 0.00 | 10.00 | 0.80 |
| Old Kangra | may 2016 | 598.00 | 66.00 | 16.37 | 19.00 | 237.00 | 50.00 | 21.00 | 0.03 | 0.00 | 25.00 | 25.00 |

| District | Kangra | EC µS/cm at 25°C | Calcium (mg/l) | Magnesium (mg/l) | Carbonate (mg/l) | Bi Carbonate (mg/l) | Chloride (mg/l) | Nitrate (mg/l) | Flouride (mg/l) | Sulphate (mg/l) | Sodium (mg/l) | Potassium (mg/l) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kangra | may 2016 | 246.00 | 25.00 | 7.42 | 0.00 | 96.00 | 21.00 | 18.00 | 0.00 | 0.00 | 14.00 | 1.80 |
| Manjgram | may 2016 | 333.00 | 25.00 | 18.00 | 0.00 | 128.00 | 30.00 | 4.10 | 0.36 | 19.00 | 14.00 | 1.80 |
| Darkati | May2016 | 395.00 | 25.00 | 24.00 | 38.00 | 103.00 | 57.00 | 6.74 | 0.11 | 0.00 | 35.00 | 9.00 |
| Raja-ka-talab | May2016 | 258.00 | 33.00 | 10.00 | 0.00 | 128.00 | 14.00 | 11.00 | 0.36 | 0.00 | 5.00 | 0.00 |
| Bhali | May2016 | 1062.00 | 83.00 | 8.00 | 0.00 | 269.00 | 91.00 | 16.00 | 0.45 | 168.00 | 125.00 | 7.30 |
| Kotla | May2016 | 407.00 | 21.00 | 25.00 | 25.00 | 128.00 | 21.00 | 14.00 | 0.36 | 15.00 | 20.00 | 1.80 |
| Thali | May2016 | 205.00 | 37.00 | 12.00 | 25.00 | 103.00 | 21.00 | 0.78 | 0.02 | 0.00 | 12.00 | 1.10 |
| Mao | May2016 | 266.00 | 45.00 | 7.42 | 25.00 | 103.00 | 35.00 | 0.06 | 0.09 | 0.00 | 12.00 | 1.00 |
| Basa Bazira | May2016 | 342.00 | 29.00 | 32.00 | 38.00 | 141.00 | 35.00 | 16.00 | 0.02 | 0.00 | 16.00 | 0.90 |
| Panjpir | May2016 | 266.00 | 45.00 | 10.00 | 25.00 | 103.00 | 28.00 | 10.00 | 0.19 | 0.00 | 10.00 | 1.00 |
| Jassur | May2016 | 384.00 | 33.00 | 30.00 | 38.00 | 103.00 | 50.00 | 20.00 | 0.06 | 0.00 | 16.00 | 1.00 |
| Bod | May2016 | 952.00 | 52.00 | 38.00 | 38.00 | 167.00 | 63.00 | 24.00 | 0.36 | 182.00 | 70.00 | 22.00 |
| Rakar | May2016 | 3.57 | 23.00 | 21.00 | 13.00 | 135.00 | 39.00 | 0.32 | 0.00 | 0.00 | 22.00 | 1.70 |
| Hardogri | May2016 | 2.82 | 21.00 | 16.00 | 16.00 | 122.00 | 35.00 | 0.87 | 0.00 | 0.00 | 22.00 | 3.80 |
| Dehrian | May2016 | 276.00 | 25.00 | 10.00 | 13.00 | 96.00 | 28.00 | 17.00 | 0.00 | 0.00 | 20.00 | 1.00 |
| Pandtehr | May2016 | 140.00 | 21.00 | 12.00 | 0.00 | 64.00 | 28.00 | 3.89 | 0.13 | 0.00 | 5.00 | 1.00 |
| Paprola | May2016 | 184.00 | 33.00 | 4.99 | 0.00 | 77.00 | 43.00 | 11.00 | 0.28 | 0.00 | 12.00 | 5.00 |
| **District** | **KULLU** | | | | | | | | | | | |
| Gadauri | May2016 | 354.00 | 52.00 | 10.00 | 25.00 | 90.00 | 43.00 | 30.00 | 0.00 | 0.00 | 9.00 | 3.70 |
| Kullu | May2016 | 290.00 | 48.00 | 5.00 | 38.00 | 77.00 | 21.00 | 5.03 | 0.07 | 0.00 | 3.90 | 4.90 |
| **District** | **MANDI** | | | | | | | | | | | |
| Jhiri | May2016 | 342.00 | 58.00 | 10.00 | 38.00 | 77.00 | 35.00 | 28.00 | 0.08 | 0.00 | 12.00 | 4.10 |
| Bahangrotu | May2016 | 1157.00 | 58.00 | 55.00 | 25.00 | 77.00 | 220.00 | 39.00 | 0.00 | 188.00 | 112.00 | 27.00 |
| Jarl | May2016 | 329.00 | 33.00 | 18.00 | 38.00 | 90.00 | 43.00 | 1.51 | 0.14 | 0.00 | 23.00 | 2.80 |
| Kaned | May2016 | 414.00 | 37.00 | 27.00 | 25.00 | 128.00 | 57.00 | 6.82 | 0.10 | 0.00 | 23.00 | 12.00 |
| Lohara | May2016 | 526.00 | 45.00 | 45.00 | 0.00 | 243.00 | 71.00 | 25.00 | 0.08 | 0.00 | 24.00 | 2.50 |
| Ratti | May2016 | 363.00 | 41.00 | 15.00 | 25.00 | 90.00 | 57.00 | 29.00 | 0.04 | 0.00 | 24.00 | 4.10 |
| Gagal | May2016 | 244.00 | 45.00 | 4.99 | 38.00 | 64.00 | 28.00 | 3.88 | 0.95 | 0.00 | 11.00 | 2.50 |

| District | SIRMAUR | EC µS/cm at 25°C | Calcium (mg/l) | Magnesium (mg/l) | Carbonate (mg/l) | Bi Carbonate (mg/l) | Chloride (mg/l) | Nitrate (mg/l) | Flouride (mg/l) | Sulphate (mg/l) | Sodium (mg/l) | Potassium (mg/l) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shambuwala | May2016 | 210.00 | 36.00 | 7.00 | 0.00 | 140.00 | 7.00 | 3.70 | 0.00 | 2.00 | 4.00 | 1.00 |
| Badripur | May2016 | 480.00 | 46.00 | 30.00 | 0.00 | 183.00 | 28.00 | 42.10 | 0.02 | 56.00 | 18.00 | 2.00 |
| Ajiwala | May2016 | 270.00 | 40.00 | 9.00 | 0.00 | 134.00 | 7.00 | 8.36 | 0.38 | 27.00 | 8.00 | 3.00 |
| Kiyarda | May2016 | 320.00 | 36.00 | 22.00 | 0.00 | 201.00 | 4.00 | 5.13 | 0.00 | 19.00 | 6.00 | 2.00 |
| Shibpur | May2016 | 520.00 | 52.00 | 33.00 | 0.00 | 98.00 | 36.00 | 26.20 | 0.32 | 156.00 | 20.00 | 4.00 |
| Nayagaon | May2016 | 290.00 | 24.00 | 24.00 | 0.00 | 189.00 | 7.00 | 2.35 | 0.21 | 6.00 | 6.00 | 1.00 |
| Khodawala | May2016 | 520.00 | 44.00 | 49.00 | 0.00 | 214.00 | 7.00 | 8.90 | 0.00 | 128.00 | 7.00 | 1.00 |
| Kala-Amb | May2016 | 760.00 | 56.00 | 10.00 | 0.00 | 189.00 | 92.00 | 60.60 | 0.12 | 91.00 | 83.00 | 54.00 |
| Dhaulakuan | May2016 | 370.00 | 44.00 | 15.00 | 0.00 | 128.00 | 14.00 | 13.00 | 0.00 | 241.00 | 99.00 | 2.00 |
| Kolar | May2016 | 560.00 | 22.00 | 60.00 | 60.00 | 134.00 | 14.00 | 31.80 | 0.00 | 81.00 | 17.00 | 2.00 |
| Akkawala | May2016 | 380.00 | 28.00 | 26.00 | 0.00 | 244.00 | 14.00 | 1.65 | 0.00 | 20.00 | 28.00 | 4.00 |
| Trilokpur | May2016 | 1070.00 | 16.00 | 5.00 | 0.00 | 195.00 | 252.00 | 12.40 | 0.00 | 139.00 | 278.00 | 5.00 |
| **District** | **SOLAN** | | | | | | | | | | | |
| Barotiwala | May2016 | 240.00 | 32.00 | 5.00 | 24.00 | 73.00 | 18.00 | 11.00 | 0.16 | 0.00 | 20.00 | 1.90 |
| Khera-chak | May2016 | 754.00 | 52.00 | 10.00 | 31.00 | 109.00 | 124.00 | 4.84 | 0.24 | 56.00 | 86.00 | 7.70 |
| Dhabota | May2016 | 599.00 | 40.00 | 19.00 | 19.00 | 135.00 | 67.00 | 43.00 | 0.25 | 37.00 | 62.00 | 1.50 |
| Mahadev | May2016 | 382.00 | 40.00 | 12.21 | 0.00 | 212.00 | 14.00 | 16.00 | 0.14 | 47.00 | 43.00 | 2.50 |
| Phalahi | May2016 | 460.00 | 36.00 | 27.00 | 25.00 | 115.00 | 39.00 | 66.00 | 0.11 | 25.00 | 29.00 | 1.80 |
| Panjahra | May2016 | 288.00 | 32.00 | 7.30 | 0.00 | 128.00 | 25.00 | 23.00 | 0.30 | 0.00 | 24.00 | 1.00 |
| Barun | May2016 | 281.00 | 32.00 | 12.00 | 25.00 | 103.00 | 18.00 | 21.00 | 0.25 | 0.00 | 19.00 | 1.40 |
| Bhagheri | May2016 | 346.00 | 15.00 | 12.00 | 25.00 | 115.00 | 32.00 | 36.00 | 0.00 | 0.00 | 39.00 | 0.80 |
| Jagatpur | May2016 | 310.00 | 16.00 | 11.00 | 19.00 | 115.00 | 18.00 | 7.76 | 0.28 | 32.00 | 39.00 | 3.10 |
| BHATOLI | May2016 | 320.00 | 40.00 | 12.00 | 0.00 | 166.00 | 21.00 | 24.00 | 0.29 | 0.00 | 24.00 | 2.00 |
| **District** | **UNA** | | | | | | | | | | | |
| Panjawar | May2016 | 1330.00 | 40.00 | 68.00 | 72.00 | 415.00 | 192.00 | 47.00 | 0.40 | 229.00 | 280.00 | 14.00 |
| Gagret | May2016 | 830.00 | 20.00 | 28.00 | 0.00 | 366.00 | 57.00 | 78.00 | 0.00 | 143.00 | 195.00 | 2.00 |
| Singhnei | May2016 | 520.00 | 36.00 | 24.00 | 42.00 | 177.00 | 43.00 | 6.10 | 0.26 | 37.00 | 57.70 | 2.30 |
| Jawar | May2016 | 530.00 | 58.00 | 26.00 | 0.00 | 354.00 | 21.00 | 12.00 | 0.12 | 60.00 | 60.60 | 8.20 |

| District | UNA | EC µS/cm at 25°C | Calcium (mg/l) | Magnesium (mg/l) | Carbonate (mg/l) | Bi Carbonate (mg/l) | Chloride (mg/l) | Nitrate (mg/l) | Flouride (mg/l) | Sulphate (mg/l) | Sodium (mg/l) | Potassium (mg/l) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mawa Kalan | May2016 | 400.00 | 40.00 | 23.00 | 0.00 | 146.00 | 50.00 | 26.00 | 0.08 | 74.00 | 42.40 | 0.90 |
| Daulatpur | May2016 | 910.00 | 84.00 | 34.00 | 0.00 | 116.00 | 146.00 | 183.00 | 0.00 | 80.00 | 81.90 | 2.30 |
| Babehr | May2016 | 380.00 | 42.00 | 27.00 | 0.00 | 207.00 | 18.00 | 13.00 | 0.34 | 98.00 | 41.80 | 1.40 |
| Raipur Marwad | May2016 | 770.00 | 38.00 | 22.00 | 0.00 | 372.00 | 53.00 | 78.00 | 0.01 | 187.00 | 207.00 | 2.00 |
| Bawal | May2016 | 620.00 | 54.00 | 54.00 | 0.00 | 195.00 | 67.00 | 44.00 | 0.18 | 221.00 | 67.60 | 14.50 |
| Bhangana | May2016 | 150.00 | 28.00 | 2.00 | 0.00 | 85.00 | 7.00 | 5.70 | 0.10 | 5.00 | 3.80 | 1.00 |
| Lalehri | May2016 | 310.00 | 60.00 | 2.00 | 0.00 | 146.00 | 21.00 | 16.00 | 0.03 | 38.00 | 17.10 | 3.90 |
| Dharampur | May2016 | 1530.00 | 112.00 | 51.00 | 0.00 | 665.00 | 188.00 | 45.00 | 0.44 | 267.00 | 283.50 | 14.00 |
| Kuluwal | May2016 | 400.00 | 42.00 | 17.00 | 0.00 | 146.00 | 50.00 | 25.00 | 0.03 | 57.00 | 43.10 | 0.60 |
| Guglahar | May2016 | 360.00 | 50.00 | 17.00 | 0.00 | 183.00 | 150.00 | 34.00 | 0.17 | 46.00 | 29.40 | 1.00 |
| Tahliwala 1 | May2016 | 400.00 | 42.00 | 35.00 | 0.00 | 232.00 | 25.00 | 8.80 | 0.13 | 79.00 | 28.30 | 2.30 |
| Santokhgarh | May2016 | 630.00 | 62.00 | 23.00 | 0.00 | 207.00 | 64.00 | 44.00 | 0.10 | 111.00 | 66.30 | 12.90 |
| Khanpur | May2016 | 870.00 | 90.00 | 39.00 | 0.00 | 336.00 | 99.00 | 72.00 | 0.23 | 115.00 | 94.90 | 1.00 |
| Nangran | May2016 | 500.00 | 50.00 | 28.00 | 24.00 | 220.00 | 39.00 | 6.00 | 0.08 | 81.00 | 55.90 | 2.10 |
| Jankaur | May2016 | 770.00 | 46.00 | 40.00 | 0.00 | 244.00 | 103.00 | 73.00 | 0.23 | 82.00 | 95.70 | 1.10 |
| Una | May2016 | 140.00 | 26.00 | 1.00 | 0.00 | 79.00 | 7.00 | 5.80 | 0.00 | 0.00 | 3.70 | 1.10 |
| Bhadsali | May2016 | 440.00 | 46.00 | 18.00 | 0.00 | 177.00 | 21.00 | 16.00 | 0.29 | 97.00 | 44.50 | 1.90 |
| Jhalera | May2016 | 320.00 | 44.00 | 13.00 | 0.00 | 195.00 | 21.00 | 21.00 | 0.23 | 2.00 | 16.60 | 3.60 |
| Ishapur | May2016 | 140.00 | 22.00 | 6.00 | 0.00 | 92.00 | 4.00 | 5.00 | 0.00 | 7.00 | 4.70 | 1.00 |
| Khwaja | May2016 | 910.00 | 74.00 | 29.00 | 0.00 | 238.00 | 117.00 | 114.00 | 0.31 | 61.00 | 94.80 | 3.50 |
| Rajli Panjal | May2016 | 630.00 | 48.00 | 46.00 | 0.00 | 232.00 | 18.00 | 12.00 | 0.18 | 220.00 | 61.80 | 7.70 |
| Panoh | May2016 | 930.00 | 80.00 | 30.00 | 0.00 | 140.00 | 146.00 | 177.00 | 0.03 | 45.00 | 83.40 | 2.40 |
| Loharli | May2016 | 400.00 | 38.00 | 32.00 | 0.00 | 201.00 | 25.00 | 9.70 | 0.00 | 78.00 | 28.20 | 2.40 |
| Kuthera Jaswal | May2016 | 310.00 | 40.00 | 19.00 | 0.00 | 110.00 | 11.00 | 29.00 | 0.00 | 68.00 | 8.40 | 0.90 |
| Amb | May2016 | 650.00 | 82.00 | 45.00 | 0.00 | 439.00 | 21.00 | 6.10 | 0.49 | 59.00 | 29.90 | 1.30 |
| Ghaneri | May2016 | 610.00 | 62.00 | 10.00 | 0.00 | 110.00 | 67.00 | 84.00 | 0.06 | 117.00 | 81.90 | 1.10 |
| Mubarikpur | May2016 | 150.00 | 26.00 | 7.00 | 0.00 | 85.00 | 7.00 | 6.70 | 0.01 | 19.00 | 3.90 | 1.10 |

## 15.7 Annexure 7: GHG Balance Accounting for HP Project using EX-ACT

**Mandate**

The World Bank Environment Strategy (2012), adopted a corporate mandate to account for the greenhouse gas (GHG) emissions for investment lending. The quantification of GHG emissions and removals (Sequestration) is an important step in managing and ultimately reducing emissions (or creating Carbon sink), as it provides an understanding of the project's GHG mitigation potential. Further, Paris Agreement also mandates reporting of assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions to achieve the goals of Article 2.

**Accounting methodology**

The World Bank has adopted the Ex-Ante Carbon-balance Tool (EX-ACT), developed by FAO in 2010, to estimate the impact of agricultural investment lending on GHG emissions and carbon sequestration in the project area. EX-ACT is a land-based appraisal system that allows the assessment of a project's net carbon-balance, defined as the net balance of $CO_2$ equivalent GHG that are emitted or sequestered because of project implementation compared to a no project or without project scenario. EX-ACT captures project activities in following five modules: land use change, crop production, livestock and grassland, land degradation, inputs and investment. EX-ACT estimates the carbon stock changes (emissions or sinks), expressed in equivalent tons of $CO_2$ per hectare and year.

***Results of the GHG Balance Analysis***

Table 1 presents the impact of the project activities or interventions and including inputs in the form of fertilizer and compost on GHG balance (Emissions and Removals). The *ex-ante* estimation of the GHG balance using Tier 1 for the HP project is shown to be negative, leading to no net emissions and actually leading to net carbon sequestration. The source of GHG is due to application of fertilizer, pesticide and compost. The results indicate a negative GHG balance of -1,745,884 $tCO_2eq$ over a period of 20 years. The annual negative GHG balance is estimated to be -87,294 $tCO_2eq$/year for the total project. The net GHG benefit on a per hectare basis for the project area is estimated to be 0.6 $tCO_2$/ha/year. **The negative GHG balance estimated using EX-ACT shows that the project interventions will lead to net $CO_2$ sequestration.**

**Table 1:** Greenhouse Gas benefits of project activities under the HP project according to EX-ACT Model

| Project activities | GHG benefits during the entire project period of 20 years ($tCO_2$)eq | | | GHG benefits per year ($tCO_{2eq}$/year) | | |
|---|---|---|---|---|---|---|
| | ***Without project scenario*** | ***With project scenario*** | ***Net carbon balance*** | ***Without project scenario*** | ***With project scenario*** | ***Net carbon balance*** |
| *Land Use Change Module* | | | | | | |
| Afforestation | 0 | -32,09,944 | -32,09,944 | 0 | -1,60,497 | -1,60,497 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Crop Production Module* | | | | | | |
| Agriculture – Annual crops | -68,70,463 | -61,80,125 | 6,90,338 | -3,43,523 | -3,09,006 | 34,517 |
| *Management of Degradation Module* | | | | | | |
| Degraded forest restoration | 3,12,341 | -8,14,499 | -11,26,840 | 15,617 | -40,725 | -56,342 |
| *Inputs and Investments Module* | | | | | | |
| Fertilizers | 37,00,614 | 56,01,176 | 19,00,562 | 1,85,031 | 2,80,059 | 95,028 |
| ***Total*** | | | | | | |
| **Net Total ($tCO_2$)eq** | **-28,57,508** | **-46,03,392** | **-17,45,884** | **-1,42,875** | **-2,30,170** | **-87,294** |
| **Per hectare per year ($tCO_{2eq}$/ha) – $CO_2$ Sequestration** | **-1.0** | **-1.6** | **-0.6** | **-1.0** | **-1.6** | **-0.6** |

**Data Used for EX-ACT Model**

| MODULE 1 : CROP PRODUCTION MODULE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **1. AGRICULTURE CROPS** | | | | | | | | |
| Intervention | Start Area (Ha.) | Without Project Area (Ha.) | With Project Area (ha.) | Agronomic practices | Nutrient Management | Water Mgt. | Manure Application | No till & residue Mgt |
| **Kharif Crops** | | | | | | | | |
| | | | | Yes | Yes | Yes | Yes | less Tillage with residue management / mulching etc. |
| Maize | 55743.00 | 55743.00 | 55743.00 | Yes | Yes | Yes | Yes | -do- |
| Tomato | 3625.00 | 3625.00 | 7425.00 | Yes | Yes | Yes | Yes | -do- |
| Capsicum | 2700.00 | 2700.00 | 5575.00 | Yes | Yes | Yes | Yes | -do- |
| Cauliflower | 1100.00 | 1100.00 | 2230.00 | Yes | Yes | Yes | Yes | -do- |
| Beans | 1050.00 | 1050.00 | 2220.00 | Yes | Yes | Yes | Yes | -do- |
| Ginger | 320.00 | 320.00 | 560.00 | Yes | Yes | Yes | Yes | -do- |
| Turmeric | 275.00 | 275.00 | 520.00 | Yes | Yes | Yes | Yes | -do- |
| | | | | Yes | Yes | Yes | Yes | -do- |
| **Rabi Crops** | | | | | | | | |
| Wheat | 48161.00 | 48161.00 | 51789.00 | Yes | Yes | Yes | Yes | -do- |
| Peas | 1360.00 | 1360.00 | 4700.00 | Yes | Yes | Yes | Yes | -do- |
| Cabbage | 455.00 | 455.00 | 1400.00 | Yes | Yes | Yes | Yes | -do- |
| Garlic | 325.00 | 325.00 | 1100.00 | Yes | Yes | Yes | Yes | -do- |
| Potato | 450.00 | 450.00 | 1575.00 | | | | | |

| 2. Forestry Interventions | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| Particulars | Is fire used to clear land | | Previous land use | Area that will be afforested / reforested (ha.) | |
| Type of vegetation that will be planted | Without project | With project | | Without Proj. | With Project |
| Forestry (conversion of open and degraded forests to high density forests) - mixed broad leaved forests, Antidesma acuminatum, Dysoxylum gobara, Elaeocarpus tectorius, | Partial | No | Degraded forests | Degraded forests | 800 plants per ha = 3852 ha. |
| | | | | | 400 plants per ha. 4708 ha. |
| | | | | | 100 plants per ha. 2140 ha. |

| | | | | | |
|---|---|---|---|---|---|
| Leea alata, Litsea monopetala, Mesua ferrea, Polyalthia jenkinsii, Schima wallichii, Shorea robusta | | | | | 1100 plants per ha. 3424 ha. |
| | | | | | Grass development = 20544 ha. |

**3. Inputs**

| Input category | Unit | Agriculture | | | Horticulture/ Agro-forestry | | | Forestry | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Amount applied | | | Amount applied | | | Amount applied | | |
| | | Start of the project | Without Project | With Project | Start of the project | Without Project | With Project | Start of the project | Without Project | With Project |
| Lime | Kg/ ha./year | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DAP | Kg/ ha./year | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **12:32:16 (N:P:K Complex Fertilizer)** | **Kg/ ha./year** | 175 | 175 | 235 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Compost/ Farm Yard Manure** | **Kg/ ha./year** | 10000 | 10000 | 15000 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Urea** | **Kg/ ha./year** | 200 | 200 | 210 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Chemical pesticides (carbofuron, Chlorpyriphos)** | **Litre/ha/ year** | 4 | 4 | 4 | | | IPM | 0 | 0 | 0 |
| Chemical herbicides | Kg./ha/year | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Chemical fungicides** | **Kg./ha/year** | 25 | 25 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| Energy Consumption | | | | | | | | | | |
| Electricity | KWh / ha/year | Mostly human labour is used. No processing. Fuel used only for | | Project will promote use of renewable | Mostly human labour is used. No processing. Fuel used only for | | Project will promote use of renewable | Mostly human labour is used. No processing. Fuel used only for | | Project will promote use of renewable |
| Diesel | Litres/ ha./year | | | | | | | | | |
| Gasoline | Litres/ ha./year | | | | | | | | | |
| LPG | Litres/ | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ha./year | transportation of produce to market | energy (solar, wind, hydro etc.). | transportation of produce to market | energy (solar, wind, hydro etc.). | transportation of seedlings wood to market | energy (solar, wind, hydro etc.). |
| Wood | Kg/ ha./year | | | | | | |

## 15.8 Annexure 8: Environmental and Social Management Plan (Generic)

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| FORESTRY OPERATIONS<br>• Plantations<br>• Nurseries<br>• Vegetative barriers<br>• Contour trenches<br>• Grass planting<br>• Eradication of invasive species<br>• Spring Source Development<br>• Fire Protection | Positive Impacts<br>• Increase in vegetative cover<br>• Increase in moisture infiltration<br>• Increase in fodder<br>• Reduction in soil erosion including soil & nutrient loss<br>• Reduction in run-off<br>• Potential plantation and grassland area<br>• Rejuvenation and Maintenance of traditional water sources<br>• Increase involvement of communities in fire protection in forest areas and awareness on its environmental impacts | Enhancement Measures<br>• Follow the provisions of Biodiversity Management Plan and Integrated Pest and Nutrient Management Plan with key strategies for biodiversity conservation that includes: i) promotion of indigenous species in plantations, fodder plots and nurseries and avoidance of exotic, invasive species; ii) adoption of sustainable harvesting and production of NTFP; iii) updating of peoples biodiversity registers in recently denotified wildlife panchayats and community capacity building; iv) site screening for avoiding critical natural habitats ; vi) negative list to ensure biodiversity conservation, prevent forest fires, habitat fragmentation, land use modifications, and prevent felling of trees.<br>• Selection of high productive native species over exotic species<br>• Plantation of mixed broad life species to supplement fodder.<br>• Equal sharing of resources among users by rules/ regulations of GP-RMP<br>• Silvipasture practices should be encouraged in areas where there is a demand for a mixture of fodder and fuel wood and can be adopted in marginal arable lands, private non-arable lands and community wastelands.<br>• Training villagers in management of forest fodder<br>• Establishment of fodder banks and grass godowns<br>• Enrichment of fodder with cotton seed, oil cakes, cellulosic wastes and commercial feed; Fodder experts shall be involved in this<br>• Inventory for dry fodder to be taken into account in fodder management practices<br>• Local communities and disadvantaged groups like women should be closely involved in forest protection, raising nurseries, seed treatment and sapling growing activities<br>• The grass should be cut low when harvested no more than 15 cm above the root stock.<br>• Grass should not be cut until it has matured and seed drop has occurred.<br>• Protection of pasture lands from other land uses<br>• Development and improvement of devices for fodder cutting besides available techniques (chafer cutting)<br>• Tree vegetation in existing forest areas should be restocked, especially in | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| | | upper and mid catchment areas for replenishment<br>• Fuel wood should be obtained from shrub species<br>• Local shrubs and perennial grasses should be planted as vegetative barriers in the form of contour v-ditches | |
| | Negative Impacts<br>• Change in diversity of flora and fauna<br>• Introduction of exotic species could have adverse impacts<br>• Increase in vector borne diseases<br>• Increased risk of forest fire, habitat and grazing resources loss | Mitigation Measures<br>• Follow the screening procedures.<br>• When land is required for these facilities, follow the resettlement policy framework (RPF) to address and mitigate any adverse social and economic impacts arising from voluntary land donation,<br>• When there are any community-imposed use restrictions that may restrict traditional usage, and adversely affect the most vulnerable households; such investment GPRMPs should be screened for adverse impacts on traditional use and customary rights, and when needed suitable mitigation action plans needs to be prepared and implemented by the beneficiary groups, GPs and HPFD.<br>• Tree planting should be done along the contours in either continuous or discontinuous trenches depending on local vegetation, terrain, soil type, land tenure and local requirements. The productivity of government, village common /private land, forest land and waste lands should be increased through afforestation / reforestation.<br>• Sufficient area should be allowed within the plantation for growing intermediate products like shrubs and grasses. The Absolute tree density shall be followed as per MoEF norms.<br>• Lower tree densities with a corresponding increase in the proportion of shrub and grass species should be planted to meet the fodder requirements.<br>• About 500-1000 trees should be planted per hectare, equally spaced along contour.<br>• Commonly acceptable arrangements in conjunction with improved pasture species should be followed for protection and exploitation.<br>• The selection of vegetative barriers species should be based on local conditions, soils moisture, etc.<br>• The barriers should be developed across the slope and along the field boundaries to intercept surface runoff and allow soil to accumulate behind the barriers.<br>• The barriers should be placed precisely along the contour through proper | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| | | alignment without loss of land available for cultivation<br>• The barriers should not be damaged while the intermediate products are harvested<br>• Bulk planting of fodder should be carried out mainly on common lands.<br>• Grass planting should be carried out in shallow trenches and ridges.<br>• Planting areas for fodder should also be developed close to homesteads to reduce time for collection | |
| SOIL WATER CONSERVATION<br>• Erosion control<br>o Contour vegetative hedges<br>o Gully control measures<br>o Drainage line treatment<br>o Stream bank protection<br>• Village pond construction/ Rehabilitation<br>• Water harvesting, water conveyance structures and reuse of rain water<br>o Check dams<br>o Sub surface dykes<br>o Recharge pits<br>o Irrigation Channels | Positive Impacts<br>• Increased groundwater recharge and availability<br>• Improved irrigation facilities<br>• Improved drinking water availability<br>• Possible improvement in groundwater quality<br>• Reduce soil erosion including soil & nutrient loss<br>• Increased perenniality of streams<br>• Reduced runoff<br>• Reduction in flood occurrence | Enhancement Measures<br>• Establish a robust groundwater monitoring and management system. Record inflows and withdrawals. Allocate quotas for withdrawals.<br>• Empower Gram Panchayats/ Community Organizations to stop indiscriminate drilling of bore wells and unscientific withdrawal of groundwater.<br>• Rules and regulations over sharing and rational use of water to be framed by the stakeholder communities through GP-RMP<br>• Build capacity of communities to operate and maintain and soil and water conservation structures.<br>• Ridge to valley (from starting point of stream) treatment is to be adopted to harvest rain water and control soil erosion because velocity of water is reduced from top.<br>• Maintenance procedures after construction, such as silt removal and vegetative cover for embankments should be by farmers. | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants |
| | Negative Impacts<br>• Reduction in water availability at down stream<br>• Siltation in water harvesting structure<br>• Pesticides & insecticides pollution in water harvesting structure with consequent effect on water quality<br>• Check dam failures<br>• Soil erosion & siltation rates due to construction activities | Mitigation Measures<br>• Follow the screening procedures.<br>• PMU to ensure water quality and availability to the community<br>• PMU to take up measure for prevention of vector borne diseases and other communicable diseases;<br>• Vegetative measures may be combined with possible cut off drains to prevent rapid overland flow into roadsides<br>• For side erosions stabilization of side slopes with vegetative cover coupled with retaining walls shall be provided<br>• Design of gully control structures are to be prepared specific to each work site | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| | • Mosquito breeding in village ponds/ farm pond<br>• Water borne diseases due to water contamination<br>• Algal growth and eutrophication due to increased levels of nutrients in surface water bodies<br>• Stagnation of water in surface streams resulting in change in taste & increase in odour<br>• Possibility of water logging | • The site for check dams shall be site specific, gully checks for low slope whereas silting basins shall be used for steep slopes<br>• Stone rip–rap or pitching, wooden piles shall be provided under conditions of high soil erosion.<br>• Provision should be made to trap transported debris and bed load. Sediment traps should be located at the inlet and easily accessible for cleaning<br>• Scour protection should be provided at the base of the overflow spillway and a stone pitched channel should be provided to lead the excess water away from the structure<br>• Village ponds should be lined and stone pitching and turfing on sided should be carried out<br>• Fencing of water impounding structures and other construction areas, especially those closer to habitation<br>• Sediment traps with stone pitching and turfing should be constructed<br>• Soil conservation measures around the structures (bio-engineering measures).<br>• Deep wells may not be dug to reduce drawing underground water.<br>• Surface run-off should be intercepted at field boundaries and soil accumulation should be behind the barriers<br>• Grass clumps should be planted all along the boundaries<br>• Disposal of waste water away from the ponds and proper drainage<br>• Fish rearing to consume the mosquito eggs.<br>• When there are tribals in the Gram Panchayat follow the TDF | |
| AGRICULTURE & ALLIED ACTIVITIES<br>• Conservation measures<br>o Vegetative field boundaries<br>o Reuse of harvested water<br>o Furrow contour cultivation<br>• Production measures<br>o Organic farming<br>o Crop demonstration | Positive Impacts<br>• Increased fodder production<br>• Reduced surface run-off and soil and nutrient loss<br>• Improved crop cultivation practices<br>• Enhanced soil moisture<br>• Improved productivity<br>• Diversification<br>• Economic benefits | Enhancement Measures<br>• Mixed cropping and flexibility in planting, rotation of crops and bringing the cultivated land under leguminous crop (pea, lentil etc.) should be encouraged as these will maintain soil fertility.<br>• Promotion of agro–forestry will maintain biological fertility of soil.<br>• Plantation of fodder species in the uncultivable waste land will supplement fodder.<br>• Use of waste bio products for packaging<br>• Demonstrations should be established only where surface stabilization using vegetative barriers are complete<br>• Plantation/ protection of pest controlling plants (Marigold, etc.) | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| ○ Rainfed crop demonstration<br>○ On farm fodder and biomass production<br>○ Intensive farming<br>○ Diversification in crop and livestock<br>• Constructions of tanks and secondary distribution of water | | • Build awareness among farmers on mixed cropping, use of bio-compost, biotic control of pests, etc. | |
| | Negative impacts<br>• Chemical fertilizer, pesticide & insecticide pollution<br>• Agriculture run-off<br>• Increased use of water<br>• Soil fertility depletion due to extensive farming<br>• Drainage congestion | Mitigation Measures<br>• Follow the screening procedure<br>• Implement the IPNMP<br>• Use of bio-compost, organic mulch/ Green Manure and vermin compost and Suitable organic / biotic control of insects and pests will result in lesser use of permissible chemical fertilizers and pesticides<br>• Selection of low water demanding crops and rain water harvesting, storage of surface water (of streams, nallah, etc.) through water storage ponds will help harvest more water for use in HYV cropping.<br>• High water consumption crops should be discouraged<br>• Selection of crops should be based on local water budget and traditional practices<br>• High nutritional value traditional crops should not be totally replaced by high yielding varieties.<br>• Leveling of crop field and maintenance of terraces/ bund to check water runoff and soil loss<br>• Genetically manipulated varieties should be avoided<br>• Integrated management of key pests<br>• Organic manure/fertilizer and bio-pesticide application to enhance yield<br>• When there are tribals in the Gram Panchayat follow the TDF | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |
| HORTICULTURE<br>• Homestead horticulture | Positive Impacts<br>• Increased production base, biomass production & perennial cover<br>• Direct economic benefits | Enhancement Measures<br>• Higher use of bio-fertilizers (bio-Compost, vermin compost, microbial inoculants, etc.) and bio pesticides will reduce chances of soil contamination and water pollution.<br>• Live hedge fencing should be encouraged | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| | • Reduced soil erosion due to increased vegetative cover<br>• Retention of soil moisture due to vegetative cover | • Use of farm yard manure or mulching practices should be encouraged<br>• Valuable plantation crops, medicinal crops and aromatic crops should be encouraged.<br>• Build awareness among farmers on medicinal crops, bio-fertilizers, bio-pesticides, etc. | Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |
| | Negative Impacts<br>• Fruit crops may compete with food producing crops<br>• Reduced crop/ horticulture diversity; Mono-cropping in horticulture may cause disease & pest problems and disappearance of species<br>• Competition for water, nutrient level may increase<br>• Increase in use of chemical fertilizers and pesticides | Mitigation Measures<br>• Follow the screening procedure<br>• Implement the IPNMP<br>• Lesser use of permissible chemical fertilizers/ pesticides reduce chances of soil contamination and water pollution<br>• Selection of crops with high efficiency in water utilization and high yield will reduce pressure on water use.<br>• Through water storage ponds supplement water needs of HYV crops<br>• Development of dry land orchards with suitable local fruit crops<br>• Benefits should be maximized by using crop cultivation, between fruit trees for 2-3 years<br>• Monoculture should be avoided by using other species along with the main species<br>• Awareness generation among farmers on the ill effects of using the pesticides, fertilizers, etc.<br>• Skill training for farmers in proper use of pesticides, fertilizers, etc.<br>• Awareness generation for farmers on using bio/ organic pesticides/ fertilizers.<br>• Skill training to farmers in preparation and use of bio/ organic pesticides/ fertilizers.<br>• When there are tribals in the Gram Panchayat follow the TDF | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| ANIMAL HUSBANDRY<br>• Livestock Management<br>o Animal health care<br>o Mangers/ Stall feeding construction/ rehabilitation<br>o Stall feeding of animals<br>o Chaff cutters for fodder<br>o Livestock pest management | Positive Impacts<br>• Decrease in biotic pressure<br>• Improved livestock/ milk production<br>• Reduced exploitation of forest areas<br>• Greater management of fodder resources<br>• Healthy Livestock<br>• Improved sanitation | Enhancement Measures<br>• Farmers training and awareness programs to check the quality of the urea-molasses brick and poisoning.<br>• Veterinary camps may be sponsored.<br>• Services should be provided by professionals.<br>• Use of farm yard manure should be encouraged<br>• Shelter for animals owned by transhumant.<br>• Training should be imparted for upgradation of animals, livestock husbandry, health of animals and nutritional standards<br>• Livestock productivity should be monitored regularly<br>• Fodder wastage should be minimized by the use of chaff cutters which will enhance the fodder bio-availability and constructing feeding stalls/ mangers<br>• No spillage of medicated water used for dipping livestock downstream<br>• Proper disposal of packaging material as burring deep in soil away from the water resources | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |

| ACTIVITIES | IMPACTS (POSITIVE and NEGATIVE) | ENHANCEMENT/ MITIGATION MEASURES | RESPONSIBILITY |
|---|---|---|---|
| | Negative Impacts<br>• Introduction of exotic/ alien species of grasses and fodder crops to meet the demand of fodder that dominate the local species.<br>• Hybrid animals are more prone to diseases and require intensive care and more provisions for health care.<br>• Limited breeding facility in case of Exotic animals.<br>• Loose/ moisturized feeding of urea-molasses brick may lead to poisoning.<br>• Increased returns from animal husbandry may trigger increase in livestock population result in stress on fodder resources.<br>• Better breed of livestock require better and more expensive fodder and management practice<br>• Lack of nutritious forage may decline the productivity of improved cattle<br>• Stress on pre and post natal care<br>• Post project maintenance of animal health program might be a problem<br>• Bacterial and parasitic diseases; Increase in tick, lice, etc.<br>• Need for preservation of vaccines in cryogenic conditions | Mitigation Measures<br>• Follow the screening procedures<br>• Review the existing breeding techniques and identify the successful breeds best suited for improvement. The populations of inferior breeds should be controlled/ eradicated.<br>• Timely assistance from the Animal Husbandry Department (AHD) for health care provisions.<br>• Increase stall feeding and reduce grazing on forest covers<br>• Control feeding of urea-molasses bricks will not result in poisoning.<br>• Proper packing and storage of treated fodder will not result in poisoning.<br>• Limited area should be brought under exotic species of grass plantation.<br>• Animal health practices like storage of vaccines & drugs, insemination centre sets, etc. through veterinary departments shall be adopted<br>• When there are tribals in the Gram Panchayat follow the TDF | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |
| HARVESTING & STORAGE OF AGRICULTURE/ | Positive Impacts<br>• Increased production base, | Enhancement Measures<br>• Higher use of bio-fertilizers (bio-Compost, vermin compost, microbial | PMU, IDP through DPOs and APOs |

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| HORTICULTURE PRODUCE (CROPS, FRUITS, VEGETABLES, HERBS, MEDICINAL PLANTS, FLOWERS, ETC.)<br>• Harvesting activities<br>• Development of Storage facilities | biomass production & perennial cover<br>• Direct economic benefits<br>• Reduced soil erosion due to increased vegetative cover<br>• Retention of soil moisture due to vegetative cover | inoculants, etc.) and bio pesticides will reduce chances of soil contamination and water pollution.<br>• Live hedge fencing should be encouraged<br>• Use of farm yard manure or mulching practices should be encouraged<br>• Valuable plantation crops, medicinal crops and aromatic crops should be encouraged.<br>• Build awareness among farmers on medicinal crops, bio-fertilizers, bio-pesticides, etc. | Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |
| | Negative Impacts<br>• Agriculture/ Horticulture wastes<br>• Pressure on land for storage facilities<br>• Wastage of agriculture/ horticulture produce<br>• Use of pesticide on stored material<br>• Disposal of agriculture/ horticulture plant wastes after harvesting, especially with vegetable and aromatic (for perfume) plants<br>• Loss of cultivable land for construction of storage facilities<br>• Damaged agriculture/ horticulture product due to pests attack etc. will lead to large amount of solid organic wastes, disposal of which will be an issue<br>• Greater use of pesticides to protect the stored agriculture/ horticulture produce may lead to product contamination<br>• Cold Storages from its normal operation may generate rotten | • Follow the screening procedures<br>• Follow the IPNMP<br>• Crops, fruits, vegetables, flowers and other agriculture/ horticulture plant wastes residue shall not be dried and burnt in the field. These wastes may be mixed with fodder and given to animals as fodder.<br>• Crops, fruits and vegetables residue shall be collected and decomposed in pits for bio-manure development<br>• Storage facilities shall be built on waste/ non-cultivable land to avoid any acquisition of agriculture land<br>• No over use of pesticides on stored material.<br>• Bio-pesticides or low harmful chemical base pesticides shall be promoted if possible<br>• Cold storage and other storage facilities shall be developed as per standard criteria for vegetables and other horticulture produce respectively to minimize damage.<br>• When there are tribals in the Gram Panchayat follow the TDF | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |

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| | crops, fruits and vegetables and other material, which will be required to be disposed. | | |
| CONSTRUCTION/ INFRASTRUCTURE/ OTHER<br>• Water harvesting and water conveyance structures<br>• Foot Bridges, Ropeways<br>• Processing/ Storage Facilities | Positive Impacts<br>• Improved accessibility to markets<br>• Improved quality of life<br>• Greater employment generation | Enhancement Measures<br>• Keep the infrastructure in good condition<br>• Use innovative public private people partnerships to build and maintain infrastructure | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |
| | Negative Impacts<br>• Removal of vegetation during construction activities<br>• Soil loss during the construction of structures and quarrying for stone and other materials<br>• Siltation of water bodies downstream during construction<br>• Low quality construction may lead to failure and more hazards in downstream<br>• Destabilization of the land and soil erosion/ landslips along the Foot bridges/ Ropeways<br>• Maintenance of the structures will require additional responsibilities to the stakeholders.<br>• Destruction of local flora during construction.<br>• Possibility of natural drainage pattern being disrupted<br><br>During the implementation phase | Mitigation Measures<br>• Use of land not suitable for other productive purposes may be brought under infrastructure activities.<br>• The safety provisions related to construction (Building) activities to be followed.<br>• Proper upkeep and maintenance of facilities built.<br>• Quality of constructions should be ensured to reduce the failure and more hazards in downstream.<br>• Proper designing and planning for road construction/laying will stabilize the land and reduce soil erosion/ landslips.<br>• Bio-physical measures to rehabilitate disturbed land to check soil erosion.<br>• All project interventions will be appropriately designed to ensure that they do not impact the forest lands or wet lands. All the physical works should be on public/ Panchayat lands.<br>• Suitable changes in location/ alignment shall be made in the schemes to avoid cutting of trees and also avoid erosion and ensure soil stabilization. In the absence of an alternate location, permission from the forest department shall be obtained for felling of trees and the department's guidelines on compensatory afforestation will be followed.<br>• The Contractor will implement the Labour Management Procedures.<br>• The Contractor will institute a GRM for labour<br>• The PMU will a) conduct sensitization and awareness campaigns for contract workers, community workers and beneficiary communities on safety, harassment, GBV-related issues, legal recourse procedures and mitigation channels; b) Train the project staff to on GBV risk mitigation; | PMU, IDP through DPOs and APOs<br>Agriculture Department<br>Animal Husbandry Department<br>Consultants<br>Farmers/ Beneficiaries<br>UGs/ CAGs |

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| | of the project, there is a likelihood that the construction activities cause temporary negative environmental impacts, which would need to be addressed. Some of the likely issues are the following:<br>• During the construction of project components significant earth work may be involved, which may cause erosion of land and cutting of trees.<br>• Possible damage to places of cultural, heritage and recreational importance.<br>• Impact on human health and safety due to dust and noise pollution, and inadequate safety measures. | c) strengthen the GRM mechanism by establishing multiple channels to initiate a complaint including confidential reporting in local language with safe and ethical documenting of GBV cases; d) include GBV specific commitments in the bidding documents.<br>• The Contractor will implement the EHS Guidelines<br>• Contractor to prevent general work site related hazards due to dust, sound and debris.<br>• The Contractor will implement the CHS Guidelines<br>**Chance Find Procedures**<br>In case of some physical works associated with construction and maintenance there might be chance finds of objects of cultural/ archaeological importance. In such cases, the regional offices of the relevant agency (e.g. the Archaeological Survey of India) will be immediately notified.<br>• As a precautionary measures avoid such sensitive sites where there are cultural heritage related issues<br>• Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over.<br>• Notify the Village Gramsabha who in turn will notify responsible local or national authorities in charge of the Cultural Property of the State<br>• Relevant local or national authorities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values<br>• Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage.<br>• If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the cultural relics authority, the community will need to make necessary design changes to accommodate the request and preserve the site. | |

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| | | • Decisions concerning the management of the finding shall be communicated in writing by relevant authorities.<br>• Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the heritage. | |