WATERSHED MANAGEMENT DIRECTORATE, UTTARAKHAND,

INDIA

UTTARAKHAND CLIMATE RESPONSIVE RAINFED FARMING PROJECT

(P179357)

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)

[BORROWER APPROVAL AND DISCLOSURE DATE]

Contents

LIST OF ABBREVIATIONS

Dy.Dir	Deputy Director
DPMU	District Project Management Unit
ESA	Environment and Social Assessment
FF	Farmer's Federation
FGD	Focused Group Discussion
FIG	Farmer's Interest Group
GP	Gram Panchayat
GPRP	Gram Panchayat Resilient Plan
IEC	Information, Education and Communication
MDT	Multi Disciplinary Team
M&E	Monitoring & Learning
PD	Project Director
PME	Participatory Monitoring & Evaluation
PMU	Project Management Unit
RVC	Revenue Village Committee (Informal body at Revenue Village of suggestive/consultative nature)
RVC Proposals	Proposals made by RVC at level of revenue village
SHG	Self Help Group
UG	User Group
VLI	Village Level Institutions
VP	Van Panchayat
WAS	Women Aam Sabha
WMD	Watershed Management Directorate, Dehradun, Uttarakhand.
WWMC	Water &Watershed Management Committee

ICM- IPM

FFS	Farmer's Field School
FSI	Farming System Intensification
FYM	Farm Yard Manure
ICM	Integrated Crop Management
IPDM	Integrated Pest and Disease Management
IPM	Integrated Pest Management
IPNM	Integrated Plant Nutrient Management
IWM	Integrated Weed Management
STCR	Soil Test Crop Response
WHO	World Health Organizations
EFC	Environment Friendly Chemicals
TOT	Training of Trainers
NPM	Non- Pesticidal Management

Executive Summary

Project Objective

The World Bank will be supporting Watershed Management Directorate, Uttarakhand (WMD) in implementing the Uttarakhand Climate Responsive Rainfed Farming Project (UCRRFP). The objective of the project is to *Improve resilience of production system to make mountain farming emission competitive and profitable in selected micro-watersheds of Uttarakhand*.

Project Components

Component A- Developing Resilient and GHG Efficient Production Systems

This component aims to enhance productivity through land treatment and development, while increasing fertilizer efficiency, water productivity, and reducing GHG emissions. To this effect, the multi-expert task team at the district level will help in preparing micro plans that will be implemented in a phased manner. Commodity-specific advisories will come from the respective technical agencies having domain knowledge. The component provides the foundation for the project to shift cultivation towards optimal input usage pattern, leading to reduced input costs and enhanced average income of farmers.

Component B – Science-Based Development of Resilient Spring-sheds

The objective of the component is to improve spring-shed efficiency by investing in (i) undertaking comprehensive catchment treatment around spring-sheds; (ii) improving quantity and stability of spring flows through drainage management; and (iii) increased volume of water stored for farm use in farm ponds. With technical inputs from consortia partners, this component will support enhanced participatory micro-watershed planning, incorporating spring-shed treatment; rehabilitation of degraded common land; and water harvesting/storage from improved spring flows. It will enhance water supply and reliability, ensuring more timely input with water budgeting for each crop, for improved farm productivity under Component A.

Component C- Enhancing Income Resilience through Agribusiness and Entrepreneurship

The objective of the component is to promote investments in agribusiness to increase the stability and diversity and thus resiliency of incomes of rural and agricultural households in the project area (designated micro-watersheds). This will be through value addition of farm-based produce and enterprise development, tapping into the State's rainfed areas' opportunities and relative strengths, also for the most vulnerable households, and tapping the surpluses from productivity gains and agriculture expansion arising resulting from Component A and B.

This component will make investments through three subcomponents: (i) Supporting Agribusiness Promotion Centers; (ii) Micro-Enterprise Development; and (iii) Income Generation Support for Vulnerable Groups.

Component D – Project Management, Monitoring & Evaluation, and Learning

The objective of this component is to (i) strengthen the institutions associated with the project; (ii) deliver effectively and efficiently project outputs in a timely and accountable manner with adaptive learning, and (iii) generate and disseminate cutting-edge knowledge on a range of issues related to climate-resilient agriculture.

This component will ensure a proactive and responsive project management and coordination, with well capacitated staff. A systemic management effort will also be made to institutionalize project developed approaches, partnerships, and systems. In addition, this component will create an institutional learning and sharing mechanism for mainstreaming resilient agriculture systems at all levels across the participating departments related to the project.

Component E: Contingent Emergency Response Component (CERC).
The project will include CERC with a zero allocation at project approval. This arrangement shall permit a rapid project restructuring should a disaster strike and allows the Bank to support recovery efforts quickly, if required.

Project Area

Uttarakhand Climate Responsive Rainfed Farming Project (UCRRFP) will be implemented in 06 hilly districts and 02 plain districts of Uttarakhand covering about 1200 villages and comprising of 56 Micro watershed clusters.

Environmental Baseline

Uttarakhand is located on the southern slopes of the Himalayan range, encompassing an area of 53,484 sq. km, of which 93% is mountainous and 65% is forested. The elevation ranges from 200 meters above mean sea level (a.m.s.l) in the Gangetic plains to over 7,800 meters a.m.s.l in the Himalayan ranges.The state is divided into two major administrative divisions: Garhwal in the northwest, which includes Chamoli, Dehradun, Haridwar, Uttarkashi, Tehri, Pauri, and Rudraprayag; and Kumaon in the southeast, which includes Almora, Bageshwar, Champawat, Nainital, Pithoragarh, and Udham Singh Nagar.

Soil
Uttarakhand features a variety of soils, all prone to erosion. In the north, soils range from glacial debris gravel to stiff clay. Moving south, brown forest soil, often shallow, gravelly, and rich in organic content, is common. The Bhabar area has coarse-textured, sandy to gravelly, highly porous, and largely infertile soils. In contrast, the Tarai region in the extreme southeast boasts rich, nutrient-dense clayey loams mixed with fine sand and humus, making it ideal for cultivating rice and sugarcane. While the Tarai region's soil is highly fertile, the hill regions face constant erosion due to steep slopes, resulting in reduced fertility.

Water Sources
Uttarakhand is rich in water resources, including glaciers, lakes, rivers, and other water bodies. However, there has been a general decline in these water resources across the state. Hydrological studies over the past decades have confirmed this diminishing trend and the worsening crisis. Several factors have contributed to decreased underground seepages, leading to reduced water availability and lower discharge in streams, as well as the extensive disappearance of springs (*naulas*), which are the primary water source for the region.

Climate
Uttarakhand's climate varies from a subtropical monsoon type with mild winters and hot summers to a tropical upland type with mild and dry winters and short, warm summers. About 80% of the area's annual rainfall of 1,546 mm occurs during the Indian Summer Monsoon (June to September). The mid-latitude westerlies contribute to the winter snowfall, feeding numerous glaciers.

The northern, northwestern, northeastern, and western parts of the state are perennially covered with snow, ranging from 9.5% to 10.2% of the area. The state has a population of approximately 11.4 million people, with a density of about 189 people per square kilometer. Urban centers like Dehradun, Haridwar, and Nainital have experienced rapid growth due to migration and economic development.

Climate Change Vulnerability
The vulnerability assessment[1] conducted for the state, based on 11 indicators, showed the highest value of vulnerability for Garhwal (Pauri Garhwal) (0.716) and the lowest for Haridwar (0.340). The range of the Vulnerability Index (VI) was divided into three categories: relatively high vulnerability (0.590-0.716) {Pauri,

[1] Climate Vulnerability Assessment for Adaptation Planning in India Using a Common Framework, *Department of Science and Technology, Government of India*

Tehri, Almora, Dehradun, Rudraprayag, Bageshwar}, relatively moderate vulnerability (0.465-0.590) {Champawat, Pithoragarh, Uttarkashi, Chamoli, Nainital}, and relatively low vulnerability (0.340-0.465) {Udham Singh Nagar, Haridwar}.
Changing climate conditions are causing loss of livelihood capital, altering agro-livestock conditions, and leading to the emergence of invasive species. The agricultural sector, which employs the largest workforce proportion in the state, is most affected. While rapid migration contributes to this issue, climate change undoubtedly threatens livelihoods in forestry, agriculture, and livestock husbandry[2].

Around 78% of Uttarakhand's population resides in rural areas, and about 60% are engaged in agriculture. However, the agrarian sector is grappling with the impacts of climate change. The rising air temperatures, uncertain rainfall, and glacier retreats in Uttarakhand are exacerbating the situation. Consequently, the state is confronted with a multitude of challenges, including high susceptibility to extreme weather events and the depletion of essential ecosystem services[3].

Agricultural
The agriculture sector in the state continues to remain heavily depended on rainfall. The net Irrigated area in the State is 3.45 lakh ha. Out of which 85.83% is in plains and 14.17% are is in hills. The irrigation intensity in the State is 159% which varies between 155% in plains to 184% in hilly region[4]. With a total cropped area (GCA) around 11,00,000 ha and net area sown around 7,00,000 ha, the cropping intensity is 155% in Uttarakhand[5].
As per the Uttarakhand Agriculture Statistics Data 2016-17, 2017-18 and 2018-19, the average use of chemical based fertilizers i.e. Urea, DAP, MoP, SSP etc. in the state is 3,82,171 t. in a year (in both rabi and kharif seasons). The consumption of chemical fertilizers (2,67,114 t) is maximum in the plain district Udham Singh Nagar, i.e 70% of the state consumption and 91% of Kumaun reason's consumption. However, in another plain district Haridwar, the consumption is 79,325 t which is 21% of the average total state chemical fertilizers consumption in a year. Among hilly project districts i.e. Rudraprayag, Tehri, Uttarkashi, Almora and Pauri it ranges 0.0 t (Rudraprayag) to 932 t (Pauri) in a year.
The average use of agrochemical (pesticides, insecticides & weedicides) in the state is 404 t in a year in two cropping seasons. The consumption of agrochemicals (2,67,114 t) is maximum in the plain district Udham Singh Nagar, i.e 40% of the state agrochemical consumption. Among hilly project the average use of agrochemicals ranges 3 t (Rudraprayag) to 37 t (Uttarkashi) in a year[6].

Agro Climatic Zones

The state has different agro-climatic conditions, slopes and height. Details of Physiographic Zones and farming situations in the state are as under:

Table-I: Agro Climetic Zones in Uttarakhand

S.N	Zone	Farming situation	Soil	Rainfall (mm/year)	Districts	Principal farm produces and Livestock
1	Zone A up to 1000 M	Tarai irrigated	Alluvial	1400	U.S. Nagar, Haridwar	Rice, wheat, sugarcane, lentil, chickpea, rapeseed mustard, mango, Litchi, guava, peach and plums. Livestock: Buffalo and cattle

[2] P Rautela, and B Karki, "Impact of Climate Change on Life and Livelihood of Indigenous People of Higher Himalaya in Uttarakhand, India." American Journal of Environmental Protection, vol. 3, no. 4 (2015): 112-124. doi: 10.12691/env-3-4-2.

[3] S. Rani and P. Tiwari (2024), Climate change vulnerability assessment for adaptation planning in Uttarakhand, Indian Himalaya; International Journal of Disaster Risk Reduction 114 (2024) 104938

[4] State Horticulture Mission, Department of Horticulture, Govt. of Uttarakhand

[5] Agriculture Statistics at a glance 2016, Directorate of Economics & Statistics, DAC&FW

[6] Agriculture Statistics Data 2016-17, 2017-18 and 2018-19, Agriculture Department, Govt. of Uttarakhand

S.N	Zone	Farming situation	Soil	Rainfall (mm/year)	Districts	Principal farm produces and Livestock
		Bhabar Irrigated	Alluvial mixed with boulders and shingles	1400	Nainital, Dehradun and Pauri Garhwal	Rice, wheat, sugarcane, rapeseed mustard, potato, lentil, mango, guava and litchi. Livestock: Buffalo and cattle
		Irrigated lower hills (600-1000M)	Alluvial sandy soil	2000-2400	Champawat, Pauri Garhwal, Dehradun, Nainital, Tehri Garhwal	Rice, Wheat, onion, chilly, peas, potato, radish, cauliflower, pulses, oilseeds, soybean, mango, guava, plums and peaches. Livestock: Buffalo and cattle
		Rain-fed lower hills (600-1000M)	Residual sandy loam	2000-2400	Champawat, Nainital, Pauri Garhwal, Dehradun, Tehri Garhwal, Bageshwar	finger millet, Maize, rice, wheat, pulses, mango, guava, plums and peaches. Livestock: Buffalo, cattle and goat
2.	Zone B 1000-1500M	Mid hills south aspect (1000-1500 M)	Sandy loam	1200-1300	Champawat, Nainital, Almora, Dehradun, Tehri Garhwal, Bageshwar	Rice, finger millet, wheat, potato, tomato, peas, cole crops, pulses, peach and plums. Livestock: Cattle, sheep & goat
3	Zone C 1500-2400M	High hills (1500-2400 M)	Red to dark	1200-2500	Pithoragarh, Almora, Chamoli, Bageshwar	Amaranth, finger millet, French-beans, Cole crops, potato, peas, peaches, plums, pear, apple and stone fruits. Livestock: Cattle, sheep and goat
4.	Zone D> 2400 M	Very High hills	Red to dark Black clay	1300	Pithoragarh, Chamoli and Uttarkashi	Amaranth, buckwheat, peas, Cole crops, apple and potato. Livestock: Sheep & goat

Source - State Horticulture Mission, Horticulture Department, Govt. of Uttarakhand

Social Baseline

State Demographic Profile

Uttarakhand is a predominantly rural state. In most districts, 75-85% of rural settlements have fewer than 500 residents. Only 17% of rural settlements have populations between 500-1999, and just 2.7% have populations of 2000 or more. The small size and widespread distribution of these settlements' present significant challenges for service delivery, especially in tough geographic and climatic conditions.

According to the 2011 Census, Uttarakhand has a population of around 10.1 million, representing 0.84% of India's total population. The population comprises 5,154,178 males and 4,962,574 females. The sex ratio is 963 females per 1000 males, slightly better than the national average of 940.

The literacy rate in Uttarakhand is 79.63%, higher than the national average of 74.04%. During the last Census (2011), 6,997,433 people were literate, with male literacy at 88.33% (3,930,174) and female literacy at 70.70% (3,067,259). These rates have improved since the 2001 Census when male and female literacy rates were 81.02% and 63.36%, respectively.

Population distribution varies significantly across districts. Four districts—Dehradun, Haridwar, Udham Singh Nagar, and Nainital—account for 61.5% of the state's population. Adding Tehri Garhwal, Pauri Garhwal, and Almora brings this total to nearly 81%, indicating high population concentration in the mid and foothills compared to the high hills' remaining six districts.

Population density also varies, with Haridwar, Udham Singh Nagar, and Dehradun having higher densities of 817, 648, and 550 persons per square km, respectively. In contrast, districts like Uttarkashi, Chamoli, and Pithoragarh have lower densities, averaging 41, 49, and 69 persons per square km. The population density in Bageshwar and Rudraprayag is 116 and 122 persons per square km, respectively[7].

Scheduled Castes and Scheduled Tribes Population

The district wise Scheduled Castes and Scheduled Tribes population in the state, as per 2011 census is given in Table II.

Table II: SC and ST Population in Uttarakhand

District	Population			SC Population			ST Population			
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	% of Total
Uttarkashi	305781	24305	330086	76875	3692	80567	3374	138	3512	1.06
Chamoli	332209	59396	391605	68000	11317	79317	9046	3214	12260	3.13
Rudraprayag	232360	9925	242285	46279	1400	47679	309	77	386	0.16
Tehri Garhwal	548792	70139	618931	94628	7502	102130	630	245	875	0.14
Dehradun	754753	941941	1696694	119123	109778	228901	101475	10188	111663	6.58
Garhwal	574568	112703	687271	109576	12785	122361	1952	263	2215	0.32
Pithoragarh	413834	69605	483439	109541	10837	120378	15915	3620	19535	4.04
Bageshwar	250819	9079	259898	69842	2219	72061	1874	108	1982	0.76
Almora	560192	62314	622506	140931	10064	150995	750	531	1281	0.21
Champawat	221305	38343	259648	41725	5658	47383	1084	255	1339	0.52
Nainital	582871	371734	954605	137906	53300	191206	5780	1715	7495	0.79
Udham Singh Nagar	1062142	586760	1648902	174919	63345	238264	117381	5656	123037	7.46
Hardwar	1197328	693094	1890422	307320	103954	411274	5249	1074	6323	0.33
Uttarkashi			330086	80567		80567			3512	
Total	**7036954**	**3049338**	**10086292**	**1496665**	**395851**	**1892516**	**264819**	**27084**	**291903**	2.89

Source – Census 2011

[7] Census 2011

Table III: SC and ST Population in UCRRFP areas

District	Households	Total Population	Scheduled Castes	Scheduled Tribes
Almora	11497	54024	14308	67
Garhwal	7159	29100	4615	21
Hardwar	5331	29875	4173	3625
Nainital	17649	86515	20480	109
Rudraprayag	11127	50279	10006	29
Tehri Garhwal	8462	44791	6015	5
Udham Singh Nagar	6276	34022	6546	39
Uttarkashi	8317	39410	9909	1164
Grand Total	**75818**	**368016**	**76052**	**5059**

Source – Census 2011

Scheduled Areas

The tribal population of the State is concentrated in the remote and forest are of Tarai and Bhabar and high reaches of Pithoragarh, Champawat, Chamoli, Uttarkashi District and Jaunsar-Bhabar area of Dehradun district. Now a day most of these people have taken to a settled life and are engaged in animal husbandry, agriculture, trad and other occupation. As per census data of 2011, out of total population of Uttarakhand about 3% of the population of the state are schedule tribes.

The Environmental and Social Management Framework (ESMF)

This Environmental and Social Management Framework (ESMF) has been prepared to identify the potential environmental and social risks and impacts of proposed Project activities and propose suitable mitigation measures to manage these risks and impacts. It maps out the Indian laws and regulations and the World Bank Environment and Social Standards (ESSs) applicable to the Project, and describes the principles, approaches, implementation arrangements, and environmental and social mitigation measures to be followed.

The potential environmental and social risks for project activities are identified as:

Environmental risks

i. Over-extraction of natural Resources.
ii. Depletion of traditional water sources.
iii. Dependency on forest for fodder, fuelwood and NTFPs.
iv. Man animal conflict.
v. Use of chemical based agricultural inputs.
vi. Low productivity of rainfed fields.
vii. Threats to biodiversity

Social risks

i. Social equity concerns especially for weaker/vulnerable section of society.
ii. Women participation.
iii. Ownership on project activities.

iv. Distribution of assets.
v. Rights of indigenous people

Environmental measures

i Best indigenous practices should be taken for resources management to foster the local skill, employment generation and also to protect the aesthetic values. However, state of art technologies should be adopted whenever required.
ii To ensure the availability of water for domestic as well as irrigational use, source sustainability measures should be given top priority over any other resource development and management activity.
iii In traditional water sources should be treated by using traditional knowledge base as well as using scientific approach.
iv Multipurpose trees (fodder, fuel wood, fibre, fruits & fertilizer - the 5 Fs) should be planted instead of exotic species in the afforestation activities under the project. Preference should be given to the local endemic species.
v To reduce man animal conflict, wild fruit plants, local shrubs and grasses should be preferred for plantation under forestry activities.
vi Any modern technological interventions (e.g. solar water lifting pumps, rope way etc.) must be installed only after proper assessment of environment friendliness of the intervention and cost benefit (effectiveness) study for its sustainability.
vii To increase income of local people, cultivation of high value plants, horticulture plantations, market linkages for agribusiness and other non-farm IGA should be promoted.
viii Organic cultivation should be preferred for climate resilient niche crops.
ix Use of alternative energy sources such as Bio-gas, solar devices, gharats etc. should be promoted to reduce dependence on forest for fuel wood.
x Drudgery reduction intervention should be promoted to help women folk

For Drainage Line Treatment, the engineering structures should be constructed through loose bolder/stones lying alongside the drainage line . Quarrying for stones prior to construction of any structure on a site should be strictly prohibited.

Social Measures

i The weaker section and SC/ST groups should be consulted / informed about the project activities so that their livelihood opportunities are enhanced and safeguarded.
ii As women are the key persons in natural resource conservation and management in the region, their role should be pivotal in planning, decision making, and implementation and monitoring.
iii In each GP, the formation of Women Aam Sabhas and inclusion of their proposals in plan should be ensured.
iv To ensure equity concerns the proposals where a large number of persons are benefited should encouraged instead where the proposals benefits a few only.
v For all types of asset creation, either individual or community land could be used for the construction purpose, with the consent & approval of the beneficiaries and Gram Panchayat. None of the lands should be donated to the project thus the right and ownership of the land will be with GP/beneficiary only.
vi Transhumant populations (henceforth referred as transhumant) within the State encompass two nomadic groups Bhotiya/Anwal and Gujjars which travel through the project target area. A transhumant action plan has been developed, which will support livelihoods improvement, in particular, livestock health and extension services and assist them to improve their quality of life through project interventions. The institutional arrangement to implement the transhumant action plan includes the project staff with the support of social development facilitators. The plan also promotes cohesion with the target GPs by increasing project awareness.

Criteria for exclusion of sub-projects/activity

- Activities likely to cause damage to wildlife by setting fire, injuring wildlife, or involving indiscriminate felling of trees or indiscriminate removal of plant, animal or mineral produce from sanctuaries/national park and adjoining forest area.
- Any construction in protected areas or priority areas for biodiversity conservation, as defined in national law
- Activities that have the potential to cause any significant loss or degradation of critical natural habitats, whether directly or indirectly, or which would lead to adverse impacts on natural habitats
- Activities that involve extensive harvest and sale/trade of forest resources (post, timber, bamboo, charcoal, wildlife, etc.) for large-scale commercial purposes
- Activities involving changing forestland into agricultural land or logging activities in primary forest
- Purchase or use of banned/restricted pesticides, insecticides, herbicides, and other dangerous chemicals (banned under national law and World Health Organization (WHO) category 1A and 1B and II pesticides)
- Construction of any new dams or rehabilitation of existing dams including structural and or operational changes; or irrigation or water supply subprojects that will depend on the storage and operation of an existing dam, or a dam under construction for the supply of water
- Activities that involve the use of international waterways.
- Any activity affecting physical cultural heritage such as graves, temples, churches, historical relics, archeological sites, or other cultural structures.*
- Activities that may cause or lead to forced labor or child abuse, child labor exploitation or human trafficking, or subprojects that employ or engage children, over the minimum age of 14 and under the age of 18, in connection with the project in a manner that is likely to be hazardous or interfere with the child's education or be harmful to the child's health or physical, mental, spiritual, moral, or social development
- Any activity on land that has disputed ownership or tenure rights.
- Any activity that will cause physical relocation of households or will require the use of eminent domain
- Any activity with significant environmental and social risks and impacts that require an Environmental and Social Impact Assessment (ESIA)
- Any activity that will require Free, Prior and Informed Consent (FPIC) as defined in ESS7.

* *Activity that cause damage to cultural property, places of religious importance and restricted historical monuments should be excluded. Whenever there is a chance find of cultural or historical artefacts (moveable and immovable) the Department of Archaeology of the state Government, the Archaeological Survey of India will be informed. Should the continuation of work endanger the historical and cultural artefacts, the project work will be suspended until a solution is found for the preservation of these artefacts, or advice from the Archaeological Survey of India is obtained.*

Environmental and Social Management Plan

At the planning phase, the possible environmental and social negative impact of the proposed activities should also be considered during PRA exercises. If the WWMC proposed any activity in their GP plans, it should be ensured that the mitigation measures for the possible negative impacts have also been proposed for implementation. With accordance to the past experiences, all the possible negative impact and the mitigation measures thereof will Annexed, which shall be properly considered and incorporated in the plans during the PRA exercise.

Implementation Arrangements

The responsibility for overall project implementation, coordination and monitoring will be with the Project Management Unit (PMU). To support PMU, there will be two regional coordination offices, headed by "Regional Project Directors"; one in Garhwal region and other one in Kumaun region. Under Regional Project Directors each project district will have "District Project Management Units (DPMU)", headed by the Deputy Director (Dy.Dir), Watershed. Each DPMU will have 3 to 4 "Field Implementation Units/Unit office".

DPMU and Unit office will organize the capacity building and training of stake holders on ESMF, ensuring quality of project processes, providing adequate staffing and organizing timely monitoring & learning activities. The Dy.Dirs, each with a number of MDTs will be the key facilitators and supervisors for the planning and implementation of GPRPs. The Dy.Dirs will be responsible for technical appraisal of the watershed plans prepared by the GPs in accordance with ESMF.

Monitoring arrangements 0f ESMF application

ESMF safeguard application and monitoring in phase wise manner will be the responsibility of all project stakeholders. A continuous process of consultations between all stakeholders for the execution of interventions is required to find out whether the planned interventions are being executed as per the ESMF or not. If not, corrective actions need to be taken in order to realize the expected environmental and social impact. The ESMF application monitoring will also help communities as well as project team to understand the visible/possible impacts of the interventions/mitigation measures/local environmental solutions taken in accordance with ESMF. Following monitoring arrangements will be made to ensure the ESMF application.

Planning Phase

The approval to Draft Plans of GP and action plan for transhumant will be granted after its proper review by MDT members, Dy.Dir/PD to ensure that it conforms to provisions of ESA. If the Draft plan is found to not-conform to ESMF guidelines the Plan will be referred back to GP with observations and suggestions for review.

Implementation Phase

Village level monitoring
Monitoring of ESMF safeguard application at village level will done by the constituted GP committee by itself or will be authorize the revenue village level committee to monitor the safeguard application processes and impacts at village level. At the village level the participatory monitoring will also done by PME team.

Internal project monitoring Internal monitoring of the Environmental and Social safeguards mentioned in ESMF will be done by Deputy Director, Regional Project Directors and WMD in accordance with the monitoring indicators, reporting on ESMF safeguard application for the proposed activities will be carried out. PMU staff will be responsible for overseeing the training and capacity building, monitoring, and Application of ESMF in planning, implementation and management of project activities.

The proposed project would continue to finance third-party impact evaluations (i.e., mid-term and completion), which would verify the project's key outcomes and physical achievements. The three tools - MIS, PME, and Impact evaluation - would support results monitoring and provide data for the results framework.

External Monitoring
ESMF safeguard application will be also monitored by external consultant on sample basis using prepared questionnaire and assessment modules which will be approved by the Watershed Management Directorate. The third party monitoring will be conducted at Mid-Term Evaluation and Final Assessment by an external agency in close collaboration with the Project Directorate.

A separate **Stakeholder Engagement Plan** (SEP) has been prepared for the Project, based the World Bank's Environmental and Social Standard 10 on Stakeholder Engagement. The SEP can be found here:

http://wmduk.gov.in/download/Draft_StakeholderPlan.pdf

Chapter-1

Introduction

Uttarakhand, encompassing the Kumaon and Garhwal Himalayas, covers an area of around 53,485 sq. km and approximately 11 million people are residing there. The state is divided into two administrative divisions - Garhwal and Kumaon - comprising 13 districts and 95 development blocks, with a multitude of villages and administrative units.
Altitude ranges from 200 m to over 8000 m above sea level, with distinct subdivisions like Outer Himalaya, Sub-Himalayan Siwalik belt, Lesser Himalaya, Great Himalaya, and Trans-Himalaya. Human settlements are prevalent up to 3500 m above sea level, with dense populations in the 1200-2000 m zone, leading to challenges in sustaining environmental resources due to increasing demands on land, forests, water, etc.

The rural economy and livelihoods in the state mostly rely on natural resources, supporting agriculture and catering to the needs of a 5.14 million livestock population for fodder. Forest cover varies across altitude zones: 45.80% of the total area is covered by forests, with different percentages across altitude zones.

Around 70% of the population depends on agriculture, but only around 9% of the total area is under cultivation, mostly rain-fed in hilly regions. Land holdings are small and fragmented, averaging 0.68 ha in the hills and 1.77 ha in the plains. Due to excessive extraction beyond the capacity to regenerate, natural resources are degrading. Forest-to-agriculture ratio is low, leading to soil erosion, declining land productivity, and water scarcity. The region faces increased risks from glacial melt, erratic rainfall, and extreme weather events, leading to frequent landslides and floods. These natural disasters significantly impact the local population, disrupting livelihoods and well-being. The Himalayan ecosystem, which provides essential services to the northern India such as water, carbon sequestration, and biodiversity, are under threat. Factors such as poverty, inadequate infrastructure, and limited adaptive capacity exacerbate the vulnerability of Uttarakhand to the adverse effects of climate change.

To address resource degradation, watershed management is crucial for conservation and sustainable development. Government of Uttarakhand has been implemented a number of watershed projects through Watershed Management Directorate (WMD) since last three decades. Projects, like the Uttarakhand Decentralized Watershed Development Project (UDWDP) phase-I & II were focused to reverse resource deterioration and support sustainable livelihoods to reduce pressure on natural resources.

1.1 Environmental and Social Management Framework (ESMF)

This Environmental and Social Management Framework (ESMF) is developed to support the environmental and social due diligence provisions for activities financed by the World Bank in the Uttarakhand Climate Responsive Rainfed Farming Project (UCRRFP). The project will support to *Improve resilience of production system to make mountain farming emission competitive and profitable in selected micro-watersheds of Uttarakhand* through; i)- constitute a consortium that will engage researchers/scientist from leading institute to handhold the project implementation, ii)- to build the climate resilient watersheds with the support of participating communities, watershed and spring-shed management interventions , iii)- the project will give both technical and farming inputs to the farmers in agriculture, horticulture, allied sectors and small ruminants to increase the productivity, iv) effort to strengthen the Agri-marketing systems of the farmers by organizing them into farmer's federations and by providing them value addition services, developing end to end supply chains and by making agro-logistics carbon neutral, in 06 hilly (Almora, Pauri, Nainital, Rudraprayag, Tehri and Uttarkashi) and 02 (Haridwar and Udham Singh Nagar) plain districts of Uttarakhand covering about 1200 villages and comprising of 56 Micro watershed clusters.. The Watershed Management Directorate (PMU) will be implementing the Project activities through six District Project Management Units (DPMUs) under it.

This ESMF follows the World Bank Environmental and Social Framework (ESF) as well as the national laws [and state and local laws, if applicable] and regulations of India. The objective of the ESMF is to assess and mitigate potential negative environmental and social risks and impacts of the Project consistent with the Environmental and Social Standards (ESSs) of the World Bank ESF and national/state requirements. More specifically, the ESMF aims to (a) assess the potential environmental and social risks and impacts of the proposed Project and propose mitigation measures; (b) establish procedures for the environmental and social screening, review, approval, and implementation of activities; (c) specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social issues related to the activities; (d) identify the staffing requirements, as well as the training and capacity building needed to successfully implement the provisions of the ESMF; (e) address mechanisms for public consultation and disclosure of project documents as well as redress of possible grievances; and (f) establish the budget requirements for implementation of the ESMF.

This ESMF should be read together with other plans prepared for the project, including the Stakeholder Engagement Plan (SEP), and the Environmental and Social Commitment Plan (ESCP).

1.2 Project Description

Uttarakhand being a hilly state, agriculture is pre- dominantly rain-fed and remains vulnerable to moderate to extreme weather conditions. Sustaining increased agriculture outputs in a rapidly changing climate will require adaptation at a faster pace. Enhancing food security while reducing GHG Emissions from farming practices will require transition to production systems that are more productive, use input more efficiently, have greater stability in outputs and are resilient to short- and long-term climate variability.
Uttarakhand Climate Responsive Rainfed Farming Project (UCRRFP) will be implemented in 06 hilly districts and 02 plain districts of Uttarakhand covering about 1200 villages and comprising of 56 Micro watershed clusters.

Result Indicators

The following Key Performance Indicators (KPI) are proposed for measuring the core outcomes of the project: -

KPI 1: Reduction in GHG emissions from representative cropped land parcels (CRI).
KPI 2: Increase in productivity of selected crops.
KPI 3: Increased water discharge in sample spring-sheds.
KPI 4: Farmers adopting climate smart agriculture technologies and practices promoted by the project (CRI).
KPI 5: Farm Income at HH Level with / without UCRRFP.

1.3 Project Components

Component A- Developing Resilient and GHG Efficient Production Systems

This component aims to enhance productivity through land treatment and development, while increasing fertilizer efficiency, water productivity, and reducing GHG emissions. To this effect, the multi-expert task team at the district level will help in preparing micro plans that will be implemented in a phased manner. Commodity-specific advisories will come from the respective technical agencies having domain knowledge. The component provides the foundation for the project to shift cultivation towards optimal input usage pattern, leading to reduced input costs and enhanced average income of farmers.

Component B – Science-Based Development of Resilient Spring-sheds

The objective of the component is to improve spring-shed efficiency by investing in (i) undertaking comprehensive catchment treatment around spring-sheds; (ii) improving quantity and stability of spring

flows through drainage management; and (iii) increased volume of water stored for farm use in farm ponds. With technical inputs from consortia partners, this component will support enhanced participatory micro-watershed planning, incorporating spring-shed treatment; rehabilitation of degraded common land; and water harvesting/storage from improved spring flows. It will enhance water supply and reliability, ensuring more timely input with water budgeting for each crop, for improved farm productivity under Component A.

Component C- Enhancing Income Resilience through Agribusiness and Entrepreneurship

The objective of the component is to promote investments in agribusiness to increase the stability and diversity and thus resiliency of incomes of rural and agricultural households in the project area (designated micro-watersheds). This will be through value addition of farm-based produce and enterprise development, tapping into the State's rainfed areas' opportunities and relative strengths, also for the most vulnerable households, and tapping the surpluses from productivity gains and agriculture expansion arising resulting from Component A and B.
This component will make investments through three subcomponents: (i) Supporting Agribusiness Promotion Centers; (ii) Micro-Enterprise Development; and (iii) Income Generation Support for Vulnerable Groups.

Component D – Project Management, Monitoring & Evaluation, and Learning

The objective of this component is to (i) strengthen the institutions associated with the project; (ii) deliver effectively and efficiently project outputs in a timely and accountable manner with adaptive learning, and (iii) generate and disseminate cutting-edge knowledge on a range of issues related to climate-resilient agriculture.
This component will ensure a proactive and responsive project management and coordination, with well capacitated staff. A systemic management effort will also be made to institutionalize project developed approaches, partnerships, and systems. In addition, this component will create an institutional learning and sharing mechanism for mainstreaming resilient agriculture systems at all levels across the participating departments related to the project.

1.4 Environmental and Social Policies, Regulations, and Laws

1.4.1 India: Legal Framework

Uttarakhand, the North-Indian state, is nestled in the Himalayas, faces unique environmental challenges due to its fragile landscapes, rich biodiversity, and vulnerability to climate change. In this context, existing legal frameworks serve as essential tools in addressing these challenges by regulating land use, protecting natural resources, particularly water, and promoting conservation efforts both in the state and across the country. India has established a robust legal framework encompassing various laws, regulations, and policies to safeguard the environment. These laws outline the rights, responsibilities, and obligations of individuals and the government concerning environmental conservation and preservation. Environmental laws and regulations aim to maintain ecological balance, prevent pollution, and promote sustainable development and promote sustainable development and judicious use of natural resources.

Table- 1.1- Applicable Environmental and Social Laws and Regulations

S. No	Act / Rules	Purpose	Applicable Yes/ No	Project Activity	Authority
1	Environment Protection Act,1986	To protect and improve overall environment	Yes	NRM- SMC & DLT activities	MoEF, GoI, DoE, State Govt. CPCB, SPCBs

S. No	Act / Rules	Purpose	Applicable Yes/ No	Project Activity	Authority
2	The Forest (Conservation) Act,1980	To check deforestation by restricting conversion of forested areas into non- forested areas	Yes	NRM, SMC, DLT & Agri-Horti activities	Forest Department, State Government and Ministry of Environment and Forests, Government of India
3	Wild Life (Protection) Act, 1972	To protect wildlife through National Parks and Sanctuaries	No	NA	Chief Conservator Wildlife, Wildlife Wing, State Forest Department and Ministry of Environment and Forests, Government of India
4	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by controlling emission of air pollutants as per the prescribed standards.	Yes	Agribusiness/ processing	Uttarakhand SPCB
5	Water Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	Agribusiness, processing	Uttarakhand SPCB
6	The Noise Pollution (Regulation and Control) Rules, 2000	To regulate and control of noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise;	No	NA	Ministry of Environment, Forest and Climate Change, Govt of India
7	Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	Conservation of cultural and historical remains found in India	Yes	Construction of irrigation structures & ABGCS	Archaeological Dept. GoI, Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH).
8	National Forest Policy, 1988	To maintain ecological stability through preservation and restoration of biological diversity.	No	NA	Forest Department, State Government and Ministry of Environment, Forest and Climate Change, Government of India
9	Biodiversity Conservation Act, 2002	Federal legislation enacted by the Parliament of India for preservation of biological diversity in India, and provides mechanism for equitable sharing of benefits arising out use of traditional biological resources and knowledge.	Yes	NRM, Agri-Horti activities etc.	Ministry of Environment, Forest and Climate Change

S. No	Act / Rules	Purpose	Applicable Yes/ No	Project Activity	Authority
10	Uttarakhand Government Order #3408/X-2-2009-12(9)/2006 TC Involvement of Van Panchayat in Reserve Forest areas[8]	To involve Van Panchayat in soil and water conservation related activities within reserve forest areas.	Yes	SMC & NRM	Government of Uttarakhand
11	Solid Waste Management Rules 2016	To effectively tackle the issues of pollution and waste management. Fertilizer Control and to promote utilization of compost	Yes	Construction of irrigation and other structures. Agriculture /Agribusun ess	Ministry of Environment, Forest and Climate Change
12	Food Safety and Standards Regulation	To adhere to the guidelines on hygiene and sanitary practices set out by the Food Safety and Standards	Yes	Processing & value addition activities	Food Safety and Standards Authority of India (FSSAI)
13	The Insecticides Act, 1968 (Act No.46 of 1968)/ Insecticides Rules, 1971	To regulate the import, manufacture, sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and for matters connected therewith.	Yes	Agriculture/ Agribusunes s	Ministry of Agriculture & Farmers Welfare, Govt of India/ Department of Agriculture & Farmers Welfare/ Directorate of Plant Protection, Quarantine & Storage.
14	The Seeds Act, 1966 (Act No. 54 Of 1966)	To provide for regulating the quality of certain seeds for sale, and for matters connected therewith	Yes	Agriculture, Horticulture, Agribusunes s, Nursery establishme nt	Ministry of Agriculture & Farmers Welfare, Govt of India/ Department of Agriculture & Farmers Welfare/ Directorate of Plant Protection, Quarantine & Storage.
15	Fertilizer (Control) Order, 1985 issued under the Essential Commodities Act, 1955.	To regulate the sale of fertilizers, liming materials, and trace element products in India	Yes	Agriculture, Horticulture, Agribusunes s, Nursery establishme nt	Deptt. of Agriculture Cooperation, Govt. of India
16	State Livestock Breeding Policy-2005	To improve genetic trait, conserve local breeds and income enhancement of livestock breeders through availability of improved breed animals.	Yes	Livestock activities	Animal Husbandry Department, Govt of Uttarakhand

S. No	Act / Rules	Purpose	Applicable Yes/ No	Project Activity	Authority
17	The Uttarakhand Bovine Breeding Act, 2018 [Uttarakhand Act No. 19 of 2018]	To provide for improvement of bovines by regulating bovine breeding activities including use of bovine breeding bulls for production of bovine semen, processing, storage, sale, AI and any other breeding activity	Yes	Livestock activities	Animal Husbandry Department, Govt of Uttarakhand

1.4.2 National Environmental and Social Assessment and Permitting

The Ministry of Environment, Forest and Climate Change (MOEF&CC) is the apex body for environment and pollution control, The Ministry of Labor and Employment (ML&E) is the apex body for occupational health and safety (OHS) with the Commissioner of Labour of Department of Labor and Employment, Government of Uttarakhand at the state level.

The major national policies, acts and rules relevant to all components funded by the project are the National Environment Policy (2006) and the Environment Protection Act (1986) for environment and pollution control; the National Policy on Safety, Health and Environment at Work Place (2009) for OHS; the National Policy on HIV/AIDS and the World of Work Report, 2014 of International Labour Organisation (ILO); and the relevant Covid-19 regulations and guidance in place. The above table (Table -1) gives a list of all relevant environment, health and safety acts and regulations and their applicability to the proposed project.

Under the Government of India's environment impact assessment (EIA) Notification 2009, the environmental classification of environmentally sensitive projects included in Schedule 1 is determined by MoEFCC, Government of India, and there are two possible outcomes:

Category A: A project is classified as Category A if it is likely to have significant negative impacts. Such projects require EIA, plus Environmental Clearance (EC) from MoEFCC;

Category B: A project is classified as Category B if it is likely to have fewer negative impacts and is listed in this category in the EIA Notification. These projects require EC from the State Environment Impact Assessment Authority (SEIAA) who classify the project as B1 (requiring EIA) or B2 (not requiring EIA) depending on the level of potential impacts. Projects classified as B2 require no further assessment.

As the union ministry for environment, forest and climate change (MoEFCC) has not specified requirement of any environmental clearance for the activities taken up under UCRRFP, no EC from the MoEFCC or SEIAA would be required for the proposed project.

1.*4.3 World Bank Standards and Key Gaps with the National Framework*

The project will follow the World Bank Environmental and Social Standards (ESSs), as well as the World Bank Group Environmental, Health and Safety Guidelines. Based on these policies, the environmental and social risk of the project is categorized as 'Moderate' risk category identified in the World Bank Environmental and Social Risk Summary (ESRS).

The World Bank's environmental and social standards applicable to project activities are summarized below.

Table 1.2- World Bank's environmental and social standards applicable to project activities

Environmental and Social Standards	Key features	Key Gaps with the National/ State Legislation and addressing gaps
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	• Identify, assess, evaluate, and manage environment and social risks and impacts, • Adopt a mitigationhierarchy: ➢ Anticipate and avoid risks and impacts, ➢ Where avoidance is not possible, minimize or reduce risks and impactsto acceptable levels, and ➢ Once risks and impacts have been minimized or reduced, mitigate and where significant residual impacts remain,compensate for or offset them, where technically and financially feasible ➢ Adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, ➢ Utilize national environmental and social institutions, systems, laws, regulations and procedures where appropriate, and ➢ Promote improved environmental and social performance in ways which recognize and enhance borrower capacity.	As per the MoEF&CC EIA Notification 2006, UCRRFP do not require any EIA or approval from MoEF&CC or USPCB. The WMD will ensure that the ESS1 provisions are implemented through contractors and monitored by E&S Specialists of PMU.
ESS2: Labor and Working Conditions	• Promote safety and health at the works, • Promote the fair treatment, non-discrimination, and equal opportunity of project workers. • Protect project workers, with emphasis on vulnerable workers • Prevent the use of all forms of forced labour and child labour • Support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law • Provide project workers with	The national and state legal provisions cover almost all requirements in ESS2 and the requirements of a functional GRM for different types of workers. For this project, a Labour Management Procedures is prepared to regulate working conditions and management of labour relations including worker specific GRM, terms and conditions of employment,

	accessible means to raise • workplace concerns	code of conduct, non-discrimination and equal opportunities, protection of labour force, prohibition of child/force labour and provision of OHS requirements. The main gap that LMP will cover is the OHS requirements of direct and contracted workers. The other gaps that the LMP fills are the provision of Code of Conduct for workers, GBV prevention measures, GRM for workers, etc. The PMU will ensure that the ESS2 provisions are implemented through Contractors and monitored by E&S Specialists of PMU. The concerned Labour Officers will also be monitoring these.
ESS3: Resource Efficiency and Pollution Prevention and Management	• Promote the sustainable use of resources, including energy, water and raw materials, • Avoid or minimize adverse impacts on human health and the environment caused by pollution from project activities, • Avoid or minimize project- related fugitive /stack emissions of short and long- lived climate pollutants, Collection and disposal of sewage and waste water from project activities, • Avoid or minimize generation of hazardous and non-hazardous waste, and • Minimize and manage the risks and impacts associated with pesticide use.	The majority of ESS3 requirements are directly addressed by existing regulations and indirectly for resource efficiency and climate change aspects, including pollution prevention and management. The WMD will ensure that the ESS3 provisions are implemented through Contractors and monitored by E&S Specialists of PMU.
ESS4: Community Health and Safety	• Anticipate or avoid adverse impacts on the health and safety of project-affected communities during project life cycle from routine and non-routine circumstances, • Promote quality, safety and climate change considerations in infrastructure design and construction, • Avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials, and have in	These existing laws and rules are to protect community health and safety. Hence, these laws and rules fulfil the community health and safety requirements. The BIS standards and building codes address the community health and safety requirements.

	place effective measures to address emergency events, and • Ensure that safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project- affected communities.	
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	• To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives. • To avoid forced eviction. • To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost6 and (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. • To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure • To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable dis- placed persons to benefit directly from the project, as the nature of the project may warrant. • To ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected	Not applicable to UCRRFP as there will not be any land acquisition and the project will not affect either rights or access to community lands/ forest rights.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	• To protect and conserve biodiversity and habitats. • To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity • To promote the sustainable management of living natural resource • To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.	Provisions from the acts meet the ESS requirements. Codes of Practice are prepared as part of ESMF to address the wildlife presence and movement outside the protected area and in and around the sub-project locations.
ESS 7: Indigenous people/ Sub Saharan African Historically Underserved Traditional Local Communities	• To ensure that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource- based livelihoods of Indigenous Peoples. • To avoid adverse impacts of projects on Indigenous Peoples/, or when avoidance is not possible, to minimize, mitigate and/or compensate for such impacts • To promote sustainable development benefits and opportunities for Indigenous Peoples in a manner that is accessible, culturally appropriate and inclusive • To improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with the Indigenous Peoples. • To obtain the Free, Prior, and Informed Consent (FPIC) of affected Indigenous Peoples	The legislation meets the requirements of ESS, including FPIC. The WMD will ensure that the ESS7 provisions are implemented through itself and monitored by E&S Specialists of PMU. A Transhumant Plan is prepared as part of the IPPF.
ESS8: Cultural Heritage	• Protect cultural heritage from the adverse impacts of project activities and support its preservation. • Address cultural heritage as an integral aspect of sustainable development, • Promote meaningful consultation with stakeholders regarding cultural heritage, and • Promote the equitable sharing of benefits from the use of cultural heritage.	The legislation meets the requirements of ESS. The Chance Finds procedures are available in the legislation. The chance find procedures will be included as a Code of Practice.

ESS9: Financial Intermediaries	• Not applicable to UCRRFP	Not applicable
ESS10: Stakeholder Engagement and Information Disclosure	• Establish a systematic approach to stakeholder engagement that helps Borrowers identify stakeholders and maintain a constructive relationship with them, • Assess stakeholder interest and support for the project and enable stakeholders' views to be considered in project design, • Promote and provide means for effective and inclusive engagement with project- affected parties throughout the project lifecycle, and • Ensure that appropriate project information is disclosed to stakeholders ina timely, understandable, • accessible, and appropriate manner.	The legislation partly covers this ESS with the act requiring providing information when asked for. Almost all government agencies have GRM and Citizen Charters detailing the redressal and services. ESS 10 has the provision for borrower to respond to grievances of project-affected parties related to the environmental and social performance of the project in a timely manner as well as to proactively disclose publicly project related information

1.5 Potential Environmental and Social Risk Impacts and Standard Mitigation Measures

At the planning phase, the possible negative impact of the proposed activities should also be considered during PRA exercises. If the WWMC proposed any activity in their GPRP, it should be ensured that the mitigation measures for the possible negative impacts have also been proposed for implementation. With accordance to the past experiences, all the possible negative impact and the mitigation measures thereof are listed here, which shall be properly considered and incorporated in the GPRP during the PRA exercise.

Table 1.3- Environmental and Social Risks and Mitigation Measures

Micro component Activity	Risks and Impacts	Mitigation Measures
FORESTRY • Afforestation (1000 plants/ ha.) • Fodder/Pasture Plantation • Assisted Natural Regeneration of Oak Areas	• Introduction of exotic species. • Proliferation / dominance of invasive / exotic species **Social** • Conflict among user over resource sharing • Shortage of grazing land during initial phase. • Restrict rights of the people	• All plantation activities should be done in accordance with Manual of Forestry. • Preference should be given to the local endemic species for plantation. • To increase the availability of local fodder/fuel, agro-forestry practices should be promoted. • Van Panchayats and Biodiversity groups in the GPs should be mobilized to ensure a higher sense of ownership and commitment towards sustainable management of common forest lands. • Equal sharing of resources among users by rules/regulation.
AGRICULTURE/ HORTICULTURE • Support for Climate Resilient Agriculture Production Systems	• Loss in soil moisture. • Loss in soil fertility (Nitrogen, Carbon, etc.). • Soil & water pollution, contamination on food items and health hazards	• High nutritional value traditional crops should not be totally replaced by high yielding varieties. • To maintain soil fertility, crops rotation and bringing the cultivated land under leguminous crops (pea, lentil etc.) should be practiced.

• Support for Climate Resilient Horticulture Production Systems • Support for Conversion/Diversification of Submerged Paddy Cultivated Lands	due to use of chemical fertilizers and pesticides. • More demand of water for irrigation and competing demands on surviving/existing sources which are used for drinking. • Wastage of water due to inefficient irrigation methods and practices • Pressure on local forests/ vegetation for fodder for animals and packaging material. • Due to monoculture chances of crop failure due to frost/fog, insect/pest and diseases. • Possibility of loss of local races/cultivars/gene pools/ crop varieties Issues with disposal of plastic mulch Social Loss of traditional / indigenous practices of crop cultivation. • HYVs are labour intensive and bring more workload on women. • Marginal groups (landless farmers/labourers) will benefit less, since they do not have land to bring under HYVs Discontinuation of barter system and more dependency on external resources / agents and, therefore, loss of self-dependency. Conflicts among the neighboring farmers due to the shade caste from vegetative field boundary	• To maintain biological fertility of the soil, planting of nitrogen fixing species on the crop field bunds should be done. • Selection of low water demanding (high efficiency in water utilization) HYV crops should be given preference. • Protected cultivation (use of polyhouse, polypit, polytrench, etc.) to reduce the chances of HYV crop failure. • Promote natural mulch and safe disposal of plastic mulch. - Follow the ***Environmental and Social Codes of Practice (ESCPs) included in Annex -II*** • *To retain soil health and reduce soil contamination & water pollution, use of bio-fertilizers (bio-compost, vermicompost, organic mulch (Green manure), microbial inoculants, etc.) and bio-pesticides should be promoted.* • *Use of permissible chemical pesticides should only be done in accordance to the application timings and safety measures mentioned in IPM strategy of the project.* • *The farmers applying pesticides should be trained on Codes of Practices to be adhered to while using the pesticides (precautions in mixing and applying, use of PPE, first aid etc)*
WATER HARVESTING • HDPE Irrigation Pipelines • Irrigation Tanks • Small Water Storage/Harvesting Tanks • LDPE Tanks	•Water logging due to improper drainage. •Water pollution through deposition of waste materiel due to public use. •Pollution through organic (Polyethylene/	• Rain water harvesting and storage of surface water (of streams, nalla, etc.) through water storage ponds/pits should be encouraged. • Construction of small Water Harvesting Tank will help to collect rain water for domestic uses and kitchen gardening.

• Pre Fabricated Geo Membrane Water Harvesting Tanks • Village Irrigation Ponds	plastic) waste by the use of LDPE sheets and plastic pipelines for water harvesting. •Health impacts due to breeding of mosquitoes. •Mud formation/ Silting along the water distribution points •More chances of water borne diseases if the unclean water is consumed without treatment •Seepage/leakage in roof tops and under water tanks. •Drawing of underground water may lead to depletion of ground water table. **Social** •Disputes over water sharing (domestic demand vs irrigation demand) may arise. •Marginal farmers are deprived from the benefits as they have small holdings.	• In rainfed areas, Low Density Polyethylene Tanks should be encouraged to collect rain/source water for irrigation. • Regular disinfection by chlorination and use of filters in storage structures will reduce chances of water borne diseases. • Proper designing, size and site selection for channel should be ensured. • Construction of smaller underground tanks to reduce chances of leakage. • Deep wells may not be dug to reduce drawing of underground water. • Disposal of waste water away from the ponds and proper drainage • Rules and regulations over sharing and rational use of water to be framed by the stakeholder communities. • Selection of site for community water storage tanks should be as per the convenience and cooperation of stakeholders to reduce conflicts among users. • Construction of water harvesting or water supply structure in individual and community land should be done only with the consent and the approval of the beneficiaries and Gram Panchayats.
LIVESTOCK • Support for Climate Resilient Production Systems (Small Ruminants/Poultry/ Fisheries/others) • Livestock nutrient management related activities	•Introduction of exotic/alien species of grasses and fodder crops to meet the demand of fodder, that dominate the local species. •Level of feed intake, type of carbohydrate in the diet and feed processing for cattle can increase the methane (GHG) emission. •Cross bred animals are more prone to diseases. •Hybrid animals require more provisions for health care. •Limited breeding facility (a bull can serve only 2 animals in a week) in case of hybrid animals. •Hybrid animals require intensive care attention. •Improper treatment of grasses or straw might lead to food poisoning.	• Animal health camps should be organized under supervision of technical experts. • Farmers should be encouraged for periodic vaccination to protect livestock from epidemic diseases. • To treat livestock, use of herbal medicines should be encouraged. • Local fodder crop/ grass species should be encouraged. • Use of organic manure/bio-fertilizers should be encouraged for fodder crop production • To reduce biotic pressure on forest, farmers should be encouraged to adopt new livestock techniques, like stall feeding, breed improvement, improve fodder production etc. • Ration balancing can be followed to reduce methane emissions • Manure should be composted in pit methods

	• Dependency on professionals in the artificial insemination and other activities and in the absence of professionals quality of service will deteriorate. • Poor quality vaccination and Bio-medical wastes may increase the out-break of diseases. • Increase in GHG emission due to Enteric fermentation: The process in which methane is produced in the rumen of cattles. • Open disposal/heaping of manure will lead to unsanitary conditions, emissions. **Social** Vulnerable families may not have access to professional services.	
INCOME GENERATING ACTIVITIES (IGA) Potential IGAs- 1.NTFPS 2.Decorative items 3.Wood craft 4.Bamboo products 5.Nursery 6.Mushroom 7.Beekeeping 8.Fish farming 9.Woollen products	• Chances of excessive harvest of a particular species / plant parts or any other natural resources/raw materials • Destabilization of stabilized slopes dug to remove soil for cultivation. • More demand for water for many IGA activities. • Risk of food poisoning due to lack of awareness in making processed products. • Water pollution due to processing activities. • Possible occupational health hazards during processing activities. • Worker safety aspects involved in collection, processing Social • Conflict among the users over common resources • Chances for economic risk due to taking up of new IGA.	• Strengthening of village resource management institutions to reduce conflicts among the users over common resources • Prohibited use of species to avoid over exploitation. • Sourcing necessary permits from Forest Department for collection/transit of NTFPs where applicable • Food safety protocols and Licenses should be in place • Any wastes from processing should be recycled/reused/disposed safety • Use of Styrofoam tray to reduce soil loss in nursery activities • Use of water saving techniques / water harvesting to meet demand of water in IGA activities. • Awareness among the users and proper training will help the users in mushroom and fish farming activities. • Follow ESHS guidelines where applicable • Processing of wool washing not be done directly in water sources. • Use of masks or nose cover (cloth) during wool processing.

AGRIBUSINESS 1-HYV cultivation 2-Polyhouse 3-Aggregation/ Processing 4-ABGCs	• Increase in use of chemical pesticides/ insecticides. • Threat to local or existing crops/species/gene-pool. • Exploitation of local shrubs and tree branches for staking purposes for some cash crops like climbers and tomato cultivated for commercial purposes. • Spread of organic/inorganic waste like fruit peel, seeds, pulp and poly sheets etc. • Use of additives, preservatives • Monoculture (of a particular Species or variety) results in decreased disease & pest resistant. • Air and water pollution by food processing units. **Social** • Income loss due to crop failures. • Threat to nutritional security of the area.	• Promote non-chemical fertilizers and pesticides • Use of hardy local improved varieties for cultivation will reduce the use of chemical fertilizers and pesticides. • Cultivation of improved local varieties to reduce threat on local gene pool. • Use of alternate non-wood staking material. • Use of bio-products for packaging • Safe disposal of organic and inorganic waste separately, as per waste management guidelines of WMD(Annexure--) • Crop diversification and intercropping according to market requirement and as natural pest barrier. • Proper pollution control arrangements in food processing units. Use only permitted additives, preservatives etc. Obtain FSSAI license as applicable. • The FIGs/ FFs, which will be responsible to run the processing unit/grading center, should have an agreement prior to establishment/construction of such unit with GP or individual (as applicable), to whom the land will belongs.

1.6.1 Risks and Mitigation Measures Specific to Disadvantaged and Marginalized individuals

Disadvantaged or vulnerable groups who may be more likely to be adversely affected by the project impacts and/or more limited than others in their ability to take advantage of a project's benefits. "marginalized individual" refer to persons who may be disproportionately impacted or further disadvantaged by the project compared with other groups due to their vulnerable status (for example, due to age, gender identity, sexual orientation, ethnicity, disability, economic vulnerable, etc.) and may require special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the project.

Under the project, fund will be provided for the livelihood initiatives for vulnerable households including marginalized groups, those are not benefitted by land-based activities of the project and also identified by the village community. This would not only result in poverty alleviation in tangible terms but also help marginalized section to organize themselves into sustainable vulnerable and collectives which will go in enhancing the productivity of the project areas.

Chapter- 2

ENVIRONMENTAL AND SOCIAL GUIDELINES

The environmental and social guidelines would promote the ability of communities to select a package of sub-projects and activities which will not only minimize or mitigate the negative environmental and social impacts but also enhancing the positive impacts. To ensure an environmental friendly and socially acceptable watershed planning under the project, following steps should be taken

2.1 Subproject Assessment and Analysis – E&S Screening

2.1.1 Selection criteria for the project activities.

The Himalayan watersheds are under constant threat of mass wasting and erosion caused by depletion of forest cover, unscientific agronomic practices, hydrologic imbalance and natural calamities. So the thrust has been given to implement such activities which not only minimize the negative environmental and social impacts but also enhancing the positive impacts. To ensure it, an Environmental and Social code of Practices has been developed and annexed in this guideline (Annexure-II). All the activities under the project should be in accordance to these codes of practices. The activities which causes negative impacts to the environment, can only be implemented after carrying out a limited Environmental Assessment (ESA) under project as listed in following Formats, 1(a) &1 (b)

Table 2.1 FORMAT 1 (a) –Criteria for exclusion of sub-projects/activity

Sl. No	Criteria
I	**Forests / biodiversity**
1	Activities likely to cause damage to wildlife by setting fire, injuring wildlife, or involving indiscriminate felling of trees or indiscriminate removal of plant, animal or mineral produce from sanctuaries/national park and adjoining forest area.
2	Activities likely to promote indiscriminate felling of trees.
II	**Dams**
3	Activity that involves construction of dam (existing or new) of 10 metres height or more
III	**Farming System**
4	Agricultural activities that intend to use banned pesticides, agrochemicals in WHO classes IA, IB and II **(refer list of pesticides – Annexure- X & XI)**
5	Activities that involve manufacture or sale, stocking or exhibiting for sale or distribution of any insecticide, pesticide, fertilizer, seed, medicine without a licence
6	Activities that totally eliminate indigenous races of food crop
7	Activities that spread a Vector of diseases of livestock
8	Activities that use asbestos or asbestos containing materials
IV	**Land / Ecosystem**
9	Activities that causes pollution of water sources.
10	Activities that can cause risk of floods and damage to downstream resources
11	Activities which would require involuntary resettlement or forced acquisition of land
12	No constructions related to common activities to be taken up on land owned by vulnerable groups.

Sl. No	Criteria
13	Activity that have any adverse impact on the indigenous people/ vulnerable families in terms of displacement or their livelihoods being affected
14	Activity that introduce/promote child labour.
15	Activity that exclude the vulnerable from the benefits.
16	Activity that involve production, storage and consumption of tobacco, drugs, alcohol, etc.
18	Activity that cause damage to cultural property, places of religious importance and restricted historical monuments.*

*Whenever there is a chance find of cultural or historical artefacts (moveable and immovable) the Department of Archaeology of the state Government, the Archaeological Survey of India will be informed. Should the continuation of work endanger the historical and cultural artefacts, the project work will be suspended until a solution is found for the preservation of these artefacts, or advice from the Archaeological Survey of India is obtained. It should be noted that Failure to report a chance find within the 48 hours of discovery, is a punishable offence under the relevant Indian legislation. Similarly, (intentional) damage to a historical or cultural artefact is a punishable offence.

Table 1.2 FORMAT 1 (b) Criterion for limited ESA of sub-projects/activity

Sl. No	Criteria
1	Construction of water impounding structures/ earth work with a height of more than 5 metre and less than 10 metre.
2	Construction of roads, bridge, civil works etc. that may cause destabilisation of lands.
3	Activity that limit the traditional/legal rights of indigenous people on common property resources.
4	Activity that involve use of private land and causes loss of livelihood.

2.1.2 PROPOSAL OF MITIGATION MEASURES FOR POSSIBLE NEGATIVE IMPACTS OF THE ACTIVITIES

At the planning phase, the possible negative impact of the proposed activities should also be considered during PRA exercises. If the WWMC proposed any activity in their GPRP, it should be ensured that the mitigation measures for the possible negative impacts have also been proposed for implementation. With accordance to the past experiences, all the possible negative impact and the mitigation measures thereof are listed in Annexure-VIII, which shall be properly considered and incorporated in the GPRP during the PRA exercise.

2.2 ENVIRONMENTAL AND SOCIAL ASSESSMENT (ESA)

The ESA would be used as a tool to evaluate the possible positive and negative impacts of the proposed watershed activities. To assess all the environmental and social impacts of activities, following Format-2 should be used at the planning phase. The possible environmental (A to S) and social (T to Z3) impacts listed in **Table-6**, should be discussed by RVC and WWMC and mentioned as positive or negative in the format. The code of proposed mitigation measures as per ESCPs in Annexure-VII should also be mentioned in the format. Several experience sharing exercises and Annexure VIII could be used for this purpose.

Table 2.3 CODES FOR POSSIBLE ENVIRONMENTAL AND SOCIAL IMPACTS OF PROJECT INTERVENTIONS

(To be filled in Format 2, as negative or positive for each project activity)

Codes	Environment Impacts
A	Impact on Surface Water (Quality/Quantity)
B	Possibilities of Siltation in water bodies (existing/constructed)
C	Soil Erosion/Gully Formation
D	Impact on stability of Hill Slopes/chances of Landslides
E	Impact on Soil Quality
F	Soil Moisture regime
G	Impact on Agricultural Productivity (Grain/Fodder)
H	Water/Air / Noise Pollution
I	Pressure on Surrounding Trees and Vegetation
J	Forest Fire
K	Impact on Biodiversity (Flora/Fauna)
L	Impact on Aquatic Life
M	Invasion of Exotic Species
N	Impact on Rare, Threatened & Endangered Species
O	Impact on the existence of plant species of Medicinal Importance
P	Generation/accumulation of Solid Waste/ Wastewater
Q	Impact due to the use of Chemical Fertilizers/Pesticides
R	Impact (danger of extinction) to the Local Gene Pool (Plants/Crops)
	Social Impacts
S	Impact of the activity on Workload/drudgery (particularly on women)
T	Impact on availability of Nutritious Food
U	Dislocation/migration of People due to loss of traditional livelihood/ Local Labour
V	Impact on Benefits and Legal rights of vulnerable, SC/ST, transhumant and people belonging to other Marginalized Groups.
W	Use of Child Labour
X	Impact related to Insect, Pest and Wildlife Attacks
Y	Impact of the intervention on Places of Religious/Historical Importance/Monuments
Z	Social Conflicts (benefit sharing)
Z_1	Effect of the activity on Human Health
Z_2	Effect of the activity on Local Cultural/Ethical/Aesthetic Values

2.2 IMPLEMENTATION OF ESG

2.2.1 INSTITUTIONAL STRUCTURE

The responsibility for overall project implementation, coordination and monitoring will be with the Project Management Unit (PMU), established under the project, will be headed by the "Project Director". To support project implementation and its administration, there will be two regional coordination offices, headed by "Regional Project Directors"; one in Garhwal region and other one in Kumaon region. Under Regional Project Directors each project district will have "District Project Management Units (DPMU)", headed by the Deputy Director (Dy.Dir). Each DPMU will be well equipped with experts. The DPMUs will have officials from different disciplines, like engineering, agriculture, horticulture, animal husbandry, and forestry etc. Each DPMU will have 3, or 4 (Tehri and Nainital only) "Field Implementation Units/Unit office" to execute the

project at the GP and watershed clusters. Unit office will have "Multi-Disciplinary Team", comprising officials from agriculture, horticulture, forestry etc., headed by the "Unit Officer".

PMU headed by the Project Director will have three Joint Directors, three Deputy Directors and a team of fourteen Experts in various sectors to support the field offices and staff for the implementation of project activities. Project Manager-Operation and Implementation along with GHG Emission Expert, Climate Change Expert, Climate Resilient Agri. Practices Expert and Social and Institutional Dev. Expert, will facilitate and monitor the implementation of ESMF in project areas. DPMU and Unit office will organize the capacity building and training of stake holders on ESMF, ensuring quality of project processes, providing adequate staffing and organizing timely monitoring & learning activities. The Dy.Dir(s), each with a number of MDTs will be the key facilitators and supervisors for the planning and implementation of GPRPs. The Dy.Dir(s) will be responsible for technical appraisal of the watershed plans prepared by the GPs in accordance with ESMF. The MDTs will provide project related information of the GPs and the communities facilitated planning within the Environmental and social framework of the project and provided technical guidance during implementation.

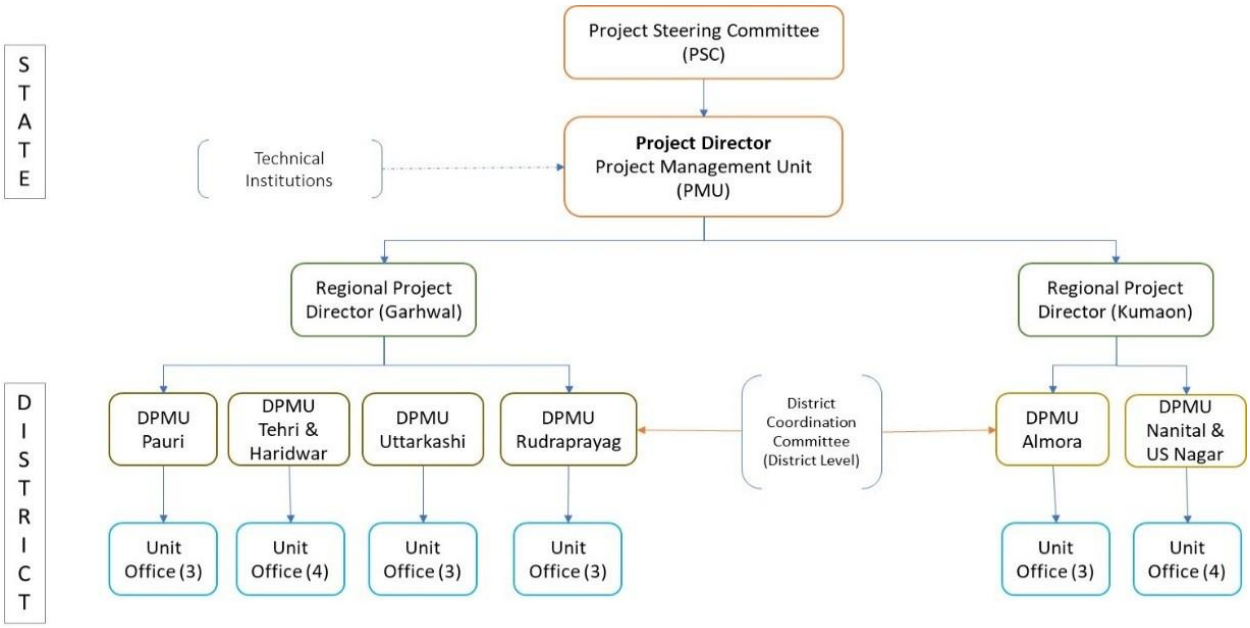


Fig 1- Institutional Structure

2.2.2 Procedures and Implementation Arrangements

The environment and social aspects to be considered, implemented and monitored by all project partners will be done in four stages from the preparation of Gram Panchayat Resilient Plan (GPRP) and the action plan for the transhumant population, to the execution of project activities.

Stage 1: Sensitization of project staff, villagers (includes settled tribes) and transhumant population regarding environment and social issues to be considered in the project.

1.a Imparting training to all village, district, state level project functionaries (PMU) at initiation of the project.

1.b Training to members of watershed committee-WWMC and key members of formal institution constituted under project with existing informal village level institutions (VLIs) and transhumant.

Role/ Responsibility and Outcome of Stage 1

Institution	Responsibility

PMU/WMD	To develop training module for ESA, arrange training on the subject and develop information, education and communication (IEC) material.
MDT/DPMU & Unit Staff	To sensitize the villagers and make them aware on environmental and social issues and provide information regarding ES safeguards to villagers.
Village Level Institutions (WWMC of GP, RVC , VP, UG, SHG)	To accept and assimilate the ES considerations.

Stage 2:- Selection of sub-projects / activities at Revenue village level with the help of ESG to be included in the RVC Proposals and the action plan for transhumant (as pre Annex-V) and Environment and Social Assessment (ESA) for activities proposed by RVC at the Gram Panchayat level (WWMC).

Annexure II will be used as reference for mitigation measures that may be required for negative impacts. Annexure III provides comprehensive list of subprojects / activities and their possible negative impacts

2.a During PRA exercise undertaken by RVC, many proposals for activities to be undertaken in the village will be put forth. Each of these sub-projects/ activities will be screened using Format 1–a (Criteria for exclusion of sub-projects/activity) & 1-b (Criteria for limited ESA of sub-projects/activity). Any activity/ sub-project falls in 1 (b) then a limited ESA will be required to be carried out before being included in RVC Proposals and the action plan for transhumant.

2.b Subprojects / activities which are selected after screening using Format 1 (b) will be subjected to ESA as per Format 2 (Annex-I). This exercise (application of Format 2) will result in inclusion of mitigative measures to reduce or eliminate negative ES impacts of the subprojects/ activities. These sub project/activities will then be incorporated in GPRPs.

Role / Responsibility and Outcome of Stage 2

Institution	Responsibility
MDT	Facilitation and guidance regarding ESCP as whole and for individual sub-projects / activities. To advice on safeguards, IPM and Transhumants.
Social Facilitators	To assist the MDT with special reference to vulnerable groups like women, SC, ST, BPL, etc.
Executive committee of RVC/WWMC	To check the Proposals are compliant to ESCP

Stage 3:- Review of Draft GPRP and action plan for transhumant through field appraisal by DD. The DD may designate authorized person for the appraisal.

Dy. Dir. will be certified that the ESCP guidelines has properly been followed in GPRP

3.a The financial approval to Draft GPRP of WWMC of GP and action plan for transhumant will be granted after its review by DPD/PD to ensure that it conforms to provisions of ESA. If the Draft GPRP of WWMC and action plan for transhumant is found to not-conform to ES guidelines the Plan will be referred back to WWMC/MDT with observations and suggestions for review.

3.b When the Draft GPRP/action plan for transhumant proposal is referred back to WWMC of GP /MDT and the transhumant then they will incorporate the required changes following steps 2 and 3 and resubmit the revised Plan to appropriate authority.

3.c The field appraisal of Draft GPRP/action plan for transhumant will be completed within period of 15 days of receipt by DPNU/Dy Dir. office.

Role / Responsibility and Outcome of Stage 3:

Institution	**Responsibility**
Dy.Dir.	Field appraisal of Draft GPRP/action plan for transhumant. Make observations on Plan regarding compliance to ESG, Technical and Financial issues. Recommend the Transhumant Plan to Project Director after review.
Project Director	Approval of Transhumant Plan with observations.
Gram Panchayat	Convene meeting of Gram Sabha to approve and adopt GPRP and Transhumant action plan.
Outcome	
GPRP/action plan for transhumant approved in compliance with ESG.	

Stage 4 – Implementation, Monitoring and Learning of GPRP and action plan for transhumant.

4.a On receipt of appraised Draft GPRP the WWMC will convene a meeting of the Gram Sabha which will approve the Draft GPRP with modification/ suggestion if any and then this adopted Plan will be termed as Gram Panchayat Resilient Plan (GPRP).

4.b After the approval and adoption of GPRP, the WWMC will implement it. For monitoring purpose, last column of Annexure VIII will be referred.

4.c The GPRP will be implemented by the Gram Panchayat. The Gram Panchayat may associate RVC and any other institutions for implementation of activities as per the provision in Procurement Manual.

4.d The MDT will continuously assist the WWMC and other village level institutions in implementation of the GPRP.

4.e The major processes and impacts of activities to be monitored to ensure compliance of ESG are listed in Annexure III (column 4).

4.f The WWMC may monitor itself or authorize the RVCs to monitor processes and impacts at village level. However the consolidated monitoring and learning (M & L) report will be furnished by WWMC to designated project authority.

4.g The observations of implementation modalities and the impact of activities on enhancing the productivity and income levels in the watershed treated by the GPRP as approved by the provisions in Step III and IV, will be learned and the learning will be used to improve the provisions made in Step I and II.

Role / Responsibility and Outcome of Stage 4

Institution	**Responsibility**
MDT/Unit Office	Provide technical inputs/trainings for activities facilitate in record keeping; ensure participation and capacity programs are in conformity with ESG and GPRP and the action plan for the transhumant. Facilitate WWMC and other Village level institutions in participatory monitoring and learning (M & L).
DPMU/DD	Ensure all reporting requirements from WWMC to Project are facilitated by them. Ensure the implementation of all subprojects / activities in conformity to ESG and technical specifications laid down by the project. Ensure release of funds to WWMC as per the GPRP schedule. Internal M & L
Gram Panchayat	Procurement, implementation, record keeping as per ESG and other manuals of the Project
Gram Panchayat, RVC , Van Panchayat, UG, SHG	Participatory monitoring and learning (M&L)
External Consultant (M & E)	Impact evaluation by sample survey
Project Director	Supervision of M&L activities in the area and documentation of learning
PMU	Collation of all M&L in project area and outside project area. Documentation of learning

2.3 CAPACITY DEVELOPMENT FOR ENVIRONMENT AND SOCIAL MANAGEMENT

The project stakeholders will apply Environmental and Social safeguards mentioned in ESMF in all project activities during planning and implementation phases. Capacity building exercises including orientation, technical, refresher, advance trainings, workshops and exposure visits, focusing on ESMF safeguard implication and monitoring will be organized in accordance with capacity development strategy of the project. The capacity building exercises along with participatory monitoring and learning process would not only help to ensure the environmental and social safeguard application, but also develop awareness and understanding towards environmental solutions by the communities.

Capacity Building or project staff is vital in maintaining the sustainability of the project, emphasizing on knowledge development and skills building. The training programmes are to be coordinated and anchored by WMD. The contents will basically focus on the ESMF, regulatory requirements, environment and social priority issues in the project and clearly brings out the value addition and enhancement benefits of appropriate management of environmental and social issues.

Detailed trainings and workshops will be provided to field-based staff after inception of the project. The timings and type of the trainings based on skills required are given in Annexure IV- Figure 3. he multidisciplinary teams in the geographical divisions are provided training in the environmental and social management guidelines designed for the project.

2.4 MONITORING ARRANGEMENTS OF ESMF APPLICATION

ESMF safeguard application and monitoring in phase wise manner will be the responsibility of all project stakeholders. A continuous process of consultations between all stakeholders for the execution of interventions is required to find out whether the planned interventions are being executed as per the ESMF or not. If not, corrective actions need to be taken in order to realize the expected environmental and social impact. The ESMF application monitoring will also help communities as well as project team to understand the visible/possible impacts of the interventions/mitigation measures/local environmental solutions taken in accordance with ESMF. Following monitoring arrangements will be made to ensure the ESMF application.

2.4.1 Planning Phase

The approval to Draft Plans of GP and action plan for transhumant will be granted after its proper review by MDT members, Dy.Dir/PD to ensure that it conforms to provisions of ESA. If the Draft plan is found to not-conform to ESMF guidelines the Plan will be referred back to GP with observations and suggestions for review.

2.4.2- Village level monitoring

Monitoring of ESMF safeguard application at village level will done by the constituted GP committee by itself or will be authorize the revenue village level committee to monitor the safeguard application processes and impacts at village level. At the village level the participatory monitoring will also done by PME team.

2.4.3- Internal project monitoring

Internal monitoring of the Environmental and Social safeguards mentioned in ESMF will be done by Deputy Director, Regional Project Directors and WMD in accordance with the monitoring indicators, reporting on ESMF safeguard application for the proposed activities will be carried out. PMU staff will be responsible for overseeing the training and capacity building, monitoring, and Application of ESMF in planning, implementation and management of project activities.

The proposed project would continue to finance third-party impact evaluations (i.e., mid-term and completion), which would verify the project's key outcomes and physical achievements. The three tools - MIS, PME, and Impact evaluation - would support results monitoring and provide data for the results framework.

2.4.4- External Monitoring

ESMF safeguard application will be also monitored by external consultant on sample basis using prepared questionnaire and assessment modules which will be approved by the Watershed Management Directorate. The third party monitoring will be conducted at Mid-Term Evaluation and Final Assessment by an external agency in close collaboration with the Project Directorate.

Chapter-3

Agriculture Specific Safeguard Strategies

Agriculture, through introduction of HYV and off-season vegetables cultivation is seen as a key intervention of the project that has direct impact on the economic status of project beneficiaries. Through ESMF guidelines the objective is to minimize or mitigate the negative environmental and social impacts and to enhance the positive impacts. Also on the other hand, to assure that impacts of the interventions made for watershed development will environment-friendly, socially acceptable and economically feasible to make them long lasting. The strategies described below will be used to facilitate the safer use of chemicals is optimized where inevitable.

3.1 Integrated Crop Management

Integrated crop management is a holistic approach for overall management of cropping systems from seed to seed for obtaining potential yield under FIS. Integrated crop management comprises four important components. They are:

- Integrated plant nutrient management (IPNM)
- Integrated weed management (IWM)
- Integrated pest & disease management (IPDM)

IPNM is dependent on IWM, IPDM is dependent on IPNM. Likewise all the three components are interdependent and supplementary to each other. IPDM without IPNM and IWM will not produce potential yield. Hence, all our trainings, field trials and demonstrations will combine IPNM, INM, IPDM and IWM judiciously aiming at farming system intensification. Farmers' Field School will be the best way to disseminate the strategic approaches and techniques of ICM (Annexure-X) to the farmers of the project area in a comprehensive manner.

3.2- Integrated Pest Management (IPM)

Pest management is an ecological matter and has much relevance in the context of highly fragile ecosystem in the Uttarakhand hills. Over-reliance on the use of synthetic pesticides in crop protection programs has resulted in disturbances to the environment, pest resurgence, pest resistance to pesticides, and lethal and sub-lethal effects on non-target organisms, including human's world over. These side effects have raised public concern about the routine use and safety of pesticides. Therefore the farmers are required to manage their land with greater attention to direct and indirect off-farm impacts of various farming practices on water, soil, and wildlife resources. Thus, reducing dependence on chemical pesticides in favour of

ecosystem manipulations is a better strategy for farmers of the region. Successful IPM is based on sound farmer's knowledge of the on-going agro-ecological processes of the farming environment; such farmers should therefore be technically sound to make decisions on the most appropriate management strategies to apply at the specific period of crop development.

To manage serious outbreaks of insect pests, farmers should be given First and Prime priority to biological/Cultural method of IPM over Mechanical control method. Subsequently the use of Chemical methods will be only last and ultimate priority and only, if crop loss is beyond ETL.

3.2.1 Objective & Aim of the Pest Management Plan

The purpose of this document is to describe a Plan by which the project will endeavor to promote and support safe, effective, and environmentally sound pest management in agricultural interventions undertaken under previous project. The plan further presents components to strengthen such capacity.

The Plan promotes the use of biological and environmental control methods and the reduction in reliance on synthetic chemical pesticides. The Plan addresses pest management issues in the context of the project's environmental assessment. (Details - Annexure- XI)

3.2.2 The World Bank Operational Guidelines

The World Bank & IFC Pesticide guidelines aims to ensure that the pesticide

- Must have negligible adverse human health effects
- Should be effective against target pests and minimal effect on non target species
- Development of pest resistance to be kept in view
- Public health pesticides must be safe for inhabitants and animals

Integrated pesticide management specifically identifies the following as the key in pest control.

- A categorical preference for bio control methods along with institutional and capacity building for the same.
- Reducing reliance on synthetic chemical pesticides and only if approved by IPM approach.
- Does not permit under any circumstance the use IA, IB and II classified pesticides. Listing of these chemicals and provided by the World Health Organization is given at the end of the report.
- Recommends the use of Participatory IPM along with specific investment components for the same.
- The permissible pesticides under project (WHO's category-III) are listed in Annexure-XI. But even these must be used as part of the IPM strategy.

Table 3.1 Integrated Pest Management (IPM) practices for major crops in Uttarakhand

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
Cereal Crop				
Paddy	Yellow Stem Borer (YSB)	Clip seedling tips, use short-duration varieties, community tillage.	Collect and destroy egg masses, clipping of seedling tips.	Release Trichogramma japonicum @ 1 lakh/ha, conserve spiders and beetles.
	Leaf Folder	Avoid excess nitrogen, wider spacing (22.5x20 cm).	Coir rope dislodging, clipping of leaves.	Release Trichogramma chilonis @ 1 lakh/ha, conserve spiders, Stenobracon parasitoids.
	Gall Midge	Early sowing, avoid staggered planting, control grassy weeds.	Field drainage (5-7 days).	Conserve wasps and spiders.
	Brown Plant Hopper (BPH), WBPH	Avoid high nitrogen, proper spacing, synchronized planting.	Manual collection if heavy infestation.	Conserve spiders and beetles.
	Rice Hispa	Clip and destroy infested leaves, remove volunteer rice.	Sweep nets, leaf clipping.	Conserve Bracon sp., spiders, ladybird beetles.
	Caseworm	Early planting, wider spacing (30x20 cm).	Field drainage, coir rope dislodging.	Release Trichogramma chilonis.
	Whorl Maggot	Water drainage intervals, Azolla/Savinia cover.	Manual removal of larvae.	Conserve spiders and beetles.
	Swarming Caterpillar, Cutworm	Deep ploughing, early sowing.	Coir rope dislodging, manual collection.	Conserve birds and ground beetles.
	Rice Leafhoppers/GLH	Timely planting, avoid excess nitrogen, intercropping.	Manual control.	Conserve Anagrus, Oligosita parasitoids.
	Gundhi Bug	Early maturing varieties, intercropping with soybean.	Manual collection.	Conserve spiders.
Wheat	Termite	Deep ploughing in summer, crop rotation, well-rotted FYM.	Dismantle termitaria and kill termite queen.	Neem cake @ 80 kg/acre, EPNs @ 100 million/acre.

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Wheat Aphid	Grow barrier crops (maize, sorghum).	Regular field monitoring.	Conserve ladybird beetles, parasitoids.
	Armyworm / Cutworm	Deep ploughing, crop rotation, intercropping (cowpea, onion, maize).	Pheromone traps @ 4-5/acre, bird perches @ 10/acre.	Release Trichogramma spp., conserve predators.
	American Pod Borer	Grow intercrops, barrier crops like sorghum.	Pheromone traps @ 4-5/acre.	Release Trichogramma pretiosum @ 0.4 lakh/acre, conserve natural enemies.
	Pink Stem Borer	Grow resistant varieties, timely sowing.	Light traps @ 1/acre.	Conserve parasitoids and predators.
	Shoot Fly	Plant barrier crops, timely sowing.	Fish meal traps.	Natural enemies, birds like black drongo.
	Brown Mite	Use tolerant varieties, avoid excess nitrogen.	-	Neem oil (2%), NSKE (5%).
	Ghujhia Weevil, Wheat Thrips	Field sanitation, crop rotation.	Light traps, sticky traps.	Conserve predators and parasitoids.
	Wheat Bug	Grow resistant varieties, timely sowing.	Manual collection.	Natural enemies.
Maize	Maize Stem Borer	Deep ploughing, intercropping, resistant varieties (HQPM 1, DHM 117, HM4).	Removal of dead hearts, bird scarer.	Release Trichogramma chilonis @ 1,60,000/ha, conserve Cotesia flavipes, spiders, beetles.
	Pink Stem Borer	Same as Maize Stem Borer.	Light traps.	Conserve parasitoids and predators.
	Shoot Fly	Timely sowing, intercropping with legumes.	Fish meal traps, bird scarer.	Release Trichogramma chilonis, conserve natural enemies.
	White Grub	Deep ploughing, crop rotation, decomposed FYM.	Manual destruction of adults.	Neem cake @ 80 kg/acre, conserve Tiphia parasitoids.
	Cutworm	Deep ploughing, crop rotation.	Light and pheromone traps.	Conserve natural enemies.

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Hairy Caterpillar	Crop rotation, timely sowing.	Collection of egg masses, larvae.	Conserve parasitoids and predators.
	Aphid	Use tolerant varieties, avoid excess nitrogen.	Monitoring, manual removal.	Conserve Aphidius spp., ladybird beetles, syrphids.
	Armyworm	Intercropping, crop rotation.	Light traps.	Release Trichogramma, conserve predators.
	Pyrilla	Timely sowing, weed removal.	Monitoring, manual removal.	Conserve Epiricania melanoleuca, lacewings.
	Thrips	Intercropping, barrier crops.	Sticky traps, manual collection.	Conserve predatory mites, natural enemies.
	Termite	Decomposed FYM, crop rotation.	Destroy termitaria.	Neem cake, biocontrol agents.
	Chafer Beetle	Timely sowing, crop rotation.	Manual collection.	Neem cake, conserve predators.
Vegetable Crop				
Onion	**Thrips**	Crop rotation, proper spacing, avoid continuous cropping.	Blue sticky traps, reflective mulch.	Conserve predatory thrips, Chrysoperla spp., ladybird beetles.
	Onion Maggot (Delia spp.)	Crop rotation, remove crop residues.	Collection and destruction of infested plants.	Conserve parasitoids, use Beauveria bassiana.
	Cutworm	Deep ploughing, weed control.	Hand-pick larvae, light traps.	Natural predators like birds, ground beetles.
	Mite	Use healthy bulbs, maintain field hygiene.	Manual removal of infested plants.	Neem oil spray 2%, predatory mites.
Potato	**Aphid**	Avoid excess nitrogen, plant tolerant varieties.	Yellow sticky traps, water spray to remove aphids.	Conserve ladybird beetles, Chrysoperla spp., parasitoids (Aphidius spp.).
	Cutworm	Deep ploughing, proper field sanitation.	Hand-pick larvae, light traps.	Conserve natural predators like birds, ground beetles.

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
Tomato	**Fruit Borer (Helicoverpa armigera)**	Crop rotation, early sowing, resistant varieties.	Hand-picking of larvae, pheromone traps.	Release Trichogramma chilonis, conserve predators (spiders, ladybird beetles).
Brinjal	**Shoot and Fruit Borer**	Resistant varieties, crop rotation, remove alternate hosts.	Removal and destruction of infested shoots and fruits.	Release Trichogramma chilonis @ 1,00,000/ha, conserve spiders, parasitoids.
Cruciferous	**Diamondback Moth (DBM)**	Intercropping with tomato/mustard, remove crop residues.	Handpick larvae, use light traps.	Release Trichogramma chilonis @ 50,000/ha, conserve Cotesia plutellae, ladybird beetles.
Cucurbitaceous	**Fruit Fly (Bactrocera spp.)**	Field sanitation, timely harvesting, crop rotation.	Use bait traps with attractants.	Release Trichogramma spp., use Metarhizium anisopliae fungus.
Leguminous	**Pod Borer (Helicoverpa armigera)**	Early sowing, crop rotation, resistant varieties.	Hand-pick and destroy larvae.	Release Trichogramma chilonis, conserve natural enemies (spiders, birds).
Fruit				
Aonla	**Shoot Gall Maker**	Prune affected shoots, maintain orchard hygiene.	Hand removal of affected shoots.	Conservation of parasitoids like Eretmocerus sp., Closterocerus sp.
	Bark Eating Caterpillar	Keep trees healthy and vigorous.	Remove webbing and caterpillars manually.	Use of biocontrol agents like Chrysoperla spp., predatory ants.
	Fruit Sucking Moth	Remove weeds and alternate host plants nearby.	Use light traps and handpick adults at night.	Conservation of natural enemies like spiders, Dicyphus hesperus.
	Whitefly	Avoid overcrowding, ensure good air circulation.	Yellow sticky traps, pruning infested branches.	Release Encarsia formosa, Eretmocerus spp.

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Mealybug	Manage ant population, maintain orchard sanitation.	Scrape off colonies, prune infested parts.	Release predators like Cryptolaemus montrouzieri, Chrysoperla spp.
Apple	**San Jose Scale**	Prune and destroy infested branches, maintain tree health.	Scrub and remove scale colonies manually.	Release Aphytis spp., Encarsia spp.
	Woolly Apple Aphid	Remove root suckers and water sprouts.	Hand removal of colonies.	Release Aphelinus mali parasitoids.
	Codling Moth	Timely harvesting, remove fallen fruits.	Pheromone traps for monitoring and mass trapping.	Use Trichogramma spp., conservation of natural enemies.
	Fruit Borer	Field sanitation, remove alternate hosts.	Collect and destroy infested fruits.	Encourage parasitoids and predators.
	Leaf Roller	Clean cultivation, prune infested twigs.	Handpick and destroy larvae.	Use Trichogramma spp., Chrysoperla spp. predators.
Apricot	**Fruit Fly (Bactrocera spp.)**	Timely harvesting, field sanitation.	Use methyl eugenol bait traps.	Release Trichogramma spp., use of Metarhizium.
	Aphid	Avoid excess nitrogen, remove weeds.	Yellow sticky traps, water spray.	Conserve ladybird beetles, Chrysoperla spp.
	Shot Hole Borer	Maintain tree vigor, avoid mechanical injuries.	Removal and destruction of infested branches.	Encourage natural enemies like predatory beetles.
	Mealybug	Maintain orchard sanitation, manage ant populations.	Prune and destroy affected plant parts.	Release Cryptolaemus montrouzieri, predatory ants.
Ber	**Fruit Fly (Bactrocera spp.)**	Field sanitation, timely harvesting.	Use bait traps with attractants (methyl eugenol).	Use Beauveria bassiana, Metarhizium.
	Mealybug	Manage ants, maintain clean orchards.	Scrape off colonies, prune infested branches.	Release Cryptolaemus montrouzieri, Chrysoperla spp. predators.

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Leaf Webber	Timely pruning, field sanitation.	Collect and destroy larvae and webs.	Conserve parasitoids and spiders.
	Fruit Borer	Regular pruning, remove alternate hosts.	Destroy infested fruits.	Release Trichogramma spp., conserve natural predators.
Citrus	**Citrus Psylla**	Proper pruning to remove dense canopy.	Collect and destroy infested leaves.	Release Tamarixia radiata parasitoids.
	Leaf Miner	Avoid overlapping new flushes.	Prune affected shoots.	Conserve Chrysoperla spp., Pediobius spp. parasitoids.
	Black Fly	Maintain orchard hygiene, avoid water stress.	Yellow sticky traps, prune heavily infested parts.	Encourage natural predators like Chrysoperla spp., ladybird beetles.
	Fruit Sucking Moth	Field sanitation, weed removal.	Light traps, hand collection of moths.	Conserve spiders, predatory bugs.
	Mealybug	Manage ants, maintain clean orchard.	Prune and destroy infested parts.	Release Cryptolaemus montrouzieri, conserve natural enemies.
Guava	**Fruit Fly**	Field sanitation, early harvesting.	Use methyl eugenol traps.	Release parasitoids like Fopius arisanus, use of biopesticides.
	Mealybug	Clean orchards, control ants.	Manual removal of colonies.	Release Cryptolaemus montrouzieri, Chrysoperla spp.
Litchi	**Fruit Borer**	Prune infested twigs, clean cultivation.	Collect and destroy infested fruits.	Release Trichogramma spp., conserve natural enemies.
	Leaf Folder	Proper pruning and sanitation.	Handpick and destroy larvae.	Encourage parasitoids and predators.
Mango	**Fruit Fly**	Collect fallen fruits, clean cultivation.	Use methyl eugenol traps.	Release parasitoids like Fopius arisanus.
	Hopper	Avoid dense planting.	Prune affected parts.	Conserve spiders, Chrysoperla spp.
Papaya	**Mealybug**	Clean field, manage ant population.	Scrape colonies.	Release Cryptolaemus montrouzieri.

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Fruit Fly	Timely harvesting.	Use traps and destroy infested fruits.	Use parasitoids like Diachasmimorpha longicaudata.
Peach	**Fruit Moth**	Remove alternate hosts.	Collect and destroy affected fruits.	Release Trichogramma spp.
	Aphid	Proper pruning.	Water spray.	Conserve ladybird beetles, Aphidius spp.
Pear	**Psylla**	Proper pruning.	Remove infested shoots.	Conserve Tamarixia spp.
	Codling Moth	Remove fallen fruits.	Use pheromone traps.	Trichogramma spp., natural enemies.
Pomegranate	**Fruit Borer**	Sanitation, pruning.	Destroy infested fruits.	Release Trichogramma spp.
	Aphid	Avoid excess nitrogen.	Water spray.	Conserve ladybird beetles.
Raspberry	**Fruit Worm**	Crop rotation.	Collect and destroy larvae.	Encourage natural enemies.
	Aphid	Remove weeds.	Sticky traps.	Conserve predators.
Strawberry	**Aphid**	Avoid overcrowding.	Yellow sticky traps.	Conserve predators.
	Spider Mite	Maintain moisture.	Remove affected leaves.	Use predatory mites.
Walnut	**Codling Moth**	Collect and destroy fallen fruits.	Use pheromone traps.	Release Trichogramma spp.
	Aphid	Avoid excess fertilizers.	Water spray.	Conserve ladybird beetles.
Spices				
Turmeric	**Shoot borer**	Plant ecological engineering plants, destroy infested shoots, mulching	Light traps @ 1/acre, collect and kill moths	Release Trichogramma chilonis @ 40,000/acre, conserve natural enemies, spray neem oil (0.5%)
	Rhizome scale	Collect and destroy severely infested rhizomes, select healthy rhizomes		
	Thrips			Conserve natural enemies like Ceranisus menes, Syrphid fly, minute pirate bug

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Bihar hairy caterpillar	Collect and destroy egg masses and larvae, remove alternate weed hosts		Conserve natural enemies like Bracon spp., release Trichogramma spp.
	Lacewing bug	Destroy volunteer plants and old neglected plantations, use healthy rhizomes		
	Leaf roller/skipper	-		Conserve natural enemies like Apanteles sp, Sympiesis sp, Brachymeria coxodentata
	White grubs	Uproot infested plants, use well decomposed FYM		
	Root-knot nematode	Uproot and destroy infested plants, treat rhizomes with hot water, crop rotation		Apply neem seed cake, Pochonia chlamydosporia
	Rhizome rot	Use resistant varieties, crop rotation, proper drainage, phytosanitary measures		Apply pine needle and neem cake powder, use fermented plant extract (FPE)
	Leaf spot	Pluck and remove infested leaves, use proper green mulching		Use plant extracts like garlic extracts
	Leaf blotch	Use proper green mulching		Use plant extracts like garlic extracts
	Dry rot	Field sanitation, crop rotation		-
	Bacterial wilt	Soil solarization, planting disease-free seed rhizomes, crop rotation		-
Chillies/ Capsicum	**Thrips**	Intercrop with Sesbania grandiflora, avoid chilli and onion mixed crop, sprinkle water over seedlings	Use yellow/blue pan water sticky traps, handpick infested parts	Apply neem cake @ 100 Kg/acre, seed treatment with imidacloprid 70% WS

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Aphids	Maintain field sanitation, remove weeds	Use yellow/blue pan water sticky traps, handpick infested parts	Seed treatment with imidacloprid 70% WS, apply fipronil 5% SC
	Red Spider Mite	Maintain field sanitation, avoid water stress	Use yellow/blue pan water sticky traps, handpick infested parts	Spray neem seed powder extract 4%, apply dimethoate 30% EC
	Tobacco Caterpillar	Maintain field sanitation, avoid water stress	Use light trap @ 1/acre, handpick larvae	Spray NSKE 5%, apply B. t. var gallariae
	Gram Pod Borer	Use ovipositional trap crops like marigold, maintain field sanitation	Use light trap @ 1/acre, handpick larvae	Release Trichogramma pretiosum, apply emamectin benzoate 5% SG
	Whitefly	Maintain field sanitation, remove weeds	Use yellow/blue pan water sticky traps, handpick infested parts	Apply fenpropathrin 30% EC, pyriproxyfen 5% EC + fenpropathrin 15% EC
	Choanephora Blight	Adopt recommended spacing, maintain field sanitation	Remove infected plant parts	Spray captan 75% WP
	Die Back and Fruit Rot	Maintain field sanitation, avoid water stagnation	Remove infected plant parts	Spray benomyl 50% WP, captan 75% WP
	Mosaic Complex	Maintain field sanitation, remove weeds	Remove infected plant parts	Seed treatment with imidacloprid 70% WS, apply fipronil 5% SC
	Powdery Mildew	Maintain field sanitation, avoid water stress	Remove infected plant parts	Spray flusilazole 40% EC, sulphur 52% SC
	Cercospora Leaf Spot	Maintain field sanitation, remove weeds	Remove infected plant parts	Spray mancozeb 75% WP, zineb 75% WP
	Bacterial Leaf Spot	Maintain field sanitation, remove weeds	Remove infected plant parts	Use seeds from healthy fruits, apply copper oxychloride 50% WP
	Alternaria Leaf Spot	Maintain field sanitation, avoid water stress	Remove infected plant parts	Spray mancozeb 75% WP, zineb 75% WP

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Fusarium Wilt	Maintain field sanitation, avoid water stress	Remove infected plant parts	Apply neem cake @ 100 Kg/acre, apply carbofuran 3% CG
Ginger	**Shoot borer**	Use attractant plants for natural biocontrol conservation, mulching with green leaves	Cut open the shoot and pick out the caterpillar	Conserve natural bioagents like ladybird beetle, spiders, Chrysopids, Trichogrammatids, Bracon sp, etc.
	Rhizome scale	Apply well-rotted sheep manure or poultry manure in splits	Collect and destroy damaged leaves	-
	Leaf roller/Skipper	Intercropping with paddy or other crops	Collect and destroy larvae and egg masses	Conserve natural bioagents like ladybird beetle, spiders, Chrysopids, Trichogrammatids, Bracon sp, etc.
	Thrips	-	-	Conserve natural enemies like Syrphid fly, minute pirate bug, predatory thrips, etc.
	White grubs	Use well-decomposed FYM, install light traps after first monsoon showers	Uproot infested plants, collect and destroy larvae	EPN Steinernema sp. can be mixed in the FYM and applied in the field
	Rhizome fly	Destroy stray plants in the off-season, select and plant healthy rhizomes	Remove and destroy rotting rhizomes	Conserve natural bioagents like ladybird beetle, spiders, Chrysopids, Trichogrammatids, etc.
	Root-knot nematode	Intercropping with marigold, deep ploughing or solarized beds during summer	Uproot and destroy infested plants	Application of neem seed cake, use of marigold plantation, Gliricidia compost
	Soft rot	Ensure proper drainage, use resistant varieties, crop rotation with maize, cotton, soybean	Uproot and destroy infected plants	Application of pine needle or neem cake powder treatments, use of bio-fumigation

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Bacterial wilt	Soil solarization, crop rotation with non-host crops	-	Incorporation of Pseudomonas spp., AM fungi, and other BCAs
	Leaf spot	Use proper green mulching to reduce soil splashes, provide shade	Pluck and remove infected leaves	-
	Fusarium yellows	Use raised beds, practice biodisinfestation procedures	-	Application of pine needle and neem cake powder treatments
	Leaf eating caterpillar	Collect and destroy infested leaves along with larvae in June-July and Oct-Dec.	Community approach of mechanical control may be adopted in the locality.	-
	Banana aphid	Remove and destroy diseased plants. Destroy wild Amomum, Colocasia, Curcuma.	-	-
	Shoot fly	Regularly monitor new plantations. Remove infested young shoots at ground level.	-	-
	Stem borer	Remove and destroy infested shoots based on 'dead heart' symptoms.	-	-
	Rhizome weevil	-	-	-
	Leaf thrips	Collect and destroy infested leaves.	-	-
	White grub	Mechanical collection of adult beetles during the emergence period.	-	Entomopathogenic nematodes (EPNs) can be sprayed at the rate of 100 million/acre.
	Chirkey & foorkey disease	Regular survey of the plantation. Remove and destroy diseased plants.	-	-

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
	Wilt disease/seedling rot	Avoid planting in swampy or dry areas. Collect and destroy affected plants.	-	-
	Flower rot	Avoid accumulation of leaf mass over inflorescence during rainy season.	Collect and bury affected flowers/spike.	-
Garlic	**Onion thrips**	Use resistant/tolerant varieties, field sanitation, avoid successive planting of preferred/alternate host crops, plant new crop upwind, reflective mulches, sprinkler irrigation, barrier crops	-	Conserve parasitoids (Ceranisus menes), predators (syrphid flies, minute pirate bug, praying mantis, predatory thrips, damselbug, lacewings, coccinellids, spiders)
	Onion maggot	Avoid close spacing, crop rotation, field sanitation	-	Conserve predators (ground beetle, rove beetles, spiders)
	Bulb mite	Avoid planting garlic after cole crops, avoid successive onion or garlic crops, flood irrigation, sow clean seed cloves	-	Conserve predators (anthocorid bugs, mirid bugs, syrphid/hover flies, green lacewings, predatory mites, predatory coccinellids, staphylinid beetle, predatory cecidomyiid fly, predatory gall midge, spiders)
	Eriophyid mite	Flood irrigation, avoid planting successive onion or garlic crops	-	Conserve predators (anthocorid bugs, mirid bugs, syrphid/hover flies, green lacewings, predatory mites, predatory coccinellids, staphylinid beetle, predatory cecidomyiid fly, predatory gall midge, spiders)
	Red spider mite	Thorough water spray	-	Conserve and augment natural enemies (anthocorid bugs,

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
				mirid bugs, syrphid/hover flies, green lacewings, predatory mites, predatory coccinellids, staphylinid beetle, predatory cecidomyiid fly, predatory gall midge, spiders)
	Gram pod borer and Tobacco caterpillar	Field sanitation, ecological engineering with intercrops, crop rotation, repellant plants, bird perches, pheromone traps, light traps	-	Inundative release of Trichogramma spp., conserve parasitoids (Tetrastichus spp., Telenomus spp., Campoletis chlorideae), conserve predators (Chrysoperla zastrowi sillemi, coccinellids, King crow, common mynah, wasp, dragonfly, spider, robber fly, reduviid bug, praying mantis, fire ants, big eyed bugs, pentatomid bug, earwigs, ground beetles, rove beetles), apply entomopathogenic nematodes (EPNs)
	Damping off	Soil solarization, avoid excessive watering, use raised beds, crop rotation, proper drainage, sow clean and healthy seed on raised beds, avoid overcrowding, use well decomposed farmyard manure	-	-
	Purple blotch	Use healthy seeds, crop rotation, proper drainage, recommended	-	-

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
		doses of N and P fertilizers, hot water soaking of garlic seed, use resistant varieties		
	Stemphylium leaf blight	Field sanitation, long rotations with non-host crops, proper field drainage, reduce plant density, hot water soaking of garlic seed	-	-
	Colletotrichum blight/anthracnose/twister disease	Field sanitation, destruction of infected plant debris, use resistant varieties	-	-
	Downy mildew	Select healthy bulbs for seed production, crop rotation, crop sanitation, avoid late planting, poor drainage, higher doses of fertilizers, frequent irrigation, use resistant varieties	-	-
	Fusarium basal rot	Crop rotation, mixed cropping with tobacco and sorghum, soil solarization, proper drainage, deep summer ploughing, avoid injury during cultural practices, flood soil in non-growing season, use resistant varieties		
	White rot	Use disease-free areas, crop rotation with cereal crops, hot water treatment of bulbs, soil solarization		
	Black mold	Leave garlic bulb for drying in the field, store seed and bulb after proper drying, maintain proper		

Crop	Pest	Cultural Treatment	Physical Treatment	Biological Treatment
		aeration in storage, avoid bruising of garlic bulbs		
	Bacterial rots (brown rot/soft rot/slippery skin)	Grow crop under optimum conditions, proper curing and rapid drying of bulbs, discard affected bulbs before storage, dry crop quickly after harvest, artificial curing during rainy season		
	Onion yellow dwarf disease	Manage vector population, plant virus-free transplants, crop rotation, remove and destroy diseased plants, rogueing of diseased plants, use blue sticky trap		Conserve predators (coccinellids, lacewings, spiders, wasps)
	Iris yellow spot disease	Plant healthy seedlings, crop rotation, eliminate alternate host plants, use sprinkler irrigation, avoid thin, patchy plant stands and crop stress		As in onion yellow dwarf disease

3.3 IPM/INM/ICM through Farmers' Field School (FFS)

Farmers' Field School has proved as the best way to demonstrate IPM/INM/ICM. It is a non-formal type of educational learning situation wherein the participants will be able to acquire the skills and knowledge of integrated pest management through the integrated adoption of production technology in raising a healthy crop. At the end of the training farmers will –

- Become experts in their own field for arriving at right decision for pest management.
- Be able to conserve the defenders (natural enemies) in their field.
- Observe the crop regularly.
- Be able to grow healthy and safe/residue free crop.

3.3.1 Bio-fertilizers:

Bio-fertilizer is a vital component of integrated nutrient supply system in establishing high yield, high quality and high returns agriculture. Bio-fertilizers should have broad-spectrum adaptability, nitrogen fixation, phosphorus solubilization and potassium release ability.

Nitrogen fixation	The nitrogen fixing microbes in bio-fertilizers can transform molecular nitrogen in air (78-80%) which accounts to approx. 5300 tones into ammonium nitrogen (NH_4-N) and to supply plants for uptake and utilization. This is the mechanism of biological nitrogen fixation. These nitrogen fixing microbes combine and inhabit ate on the surface of plant roots and function as nitrogen fixation through the photosynthesis in leaves. These are of two types 1. *Rhizobia species* for legumes and pulse crops, 2. *Azotobacter* and *Azospirillum* for cereals, grasses, vegetables, oil seed, fruits and flowering plants.
Phosphorus solubilizers	Phosphorus solubilizers are also the biofertilizers which transform non-soluble (insoluble) and soil fixed phosphate into soluble phosphorus by utilizing the bio-acids which are produced from microbial fermentation processes. A number of P solubilizing organisms as bio-fertilizers available are PSB, phosphatica contain *Pseudomonas striata, Aspegillus awamoori* etc.

Bio-fertilizer use in crops: Pulse crops[9]

Pea	Use *Rhizobium* culture @ 24-30 g/kg seed, also use phosphorus solubilizer (*Bacillus polymyxa* or *Pseudomonas striata* or both mixture) @ 5 kg/ha as a soil application.
Mung and Urd	25-30 g/kg seed as seed treatment. For PSM use 5 kg PSM per ha as soil application.
Soybean	25-30 g/kg seed treatment + 5 kg per ha of PSM as soil application is recommended.
Frenchbean and Rajmah	30 g/kg seed treatment + 5 kg/ha of PSM as soil application.
Cowpea	25 g/kg seed treatment + 5 kg/ha of PSM. as soil application.

Bio-fertilizer use in crops: Horticultural Crops[10]

Citrus, Apple, Plum, Apricot, Pear, Peaches, Almond and Walnut	Mix *Azotobactor/Azospirillum* @ 10 kg and PSM @ 5 kg/ha with FYM/compost mix nicely in compost pit and fill the pit (0.75x0.75x0.75m) with the mixture of compost: soil (1:1).

[9] &

[10] Package of Practices- UDWDP-II, WMD, Uttarakhand

Ginger and Termeric Colocassia	i) Use *Azotobactor* and *Azospirillum* in 1:1 ratio @ 5 kg/ha and 5 kg/ha PSM as soil application. ii) Prepare a solution of *Azospirillum* 2 kg and 2 kg PSM in 15 litter of water and dip the rhizome in the solution for 10-15 minutes and plant the treated rhizome in the evening.

Bio-fertilizer use in crops :Vegetable crops[11]

Cabbage, Cauliflower, Tomato, Brinjal, capsicum and chillies	Use 10 kg/ha *Azospirillum* and 5 kg/ha PSM as soil application in furrows or broadcast. Prepare solution of 1 to 1.5 kg *Azospirillum* + 0.5 kg PSM in 5 litter of water. Dip the roots of seedlings in solution for 5 minutes and transplant.

Safe use of pesticides[12]

Storage

- Pesticides should be kept in a dry, locked store. Keep away from children.
- Take only sufficient pesticide for the day's application from the store to the site.
- DO NOT transfer pesticides from the original container and packing into other containers.

Application

- Identify the pest and ascertain the damage done.
- Use pesticide only if it has exceeded the Economical Injury Level.
- Use only the recommended pesticide which is the least toxic.
- Read the instructions manual of the pesticide and equipment.
- Check the spraying equipment and accessories to be used.
- Ascertain that all components are clean, especially filling and suction strainer, sprayer tank, cut-off device, and nozzle.
- Replace worn-out parts such as 'O' ring, seal, gasket, worn-out nozzle tip, hose clamps, and valves.
- Test the sprayer and ascertain whether it pumps the required output at rated pressure. Check the nozzle spray pattern and discharge rate.
- Calibrate the sprayer. Set spraying speed and nozzle swath by adjusting spray height and nozzle spacing.
- Make sure that appropriate protective clothing (overalls, boots, mask, goggles/face shield) is available and is used.
- Train all involved in the application and understand the recommendations. Ensure that soap, towel, and plenty of water are available.
- Recheck the use instructions of the pesticide and equipment.
- Make sure pesticides are mixed in the correct quantities.
- Wear appropriate clothing.
- Avoid contamination of the skin, especially the eyes and mouth.

[11] Package of Practices- UDWDP-II, WMD, Uttarakhand

[12] TNAU Agritech Portal, Tamilnadu Agricultural University, Coimbatore (https://agritech.tnau.ac.in/crop_protection/crop_prot.html)

- Liquid formulation should be poured carefully to avoid splashing.
- Do not spray in high wind, high temperature, or rain.
- Avoid drift by selecting the proper direction of spraying and holding the nozzle and boom at a proper height.
- Start spraying near the downwind edge of the field and proceed upwind so the operator moves into the unsprayed area.
- Follow the correct spray technique. Spray the plant crop thoroughly by operating the sprayer at the correct speed and pressure.
- Prevent persons from entering treated areas until it is safe to do so.
- Mark the sprayed plots with a flag.
- Never eat, drink, or smoke when mixing or applying pesticides. NEVER blow out clogged nozzles or hoses with your mouth.
- Never allow children or unauthorized persons to be nearby during mixing. NEVER leave pesticides unattended in the field. Never spray if the wind is blowing toward grazing livestock or regularly used pastures.

Washing the Equipment and Disposal of Containers

- Remaining pesticides left in the tank after spraying should be emptied and disposed of in pits dug on wasteland.
- Never empty the tank into irrigation canals or ponds.
- Never leave unused pesticides in sprayers. Always clean equipment properly. After use, oil it and store it in the storeroom.
- Do not use empty pesticide containers for any purpose.
- Crush and bury the containers, preferably in a landfill dump.
- Clean buckets, sticks, measuring jars, etc., used in preparing the spray solution.
- Remove and wash protective clothing and footwear. Wash yourself well and put on clean clothing.

First Aid and Safety Measures

- Make sure appropriate protective clothing (overalls, boots, mask, goggles/face shield) is available and is used.
- Avoid contamination of the skin, especially the eyes and mouth.
- Handle liquid formulations carefully to avoid splashing.
- In case of contamination, wash the affected area thoroughly with soap and water.
- Prevent persons from entering treated areas until it is safe to do so.
- Ensure a first aid kit and plenty of water are available for emergencies.

Record Keeping

- Keep an accurate record of pesticide usage.

Chapter-4

STAKEHOLDER ENGAGEMENT, DISCLOSURE, AND CONSULTATIONS

Stakeholder consultations are a necessary step to obtain the views of people who may be affected by development projects or may otherwise have an interest in their outcomes, and to inform them about changes that could affect them. Such feedback assumes greater significance in the case of people who may be adversely affected. Since these stakeholders usually do not have a direct role in decisions about projects that affect them, consultations are an important mechanism to ensure that their concerns are considered while these decisions are made. In many cases, consultations are not only an important part of an effective development process, they may also be required by Operational Policies and Procedures.

Well-conducted consultations provide project affected people with a clear understanding of how the project, and the changes it will bring about, will have an impact on them, as well as meaningful ways to influence decision-making during project design and preparation. They include clear channels for communications with project agencies throughout preparation and implementation as well as transparent mechanisms for redress during project implementation. Consultations with project stakeholders contribute to identifying the full range of project impacts, help identify and design measures to mitigate negative impacts and elicit suggestions to enhance project benefits. When done properly, consultations can make a significant contribution to increasing the development impact and sustainability of development projects. Apart from the requirements of due process, there is evidence that well conducted consultations improve project design and implementation. Participatory processes and citizen involvement add value, increase sustainability and build support for projects.

In view of the above, 06 stakeholder consultations have been conducted under UCRRFP 06 Gram Panchayats. A team from Watershed Management Directorate along with the Safeguard consultant from The World Bank were available during the consultations. At first, community was introduced to the Uttarakhand Climate Responsive Rainfed Farming Project (UCRRFP) goals and its objectives.

After the introduction of the team and the project goals and objectives, the following points were discussed with the communities which are as follows-

1. Protentional of the village in terms of available irrigation, barren land.
2. Protentional of the village in terms of crops, vegetable, fruits, flowers.
3. Identification of the risks.
4. Discussion on the available natural resources/springs.
5. Knowledge, Capacity of the villagers.
6. Status of the trainings, guidance provided to villagers by the government departments.
7. Status of the works/activities done by other projects/departments.

A separate Stakeholder Engagement Plan (SEP) has been prepared for the Project, based on the World Bank's Environmental and Social Standard 10 on Stakeholder Engagement. The SEP is disclosed in WMD website : http://wmduk.gov.in/download/Draft_StakeholderPlan.pdf

This ESMF, as well as the SEP and the Environmental and Social Commitment Plan (ESCP) that have been prepared for this project, have been disclosed in draft for stakeholder consultations on the WMD website http://wmduk.gov.in/download/Draft_ESCP.pdf on 9th November, 2023.

Chapter-5

GRIEVANCE REDRESSAL MECHANISM

The project will place special emphasis on transparency, accountability, openness and disclosure of information to the community. In keeping with above principles, wide spread disclosure of information through wall writings, paintings, awareness generation campaigns, radio programmes, publications, village level workshops, unit level workshops will be carried out. Besides above, website- www.wmduk.gov.in and www.gramya.in have been developed for information dissemination regarding the implementing projects. The dedicated project website will be updated regularly with the latest monthly physical and financial status of the project.

A citizen charter for WMD has been prepared and as per the RTI Act, the Public Information Officer at State, Division, Unit and Gram Panchayat Level have been designated and information displayed. At block level and district level, information regarding the areas/ Gram Panchayats selected under project will be widely displayed.

In keeping with the guiding principles of transparency, accountability and openness, a grievance redressal mechanism in UCRRFP will be put in place. Since the Gram Panchayat will be the project implementing agency, grievance redressal mechanism both within and outside Gram Panchayat will be adopted.

Following administrative and legal mechanisms for redressal of grievances are available for any citizen, institutions, group of individuals representing project area or outside.

5.1 WITHIN THE GRAM PANCHAYAT

Following mechanism for early resolution of grievance are available with in Gram Panchayat.

1. **Provisions of Uttarakhand Panchayat Raj Act:** The Provisions available for grievance redressal as per the Uttarakhand Panchayat Raj Act can be invoked.

2. **Complaint box-** Village/ Gram Panchayat level written grievances, if any, will be collected in a sealed box kept in a public place in each village with in a Gram Panchayat. This complaint box would be opened once every month on a fixed date in the presence of all stakeholders and project functionary. The specific complaints/ grievances would be discussed and steps will be taken to resolve them with in 15 days. In case the community or the members of the community are unable to resolve them, the next administrative unit will receive the complaint for redressal.

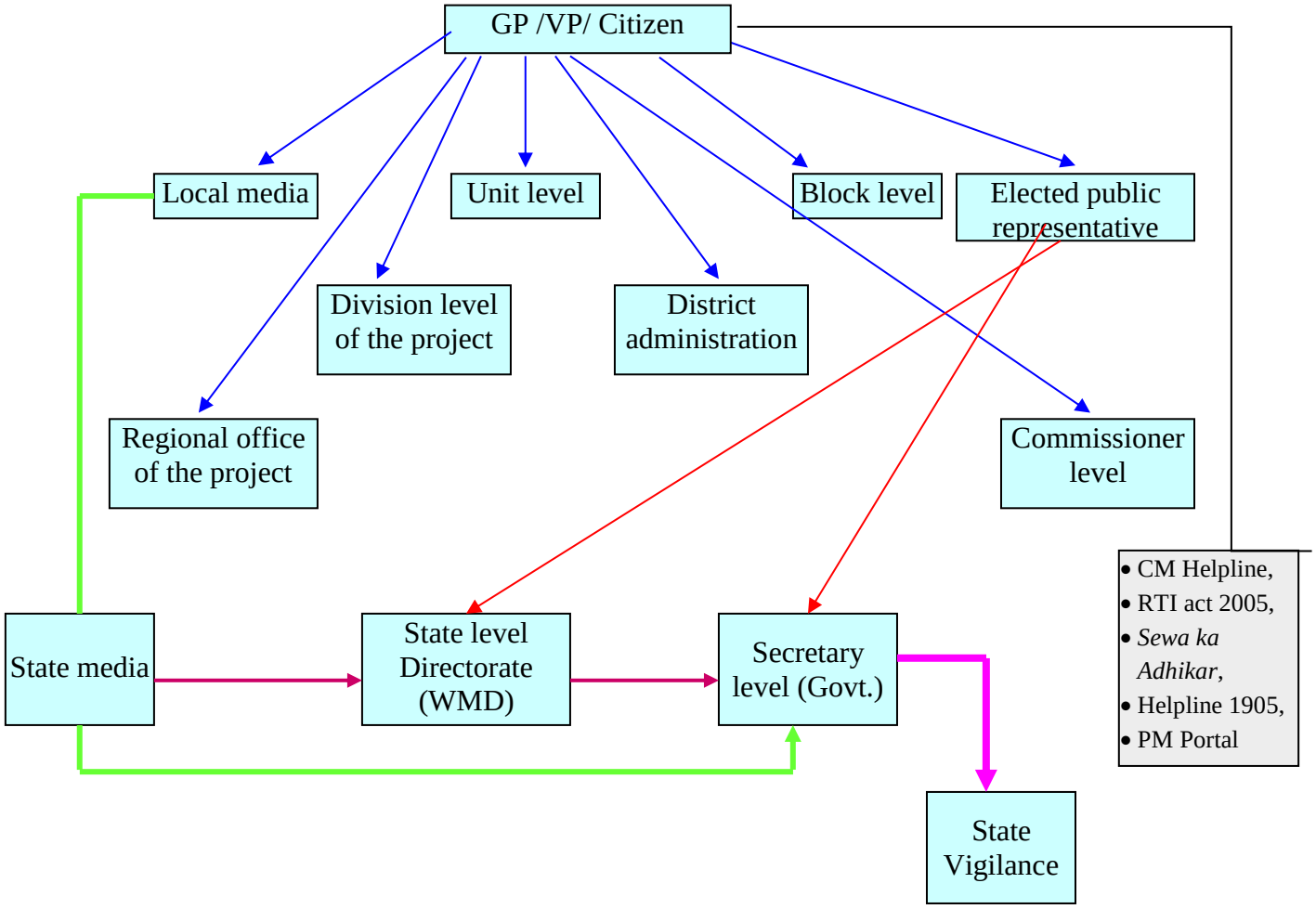
3. **Information Education Communication:** Wide publicity would be given regarding the grievance redressal mechanism available with in Gram Panchayat.

5.2 OUTSIDE THE GRAM PANCHAYAT

Following administrative, legal and other mechanisms are available for grievance redressal outside Gram Panchayat.

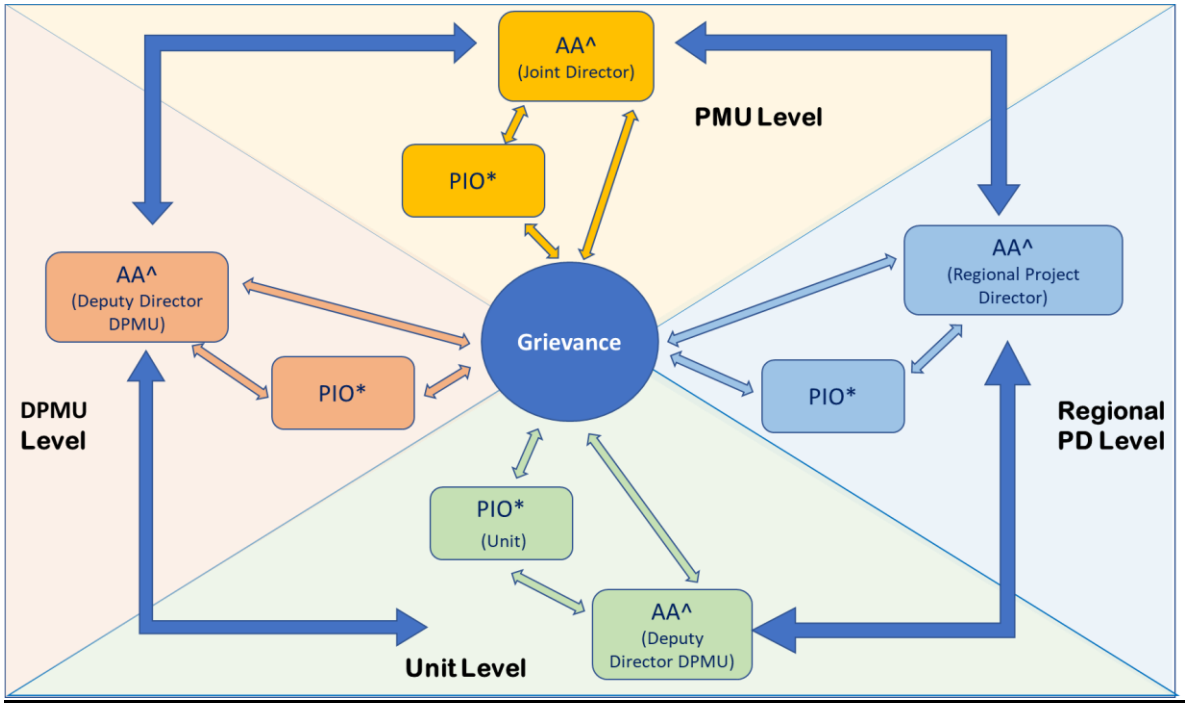
5.2.1- Administrative mechanism-

Figure 1: Administrative Mechanism (GRM)



The arrow indicates the level of the officer/institutions that the complainant can approach for grievance redressal.

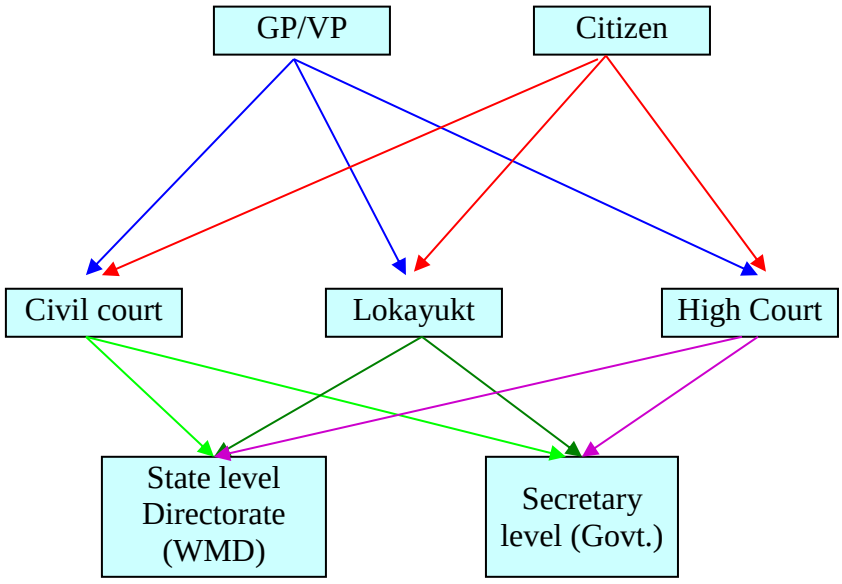
5.2.1.1 Grievance Redressal Mechanism within WMD



*- Public Information Officer (1st Receiver & Replier of grievance)
^- Appellate Authority

5.2.2- Legal mechanism-

Figure 2 Legal Mechanism (GRM)



The arrow indicates the level of the officer/institutions that the complainant can approach for grievance redressal.

5.2.3- Other mechanisms –

- All Gram Pradhans have been designated as Public Information Officers under RTI act at Panchayat level in the project area. All complaints regarding project should be acknowledged by the Gram Panchayat & final reply is expected to be delivered within 30 days, under RTI (Constitutional mandate).
- For those citizens who are residing outside the project area, they can witness large hoardings of project area with name of Gram Panchayats at block & district headquarter. They can also access other relevant project information through the website www.wmduk.gov.in; www.gramya.in
- Stakeholders are welcome to use this facility and may also write through the e-mail ID: wmd-ua@nic.in or through postal correspondence to: Office of the Chief Project Director, Watershed Management Directorate, Indira Nagar Forest Colony, Dehradun (Uttarakhand) PIN-248 006.

ANNEXURES

Annexure-1 - Format – 2 Environmental and Social Assessment for RVC and WWMC

To be filled up by RVC and GP being facilitated by MDT/Social Coordinator & Facilitators during Step 2 for selecting sub-projects/activities.

Put '✓' if the negative impact occurs, '×' if the negative impact does not occurs and '~' if the negative impact occurs partially.

Sl. No	Project activities	Codes for possible environnemental impacts (Reference to Table-6)																		Codes for possible social impacts (Reference to Table-6)										Mitigation measures (Code, as mention in the ESCP-Annex-VI)	Justification for decision/Remark
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	Z_1	Z_2			
Arable land																																
	Agriculture																															
1.	Cultivation of HYVs,																															
2	Cash crops / vegetables																															
3.	Spices and condiments																															
4.	Organic farming																															
5.	Diversified agriculture																															
6.	Terrace repairs																															
7.	Vegetative field boundaries																															
	Horticulture																															
8.	Orchard development																															
9	Homesteads fruit plantation																															
10.	Rejuvenation of old orchards																															
	Agribusiness																															
11	HYVs																															
12	Poly Houses, Poly tunnel																															
13	Growth Centers Processing Canters																															

Sl. No	Project activities	Codes for possible environnemental impacts (Reference to Table-6)																		Codes for possible social impacts (Reference to Table-6)										Mitigation measures (Code, as mention in the ESCP-Annex-VI)	Justification for decision/Remark
Non-Arable land																															
	Forest																														
14.	Strengthening of Van Panchayat																														
15.	Afforestation																														
16.	Bamboo/Agave plantation																														
17.	Soil and water conservation works																														
18.	Assisted natural regeneration																														
.	**Silvi-pasture**																														
19.	Plantation of fodder trees/shrubs/grasses																														
20.	Fodder development																														
	Water Harvesting																														
21.	Maintenance of existing water source																														
22.	Common water harvesting structures																														
23	RWHT/ LDPE Tanks																														
	Livestock & animal husbandry																														
24.	Breed improvement																														
25.	Stall feeding																														

Sl. No	Project activities	Codes for possible environnemental impacts (Reference to Table-6)	Codes for possible social impacts (Reference to Table-6)	Mitigation measures (Code, as mention in the ESCP-Annex-VI)	Justification for decision/Remark
26.	Nutrition management				
27.	Disease control & health, veterinary facilities				
28.	Stray animal castration				
	Natural hazards mitigation				
29	Small landslides control				
30	Drainage line treatment				
	Income generating activities				
31.	NTFP/MAP based activities				
32	Seed production and nursery raising				
33	Food processing				
34	Livestock based activities				
35	Fibre/ wool based activities				
36	Mushroom cultivation				
37	Knitting and weaving				
	Need based Infrastructure development				
38	Storage facilities				
39	Market linkage				
40	Rural credit facilities				
Transhumant					
41	Temporary shelter				
42	Water facility				

Sl. No	Project activities	Codes for possible environnemental impacts (Reference to Table-6)																		Codes for possible social impacts (Reference to Table-6)										Mitigation measures (Code, as mention in the ESCP-Annex-VI)	Justification for decision/Remark
43	Animal health care																														
44	Fodder																														
45	Migratory path																														
	Any others																														

Table 2 CODES FOR POSSIBLE ENVIRONMENTAL AND SOCIAL IMPACTS OF PROJECT INTERVENTIONS
(To be filled in above Format 2, as negative or positive for each project activity)

Codes	Environment Impacts
A	Impact on Surface Water (Quality/Quantity)
B	Possibilities of Siltation in water bodies (existing/constructed)
C	Soil Erosion/Gully Formation
D	Impact on stability of Hill Slopes/chances of Landslides
E	Impact on Soil Quality
F	Soil Moisture regime
G	Impact on Agricultural Productivity (Grain/Fodder)
H	Water/Air / Noise Pollution
I	Pressure on Surrounding Trees and Vegetation
J	Forest Fire
K	Impact on Biodiversity (Flora/Fauna)
L	Impact on Aquatic Life
M	Invasion of Exotic Species
N	Impact on Rare, Threatened & Endangered Species
O	Impact on the existence of plant species of Medicinal Importance
P	Generation/accumulation of Solid Waste/ Wastewater

Q	Impact due to the use of Chemical Fertilizers/Pesticides
R	Impact (danger of extinction) to the Local Gene Pool (Plants/Crops)
	Social Impacts
S	Impact of the activity on Workload/drudgery (particularly on women)
T	Impact on availability of Nutritious Food
U	Dislocation/migration of People due to loss of traditional livelihood/ Local Labour
V	Impact on Benefits and Legal rights of vulnerable, SC/ST, transhumant and people belonging to other Marginalized Groups.
W	Use of Child Labour
X	Impact related to Insect, Pest and Wildlife Attacks
Y	Impact of the intervention on Places of Religious/Historical Importance/Monuments
Z	Social Conflicts (benefit sharing)
Z_1	Effect of the activity on Human Health
Z_2	Effect of the activity on Local Cultural/Ethical/Aesthetic Values

Annexure-II Environmental and Social Code of Practices (ESCPs)

SN	Subprojects/activities	Code No.	Measure/Guideline
	FORESTRY	EC F 1.1	All plantation activities should be done in accordance with Manual of Forestry.
		EC F 1.2	Preference should be given to the local endemic species for plantation.
		EC F 1.3	Select native fodder species with high nutritive value.
		EC F 1.4	Plantation of mixed broadleaf species to supplement fodder.
		EC F 1.5	To increase the availability of local fodder/fuel, agro-forestry practices should be promoted.
		EC F 1.6	Plantation of fodder species in unculturable wastelands.
		EC F 1.7	Van Panchayats and Biodiversity groups in the GPs should be mobilized to ensure a higher sense of ownership and commitment towards sustainable management of common forest lands.
		EC F 1.8	Equal sharing of resources among users by rules/regulation.
	SOIL & WATER CONSERVATION	EC SC 2.1	Levelling of crop fields and maintenance of terraces / bunds to check water runoff and soil loss.
		EC SC 2.2	Storage of surface/Rain water through water storage structures.
		EC SC 2.3	Vegetative soil conservation measures around the engineering structures (bio-engineering measures).
		EC SC 2.4	Main streams/rivers, of MW/SWS, should be treated through Retaining Wall like stream bank protection activities instead of Cross barriers/ Check dams.
		EC SC 2.5	Quarrying for stones prior to construction of any structure in a site should strictly prohibited. The engineering structures for DLT should be constructed from loose bolder/stones lying alongside the drainage line.
		EC SC 2.6	Use of stone riser technique for field bonding should be adopted as a preventing measure to check soil erosion.
			Any other stie specific measures
	AGRICULTURE/ HORTICULTURE	EC AG 3.1	High nutritional value traditional crops should not be totally replaced by high yielding varieties.
		EC AG 3.2	To maintain soil fertility, crops rotation and bringing the cultivated land under leguminous crops (pea, lentil etc.) should be practiced.
		EC AG 3.3	To maintain biological fertility of the soil, planting of nitrogen fixing species on the crop field bunds should be done.
		EC AG 3.4	Selection of low water demanding (high efficiency in water utilization) HYV crops should be given preference.
		EC AG 3.5	Protected cultivation (use of polyhouse, polypit, polytrench, etc.) to reduce the chances of HYV crop failure

SN	Subprojects/activities	Code No.	Measure/Guideline
	Integrated Crop Management (ICM)	EC ICM 4.1	Site-specific suitable crops should be grown.
		EC ICM 4.2	To retain soil health and reduce soil contamination & water pollution, use of bio-fertilizers (bio-compost, vermicompost, organic mulch (Green manure), microbial inoculants, etc.) and bio-pesticides should be promoted.
		EC ICM 4.3	Lesser use of permissible chemical fertilizers / pesticides (Annex 6 & 7) will reduce chances of soil contamination and water pollution.
		EC ICM 4.4	Plantation/protection of pest controlling plants (Marigold, etc.).
		EC ICM 4.5	Adoption of package of following cultural practices should be promoted.
		EC ICM 4.5.1	Deep ploughing
		EC ICM 4.5.2	Line sowing
		EC ICM 4.5.3	Mix cropping
		EC ICM 4.5.4	Use of Organic Manure
		EC ICM 4.5.5	Seed Treatment
		EC ICM 4.5.6	Base dose Application
		EC ICM 4.6	Use of permissible chemical pesticides should only be done in accordance to the application timings and safety measures mentioned in IPM strategy of the project.
	WATER HARVESTING	EC WH 5.1	Rain water harvesting and storage of surface water (of streams, nalla, etc.) through water storage ponds/pits should be encouraged.
		EC WH 5.2	Construction of Roof Rain Water Harvesting Tank will help to collect rain water for domestic uses and kitchen gardening.
		EC WH 5.3	In rainfed areas, Low Density Polyethylene Tanks should be encouraged to collect rain/source water for irrigation.
		EC WH 5.4	Regular disinfection by chlorination and use of filters in storage structures will reduce chances of water borne diseases.
		EC WH 5.5	Proper designing, size and site selection for channel should be ensured.
		EC WH 5.6	Construction of smaller underground tanks to reduce chances of leakage.
		EC WH 5.7	Use of Ferro-cement for repairs of tanks.
		EC WH 5.8	Deep wells may not be dug to reduce drawing of underground water.
		EC WH 5.9	Disposal of waste water away from the ponds and proper drainage
		EC WH 5.10	Fish rearing to consume the mosquito eggs.
		EC WH 5.11	Rules and regulations over sharing and rational use of water to be framed by the stakeholder communities.
		EC WH 5.12	Selection of site for community water storage tanks should be as per the convenience and cooperation of stakeholders to reduce conflicts among users.
		EC WH 5.13	Installation / lying of pipelines deep in the ground will reduce freezing of water and.

SN	Subprojects/activities	Code No.	Measure/Guideline
		EC WH 5.14	Compaction of the excavated soil in the dug pipelines
		EC WH 5.15	Skill development among villagers to repair / maintain the pipelines
		EC WH 5.16	Strengthening of traditional local institutions will also help to sort out conflict among users.
		EC WH 5.17	Construction of water harvesting or water supply structure in individual and community land should be done only with the consent and the approval of the beneficiaries and Gram Panchayats.
		EC WH 5.18	The benificiaries should form usergroups and these groups themselves should be reach to an agreement prior to construction of water harvesting structures on any ones private land belonging the group.
	LIVESTOCK	EC LS 6.1	Animal health camps should be organised under supervision of technical experts.
		EC LS 6.2	Farmers should be encouraged for periodic vaccination to protect livestock from epidemic diseases.
		EC LS 6.3	To treat livestock, use of herbal medicines should be encouraged.
		EC.LS.6.4	Local fodder crop/ grass species should be encouraged.
		EC LS 6.4	Use of organic manure/bio-fertilizers should be encouraged for fodder crop production.
		EC LS 6.5	To reduce biotic pressure on forest, farmers should be encouraged to adopt new livestock techniques, like stall feeding, breed improvement, improve fodder production etc.
	AGRIBUSINESS	EC AB 7.1	Use of hardy local improved varieties for cultivation will reduce the use of chemical fertilizers and pesticides.
		EC AB 7.2	Cultivation of improved local varieties to reduce threat on local gene pool.
		EC AB 7.3	Use of alternate non wood staking material.
		EC AB 7.4	Use of bio-products for packaging
		EC AB 7.5	Safe disposal of organic and inorganic waste separately, as per waste management guidelines of WMD(Annexure-XII)
		EC AB 7.6	Crop diversification and intercropping according to market requirement and as natural pest barrier.
		EC AB 7.7	Proper pollution control arrangements in food processing units. FSSAI permits
		EC AB 7.8	The FIGs/ FFs, which will be responcible to run the processing unit/grading center, should have an agreement prior to establishment/construction of such unit with GP or individual (as applicable), to whom the land will belongs.
	INCOME GENERATING ACTIVITIES (IGA)	EC IGA 8.1	Strengthening of village resource management institutions to reduce conflicts among the users over common resources
		EC IGA 8.2	Prohibited use of species to avoid over exploitation.
	Potential IGAs-	EC.IGA.8.3	Use of Styrofoam tray to reduce soil loss in nursery activities.
	1. NTFPS	EC IGA 8.4	Use of water saving techniques / water harvesting to meet demand of water in IGA activities.
	2. Decorative items 3. Wood craft	EC IGA 8.5	Awareness among the users and proper training will help the users in mushroom and fish farming activities.

SN	Subprojects/activities	Code No.	Measure/Guideline
	4. Bamboo products 5. Nursery	EC IGA 8.6	Processing of wool washing not be done directly in water sources.
	6. Mushroom 7. Beekeeping 8. Fish farming 9. Woollen products	EC IGA 8.7	Use of masks or nose cover (cloth) during wool processing.
	NEED BASED INFRASTRUCTURE DEVELOPMENT	EC IF 9.1	Treatment of the destabilized sites through vegetative measures, jute netting, etc.
		EC IF 9.2	Quality of constructions should be ensured to reduce the failure and more hazards in downstream areas.
		EC IF 9.3	Proper designing and planning for road construction/laying to reduce soil erosion/landslips.
		EC IF 9.4	Bio-physical measures to rehabilitate disturbed land and checking soil erosion.
		EC IF 9.5	The land, not suitable for other productive purposes should be brought under infrastructure activities.
		EC IF 9.6	Preference to marginal groups in local employment.
		EC IF 9.7	Construction of any structure in individual or community land should be done only with the consent and the approval of the beneficiaries and Gram Panchayats.
		EC IF 9.8	Construction of assets of common benifits should be strictly prohibited in the lands which belongs to vulnerable group members.
	USE OF ALTERNATE ENERGY SOURCES	EC AE 11.1	Alternative means of energy should conserve the adjoining forests and provide to meet the needs of the people
		EC AE 11.2	Environment friendly alternative energy sources and/or the energy saving devices should be installed on priority basis to share the labour put in by womenfolk to collect fuel wood.
	Biogas	EC AE 11.3.1	It is to be insured that the installed bio-gas plant is of good quality standards and leak proof to avoid accidents due to leakage of methane.
		EC AE 11.3.2	User should be aware about proper dung to water ratio and to avoid any gap between 2 slabs covering the slurry outlet tank to reduce mosquito breeding.
		EC AE 11.3.3	To fulfil the higher water requirement per day, in the House Holds having Biogas, the water availability issue should be also taken care.
		EC AE 11.3.4	Training should provide for the proper use and awareness to avoid accidents.
	Pine Briquetting	EC AE 11.4.1	Charring should be done under fully covered pit or tighten quill to reduce harmful smoke.
		EC AE 11.4.2	Women should be aware to avoid synthetic saari/dress during charring to reduce fire hazard.
		EC AE 11.4.3	Use of rubber sleeper/shoes should ensure to avoid electricity shock incidents.
	Solar equipment	EC AE 11.5.1	Components of waste/unused batteries of solar equipment are hazardous to health so there safe disposal should be ensured.

Annexure II Mitigation measures for negative impacts and indicators

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
FORESTRY **1.** Afforestation **2.** Silvi-pasture **3.** Fuel wood Plantation	▪ Introduction of exotic species. ▪ Proliferation / dominance of invasive / exotic species ▪ Conflict among user over resource sharing • Shortage of grazing land during initial phase. • Restrict rights of the people	• EC F 1.1 • EC F 1.2 • EC F 1.3 • EC F 1.4 • EC F 1.5 • EC F 1.6 • EC F 1.7 • EC F 1.8 • EC F 1.9	• Area covered under afforestation (ha). • Increase/decrease in fodder / fuelwood yield. • Decrease/increase in women labour (days) for collection of fuel wood and fodder. • Increase/decrease in number of Oak seedlings/sapling. • Increase/decrease in forest crown cover/ canopy closure. • Increase/decrease in soil moisture. • Increase/decrease in forest floor vegetation and litter layer thickness. • Reduction/increase in occurrence of fire incidences. • Increase/decrease in forest wealth (resin, NTFPs, leaf litter layer, fodder etc.). • Increase/ decrease in the use of non- chemical applications e.g.,bio-pesticides, mechanical, cultural activities. ▪ All receive benefits.

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
AGRICULTURE 1. High Yielding Varieties 2. Diversified Agriculture 3. On-Farm Cultivation (Vegetables, spices and condiments) 4. Terrace Repair 5. Vegetative Boundary	• Loss in soil moisture. • Loss in soil fertility (Nitrogen, Carbon, etc.). • Soil and water pollution due to use of pesticides. • More demand of water for irrigation and competing demands on surviving/existing sources which are used for drinking. • Pressure on local forests/ vegetation for fodder for animals and packaging material. • Loss of traditional / indigenous practices of crop cultivation. • HYVs are labour intensive and bring more workload on women. • Marginal groups (landless farmers/labourers) will benefit less, since they do not have land to bring under HYVs • Due to monoculture chances of crop failure due to frost/fog, insect/pest and diseases. • Discontinuation of barter system and more dependency on external resources / agents and, therefore, loss of self-dependency. • Possibility of loss of local races/cultivars/gene pools/ crop varieties • Conflicts among the neighbouring farmers due to the shade caste from vegetative field boundary	• EC AG 3.1 • EC AG 3.2 • EC AG 3.3 • EC AG 3.4 • EC AG 3.5 • EC ICM 4.1 • EC ICM 4.2 • EC ICM 4.3 • EC ICM 4.4 • EC ICM 4.5 • EC ICM 4.5.1 • EC ICM 4.5.2 • EC ICM 4.5.3 • EC ICM 4.5.4 • EC ICM 4.5.5 • EC ICM 4.5.6 • EC ICM 4.6 • EC F 1.5 • EC SC 2.1 • EC SC 2.6 • EC WH 5.2 • EC WH 5.3	• Damage to crops (resistance against diseases, frost, drought etc.) • Production of grain, straw and other plant products • Quality of production (taste, odour, colour, perishability etc.) • Increase/decrease in per unit land economic benefits • Changes in nature of soil (fertility, hardness, moisture, colour etc.) • Quantity of seeds produced • Reduction/increase of soil erosion and water runoff • Increase / decrease in work load on women • Number of local crop varieties grown and area under them • Increase/ decrease in the use of non- chemical applications e.g.,bio-pesticides, mechanical, cultural activities. • No. of farmers adopting the ICM/IPM/INM/IWM.

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
HORTICULTURE **1. Fruit Crops**	• Soil contamination due to use of chemical fertilizers and pesticides and herbicides. • Increase in water consumption, therefore depletion in water resources. • Increase in water pollution due to use of pesticides / fertilizers. • The marginal landholders will benefit less, as they may not have land to bring under horticulture. • Health hazards due to more use of chemical fertilizers & pesticides	• EC ICM 4.2 • EC ICM 4.3 • EC AG 3.4 • EC SC 2.2 • EC IF 9.7	• Increase or decrease of production of fruits and other plant products • Quality of production (taste, odour, colour, perishability etc.) • Increase / decrease in economic benefits per unit land • Damage of crops against diseases, frost, drought, etc. • Increase/ decrease in the use of non- chemical applications e.g.,bio-pesticides, mechanical, cultural activities, climate resilient varieties, soil test based fertilizer application, restriction of non-permissible pesticides etc.
Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
WATER HARVESTING 1. Village Pond 2. Irrigation Ponds 3. Roof water harvesting 4. LDPE Tanks	▪ Water logging due to improper drainage. ▪ Water pollution through deposition of waste materiel due to public use. ▪ Pollution through organic (Polyethylene/ plastic) waste by the use of LDPE sheets and plastic pipelines for water harvesting. ▪ Health impacts due to breeding of mosquitoes. ▪ Disputes over water sharing (domestic demand vs irrigation demand) may arise. ▪ Mud formation along the water distribution points ▪ Marginal farmers are deprived from the benefits as they have small holdings. • More chances of water borne diseases if the unclean water is consumed without treatment • Seepage/leakage in roof tops and under water tanks.	▪ EC WH 5.1 ▪ EC WH 5.2 ▪ EC WH 5.3 ▪ EC WH 5.4 ▪ EC WH 5.5 ▪ EC WH 5.6 ▪ EC WH 5.7 ▪ EC WH 5.8 ▪ EC WH 5.9 ▪ EC WH 5.10 ▪ EC WH 5.11 ▪ EC WH 5.12 ▪ EC WH 5.13 ▪ EC WH 5.14 ▪ EC WH 5.15 ▪ EC WH 5.16 ▪ EC WH 5.17 ▪ EC WH 5.18	• Increase/decrease in water use efficiency for all activities e.g., household consumption, irrigation, drinking, etc. • Increase/decrease in irrigated area • Increase/decrease in crop production • Increase/decrease in water quality (colour, taste, odour) • Decrease/increase in time and distance per day put in for collection of water • Access to water by the marginalized groups • Alternate livelihood for those vulnerable whose land may be affected. ▪ Access to transhumant to meet their water requirements.

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
	• Drawing of underground water may lead to shortage of water in other adjacent sources. • Deposition of excavated soil damages the surrounding vegetation • Conflicts among the users/owners of the land where the well is dug. • Due to freezing of water in winters, water pipes get damaged and water supply gets interrupted. • Difficult on the part of villagers to maintain / repair pipelines. • Loss of land		
LIVESTOCK (Small Ruminants) 1. Natural breeding 2. Artificial insemination 3. Fodder management **4.** Veterinary camps	• Introduction of exotic/alien species of grasses and fodder crops to meet the demand of fodder, that dominate the local species. • Hybrid animals are more prone to diseases. • Hybrid animals require more provisions for health care. • Limited breeding facility (a bull can serve only 2 animals in a week) in case of hybrid animals. • Hybrid animals require intensive care attention. • Improper treatment of grasses or straw might lead to food poisoning. • Dependency on professionals in the artificial insemination and other activities and in the absence of professionals quality of service will deteriorate. • Poor quality vaccination may increase the out-break of diseases.	• EC LS 6.1 • EC LS 6.2 • EC LS 6.3 • EC LS 6.4 • EC LS 6.5 • EC LS 6.6	• Reporting of animal coverage. • Non-occurrence of diseases/ disease outbreaks. • Production of milk, meat enhancement. • Overall improvement/deterioration in productivity of milk, meat etc. • Quantity of fodder saved/consumed. • Enhancement/decrease in fodder production. • Increase/reduction in work load of women. • Changes in animal type (animal composition). • Increase/ decrease in the use of drugs and pesticides. • Facilities extended to transhumant.
CONSTRUCTION ACTIVITIS / INDUCED DEGRADATION	• Soil loss during the construction of engineering structures and quarrying for stone and other materials	• EC IF 9.1 • EC IF 9.2 • EC IF 9.3	• Conservation of soil measured by stabilized erosivity, gullies etc.

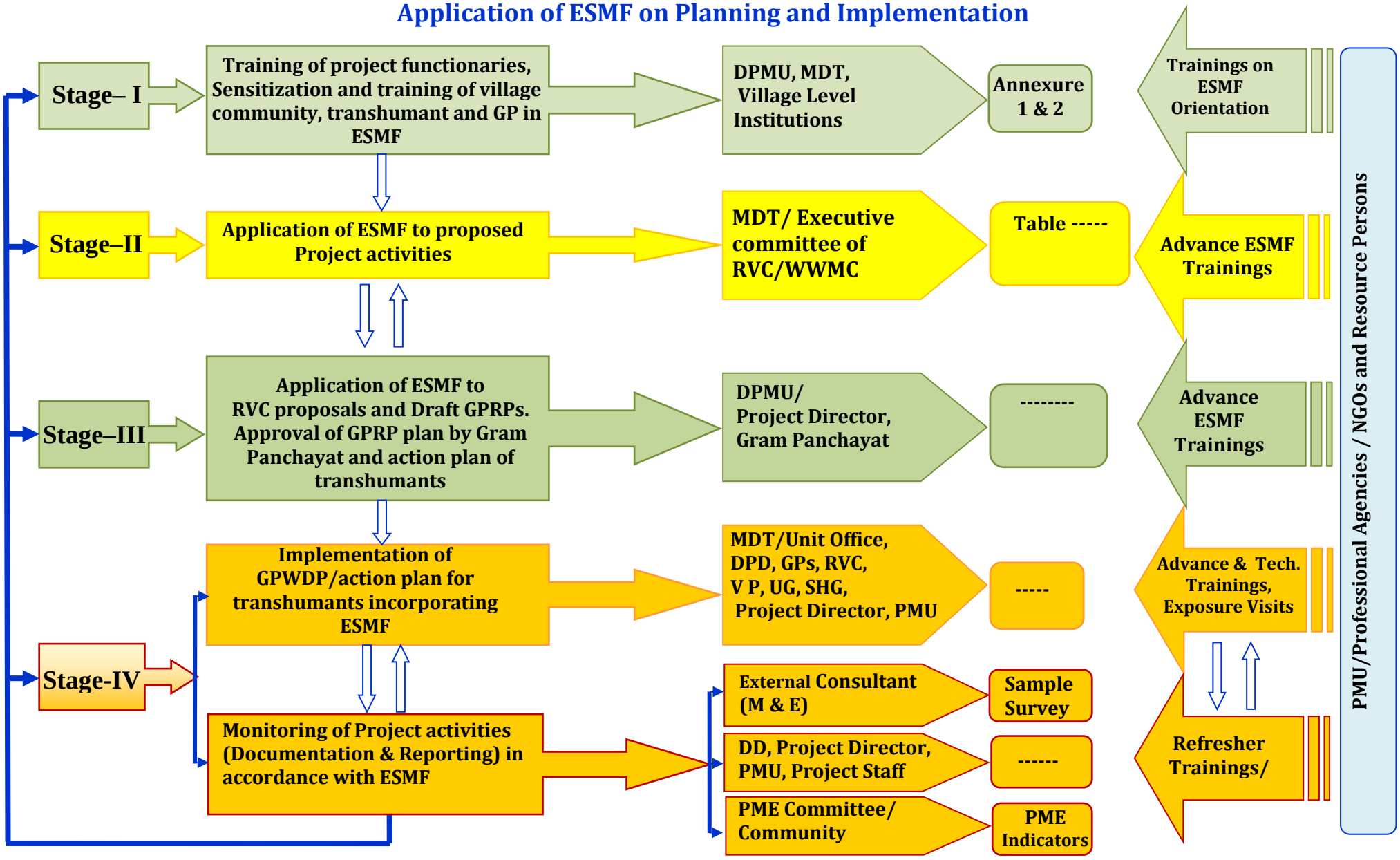
Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
1. Drainage line treatment **2. Soil and water conservation works** **3. Storage & Marketing facilities**	• Siltation of water bodies downstream during the construction of engineering measures. • Maintenance of the structures will require additional responsibilities to the stakeholders. • Low quality constructions may lead to failure and more hazards in downstream • Destabilization of the land and soil erosion/landslips along the road cuttings. • Siltation of water bodies downstream due to runoff. • Destruction of local flora during road construction and also along the roads. • Construction of the structures may cause some soil erosion. • Deterioration of cultural institutions (such as barter systems, helping attitude etc.)	• EC IF 9.4 • EC IF 9.5 • EC IF 9.6 • EC IF 9.7 • EC IF 9.8 • EC SC 2.1 • EC SC 2.2 • EC SC 2.3 • EC SC 2.4 • EC SC 2.5 • EC SC 2.6	• Reduction/increase in the frequency of slope slippages , debris flow, swollen streams, flash flood in downstream • Increase/decrease in water yield in the downstream sources and duration of water discharge • Increase/decrease in number of link paths • Availability/non-availability in off-season food products • Increase / decrease Productive land use for infrastructure • Improvement in incomes of vulnerable groups (child labour) and leisure time. • Increase /decrease in nutrition and education levels

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
INCOME GENERATING ACTIVITIES (IGA) 1. NTFPS 2. Decorative items 3. Wood craft 4. Bamboo products 5. Nursery 6. Mushroom 7. Beekeeping 8. Fish farming 9. Woollen products	• Conflict among the users over common resources • Chances of excessive harvest of a particular species / plant parts • Destabilization of stabilized slopes dug to remove soil for plant raising in the nursery • More demand for water for many IGA activities. • Risk of food poisoning due to unaware use of over grown / decayed mushroom. • Chances for economic risk due to death of fishes due to diseases. • Water pollution due to processing of wool for making products. • Possible occupational health hazards during wool processing.	• EC IGA 8.1 • EC IGA 8.2 • EC IGA 8.3 • EC IGA 8.4 • EC IGA 8.5 • EC IGA 8.6 • EC IGA 8.7	• Number of plants of different species raised • Increase/decrease in productivity. • Increase/decrease in income of beneficiary. • Participation of vulnerable groups in decision making at the watershed level.

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
AGRIBUSINESS **1-HYV cultivation** **2-Polyhouse** **3-Collection/Processing Canters**	• Increase in use of chemical pesticides/ insecticides. • Threat to local crops/species. • Exploitation of local shrubs and tree branches for staking purposes for climbers and tomato. • Spread of organic/inorganic waste like fruit peel, seeds, pulp and poly sheets etc. • Monoculture (of a particular Species or variety) results in decreased disease & pest resistant. • Threat to nutritional security of the area. • Air and water pollution by food processing units.	• EC AB 7.1 • EC AB 7.2 • EC AB 7.3 • EC AB 7.4 • EC AB 7.5 • EC AB 7.6 • EC AB 7.7 • EC AB 7.8 • EC ICM 4.1 • EC ICM 4.2 • EC ICM 4.3 • EC ICM 4.4 • EC ICM 4.5 • EC ICM 4.5.1 • EC ICM 4.5.2 • EC ICM 4.5.3 • EC ICM 4.5.4 • EC ICM 4.5.5 • EC ICM 4.5.6 • EC ICM 4.6 •	• Business plan with accordance to local climate/ conditions. • Species that are hardy and local. • Crop diversification. • Use of alternate staking material. • Arrangements for safe disposal of waste and controlling pollution in processing canters.
ALTERNATE ENERGY SOURCES	• Higher demand of water for bio-gas plants could create problems in the areas of water scarcity. • Chances of increased mosquito breeding at slurry outlet tank. • Hazard of accidents by leakage of methane gas. • In the households with bio-gas plants, the per day requirement would be higher. • Charring of pine needles would produce harmful smoke. • Fire hazard during charring.	• EC AE 11.1 • EC AE 11.1.1 • EC AE 11.1.2 • EC AE 11.1.3 • EC AE 11.1.4 • EC AE 11.2.1 • EC AE 11.2.2 • EC AE 11.2.3 • EC AE 11.3.1	• Level of awareness to use alternate energy devices. • Quality standards and safety measures taken for establishment/use of biogas plant. • Disposal of inorganic waste.

Subprojects/activities	Negative Impacts	**Mitigation Measures**	**Indicators**
	• Hazard of electric shock during the use of briquette moulding machine. • Pollution and health hazard through components of waste/unused batteries of solar equipments.		
SOCIAL MOBILIZATION / FORMATION OF COMMUNITY GROUPS			Maintenance of records for: • How many people of WWMC (including Women, SC, ST, transhumant, BPL and other vulnerable and weaker sections) attended the meeting. • Number of beneficiaries (including Women, SC, ST, transhumant, BPL and other vulnerable and weaker sections) • Whether every member of the beneficiary group is participating or not? • Increase/decrease in labour demand.

Annexure IV-Figure 3: Application of ESMF on Planning and Implementation



Annexure-V Transhumant Action Plan

Transhumant population

The transhumant population win the state mainly is the Gujjars and Bhotiyas/ Anwals communities. All these transhumant communities have their own unique features. Generally transhumants are herdsman and agriculturist but in case of Bhotiyas, the annual migration also brings forward the prospects of trade. Anwals make their living by providing services as herdsmen to sedentary Bhotiyas and other farmers of area. Gujjars practice semi-sedentary transhumance with settlement with in the project area.

Since the transhumant communities will be important stakeholders affecting the natural resources of the project area, special emphasis will laid as regards the inclusion/ participation of these groups in the project activities. A Transhumant Action Plan is being prepared to provide the project benefits of the project interventions which would result in improvement of socio-economic status of the transhumant.

Preparation of Transhumant Action Plan

The MDT and social facilitators will prepare the Transhumant action plan based on the requirements of the transhumant community which will be approved by the Deputy Directors and PMU/WMD respectively.

Objectives

The Transhumant Action Plan will be prepared to achieve the following objectives:

- Sensitization of all project stakeholders / partners as regards transhumant issues.
- Ensuring informed participation of the transhumant population in the project activities with improvement in quality of life of transhumant population in the project area.
- Develop plans, which give due consideration to the options preferred by them.
- Ensuring that all interventions are culturally compatible with their lifestyles and animal husbandry.
- Augmentation of grazing zones falling under the transhumance corridors and routes, as well as their appropriate management, supplementing in a delineated and operational manner.
- Boost epidemiological surveillance and tools for the control of the major animal diseases associated with transhumance (Foot and Mouth Disease, Contagious Bovine Pleuro Pneumonia, Peste des petits ruminants (PPR), Trypanosomiasis, Haemorrhagic septicemia (HS), Black Quarter (BQ) through awareness and preventive measures.

- Take into account the sustainability of pastoral natural resources managed within pastoral systems linked with transhumance.
- Implement mechanisms for the supervision of animal movement linked with transhumance practices.
- Create an environment for harmonizing the aim of natural resource management (NRM) with improvement in quality of life of transhumant in the project area.

TRANSHUMANT POPULATION IN UTTARAKHAND

Popular routes for Bhotiya/Anwal are in the district Almora, Pauri, Uttarkashi, Pithoragarh and Gujjars follow the routes through district Dehradun, Tehri, Rudraprayag, Uttarkashi. The profile of the major transhumant communities in the project area is as follows:

BHOTIYA/ ANWAL:

Livestock- Sheep and Goats

Type of transhumance- Traditional without families

Movement pattern- They cross through project area with few groups practicing semi-sedentary transhumance in project area.

Upward- Migrate with livestock from lower valley to alpine meadows from spring (in March). Anwal collects the herds from sedentary farmers.

Downward - Starting from autumn (in late September to October) towards their abodes in lower valley; Anwal collects the wages from sedentary farmers.

Source of Income - Animal & by-products and Subsistence agriculture.

The Bhotiya are to be found all along the Tibetan border from Nepal in the east to Uttarkashi in the west.

GUJJARS-

Livestock- Buffaloes and cows

Type of transhumance- Traditional with families

Movement pattern- They cross through project area with few groups practicing semi-sedentary transhumance in one GP only.

Upward- Migrate with livestock from lower valley to alpine meadows from spring (in March) with gradual assent.

Downward - Starting from autumn (in late September to October) towards their abodes in lower valley.

Source of Income - Animal & by-products

They are the community of nomadic Muslims extending along the Himalaya from Kashmir, Himachal Pradesh to Garhwal residing in the Shiwalik circle of Uttarakhand/Uttar Pradesh.

Tenural Rights:

The 'Gujjars' enjoy traditional privilege of grazing in the forest area. They have the privilege to make deras inside the forest. Traditionally it was their right to keep as many buffaloes as they could afford and had the right to graze and lop. But due to increase in population of 'Gujjars' as well as their live stock, certain rules and restrictions have been imposed. As per the notification of Forest Department, no. 1079(1) XIV 215 dated 17.12.1986 one cattle unit is permitted to graze in 5.09 ha of forest.

Measures Adopted by Forest officials for controlling grazing and Lopping:

The grazing rules lead to control lopping and grazing in the forest areas. These are as follows:

Controlled Lopping:

- Every 'Gujjar' will have his cattle marked before he enters the "Khol" and will settle his "Dera" (Group of households) only in those areas permitted by the DFO.
- Lopping will be permissible in those areas only which have been mentioned in the Working Plan.Trees less than 30 cm diameter will not be lopped. The following species will not be lopped- Sal, Khair, Semal, Bamboo, Toon, Sain, Black siris etc.
- A 'Gujjar' will keep his buffalo tied in "Khuti" at his "Dera". If the site is on a slope, buffaloes will be stall-fed at "Dera" and not at lopping site. Buffaloes not be allowed to roam freely all over the area.
- Lopping of leading branches prohibited.
- "Hasiya" sickle used for lopping. No other type of knife allowed for lopping.
- Upper half of the canopy shall not be lopped. Also branches more than 5-7 cm in girth is not to be cut.

The transhumance cycle followed by the major communities is as follows:

Season	Months	Duration	

	From	To		Pasture sites
Spring	Early April	End of June	90 days	Lower Alpine pastures
Summer	End of June	Late September	83 days	Alpine pastures
Autumn	Mid-September	End of November	71 days	Lower Alpine pastures
Winter	December	End of march	121 days	Foothills or planes

Key Features of Transhumant in the State

Features	Bhotiya/ Anwal	Gujjar
Livestock	Sheep and Goats	Buffaloes and cows
Type of transhumance	Traditional without families	Traditional with families
Movement pattern	Traversing and semi-sedentary	Traversing; semi-sedentary
Source of Income	Animal & animal by-products; Subsistence agriculture, Wages from providing transhumance services	Animal & animal by-products
District	Almora, Pauri, Uttarkashi, Pithoragarh	Dehradun, Tehri, Rudraprayag, Uttarkashi

Movement patterns

There are two types of transhumant practices:

- Intra valley transhumance i.e, movement of pastorals within valleys and
- Inter valley transhumance i.e, movement of pastorals foothills and low lands to high Himalayan alpine valleys.

The transhumant gets the permission of Forest Officials for grazing for six months from October to March. The permission given to them in identified compartments of a Forest Range.

Economy - The transhumant economy is primarily dependent upon the livestock they possess concurrently related to the animals and animal products. In supplementation trade, agriculture, collecting medicinal herbs, seasonal labour is undertaken to generate funds for their meager requirements.

- Bhotiya mostly depends upon the sale of wool and meat. Agriculture is also undertaken at habitations with the involvement of other family members.

- Anwals are too poor to undertake trade as they fend for themselves by providing services as pastorals to sedentary farmers with large flocks. In return they either get cash or are being paid in kind (sheep or goat). Agriculture is undertaken according to seasonal habitation during migration.

- Gujjars mostly depend upon sale of milk and milk products especially on the tourism routes as their migration coincides with the pilgrimage season.

NEED ASSESSMENT BY PROJECT

Group Discussions, personal interaction should be conducted by the project MDT with the transhumant groups during their passage through project areas. The objective of discussions will be gaining an insight into the community's perception regarding their problem and possible mitigation measures.

General problems (as identified in previous project UDWDP-II):

- Degradation of and reduction in pastures land.
- Reduced availability of fresh fodder
- High incidence of diseases in the animals
- Lack of veterinary services
- Loss of livestock due to accidents, wild animals, diseases etc.
- High incidence of human diseases
- Low productivity of animal products
- Exploitation by middlemen
- High prevalence of indebtedness
- Lack of education in the transhumant communities
- Information and Communication gap with the outside world.

PROJECT INTERVENTIONS

Based on the need assessment the following project interventions would be taken up under the Transhumant Action Plan:

1. Health camps– To tackle the health care & hygiene requirement of transhumant communities, the health camps will be organized during their stay in project area. The transhumant families would also be given a routine check-up during the camp. For the health camps and sensitization workshops of transhumant communities regarding health care, hygiene, vaccination, family planning and welfare etc. the linkage will be developed with State Health Department and the doctors of the nearest PHC/Add. PHC will be invited in these

camps/sensitization workshops. So by these trainings /workshops the communities will be aware about the latest schemes/programmes of the State Health Department and could get benefits in near future. The first aid kits would be distributed after they are made aware of its usage.

2. Veterinary Services – To tackle the emergent veterinary health care requirements along with enhancing adoption of scientific practices (vaccination, immunization, improved breeding etc), veterinary health camps would be organized for the transhumant. These camps would provide services such as drenching, deworming, vaccination, medicines, first aid kits including information dissemination as regards their application. These camps would also serve the objective of sensitizing the transhumant regarding adoption of improved breeding, feeding, animal hygiene and rearing practices for overall healthy live stock.

For the livestock health camps, training and workshops the linkage will be developed with state "Animal Husbandry Department". The veterinary doctors of nearest hospital/dispensaries will be invited as a expert for the health camps, training and workshops. So by such type of linkage the transhumant will be aware about the latest technology and schemes of the state A.H. department and could be regularly benefitted in near future.

3. Sensitization of local communities by organizing workshops and training- The social mobilization process would involve awareness generation, sensitization of the project staff and officials, Gram Panchayats and local communities towards issues of transhumant population passing through their area i.e. health and hygiene, NRM and Animal Husbandry issues.

- Key Agency – Multi disciplinary team, Tribal & Transhumant, welfare committee, field non governmental organization, motivators & facilitators.

- Key Activities – Rapport building, awareness about the project and consultation with target population, sensitization workshop for GPs & VPs. IEC campaign would also be conducted through "nukkad natak", supply of posters, flyers etc.

4. Capacity building by organizing training programmes– The field staff, motivators & facilitators of the concerned GPs would be provided training towards sensitization of community towards transhumant issues.

5. Child and Adult Education Programme- The child and adult education is the major issue for the transhumant communities. Most of the transhumant groups just pass from the project areas and stay hardly 6-10 days in project areas, but few groups (Gujjars) are semi sedentary who stays for three to six months in the project area with their families. For these groups the child and adult education programme will be taken up by project. The education programme could be taken up with the help of local NGO's. The NGO will help in the primary education of children/adult and educating the communities about the health/hygiene and other social issues.

6. Enhancing fodder availability – An MOU would be signed between the concerned GP/VP and UCRRFP for forestry & pasture development activity. The GP/VP falling in the transhumant routes would be sensitized towards inclusion of forestry and fodder development activities under GPRP. In addition to above, the fodder

requirement of the transhumant population during transit would be further augmented by supplying balanced concentrated feed.

7. Distribution of hard components – Tentage, tubs for feeding & drinking of small animals, blankets, polysheets for shelters, etc. would be distributed during the animal health camps organized by divisions and visits to transit camp sites of transhumant. The beneficiaries would be made aware of as regards proper utilization and maintenance of the above items for their long term use and resulting sustainable benefits.

SUSTAINABILITY ISSUES

1. Effective Social Mobilization - Sensitization of communities at GP level by motivators, facilitators, MDT, to transhumant issues. GPs falling in the migratory route of the transhumant population would be mobilized to take up activities for augmentation of fodder and biomass viz. forestry, fodder and pasture development in their respective GPRPs.
2. Awareness Campaign – Live stock is the basis of subsistence for transhumant communities. Intensive awareness campaign would focus on preventive treatment of diseases through proper immunization. Along with this transhumant would be mobilized to avail the facilities provided under the programme with the understanding that these measures can be adopted by them also.
3. Veterinary Services – Veterinary camps, mass drenching, vaccination, improved breeding, better feed and feeding practices etc. are the interventions which would demonstrate that adopting good practices are actually beneficial for livestock health, resulting in better prices for animals & their by products.
4. MOU Between DPD & GPs/VPs – A memorandum of understanding (MOU) between concerned DPDs & GPs would be signed (Annexure-1). The MOU would enable the project officials to undertake activities for developing community land for increasing fodder availability and sensitization among local communities towards transhumant issues. The Gram Pardhan as the member of Tribal & transhumant Welfare Committee would actively participate with the project officials to ensure that after the project duration activities like community land development are sustained. The GP/VPs after sensitization would (according to MOU) come forward for:

   a) Take up forestry and fodder/ pasture development activities on community land through GPRPs.

   b) Protect the grazing land & plantation on community land.

   c) Protect transhumant during their stay in local area.

   The MOU between the two parties would also ensure that the responsibilities related to the transhumant action plan are acceptable & understood and relevant cooperation is generated.

5. Distribution of Hard Components – The transhumant would be given hard components like tentage, polysheets for animals, blankets, tubs for feeding & drinking of small animals, first aid kits etc. This would generate acceptance amongst transhumant population regarding adoption of simple techniques and proper utilization of such components.
6. Convergence and Linkages- The transhumant could be linked to the following department/ agencies-
    1. State "Animal Husbandry Department"- For all livestock health services.
    2. State "Health Department"- For human health hygiene services.
    3. "Khadi Gramoudyog Board (KVIC)"- For selling of wool
    4. "Cooperative –Dairy Department"- For selling of milk
    5. Non Government Organization (NGO)- For child/adult education.

Negative list of intervention:

Following intervention will not be allowed in the project-

- Any intervention which is not as per ESMF of the Project.
- Any intervention which is not accepted by the transhumant.
- Any activity that affect their traditional rights in the forest.
- Any intervention that is against their cultural heritage and ethnic identity.

Implementation Schedule:

During the mobilization phase (preparatory phase) the area and location of transhumant people will be find out and through discussions the annual plan for relevant divisions will be prepared.

The implementation schedule will be following:

S. No.	Activities	Year I	Year II	Year III	Year IV	Responsibilities
1.	Identifying the specific location and the target group	October to December				DPMU & Unit Staff
2.	Awareness about the project and consolidation with the target groups	October to November				DPMU & Unit Staff

S. No.	Activities	Year I	Year II	Year III	Year IV	Responsibilities
3.	Assessment of Need	November to December				DPMU & Unit Staff
4.	Tribal plan preparation		April			Dy Dir/PD
5.	Approval of tribal plan		May to September	May to September	May to September	Dy. Dir.
6.	Procurement of different goods/items		October to December	October to December	October to December	DPMU & Unit Staff
7.	Training of the transhumant groups		October to December	October to December	October to December	DPMU & Unit Staff
8.	Animal husbandry services		October to January	October to January	October to January	DPMU & Unit Staff

(To be annexed in transhumant plan)

CONTRACT

This contract is entered into this day.....year ……, by and between, UCRRFP (First party) through Deputy Director, Division……. District.....and Gram Panchayat/ Van Panchayat (Second party) located at.....P.O.....District.....

Now therefore the parties hereby agree to observe responsibilities as following:

The first party will:

- Identify Transhumant routes and halting stations in the project area.
- Provide technical facilitation for project preparation to develop fodder plantation in the community land under GPs.
- Organization of animal health camps for transhumant during transit through project area.
- Organization of human health camps for transhumant during transit through project area.
- Provision of shelter facilities for animals, and human beings.
- Awareness generation and sensitization of local communities towards transhumant

The second party will

- Take up forestry activities and pasture development under GPRPs
- GP/VP will protect the grazing land and plantation on the community land.
- Protect Transhumant during their stay in local area.

- Gram Pradhan/ Gram Panchayat members would actively participate in the implementation of Transhumant Action Plan.

First Party	Second Party
(WMD)	(Gram Panchayat/Van Panchayat)

Witness
1.
2.

Annexure VI-

LIST OF PESTICIDES WHICH ARE BANNED, REFUSED REGISTRATION AND RESTRICTED IN USE13

(Updated on 31.03.2024)

I. PESTICIDES / FORMULATIONS BANNED IN INDIA

A.	**Pesticides Banned for manufacture, import and use.**	
	1.	Alachlor (S.O. 3951 (E), dated 08.08.2018)
	2.	Aldicarb (S.O. 682 (E) dated 17th July 2001)
	3.	Aldrin
	4.	Benzene Hexachloride
	5.	Benomyl (S.O 3951(E) dated 8th August, 2018)
	6.	Calcium Cyanide
	7.	Carbaryl (S.O 3951(E) dated 8th August, 2018)
	8.	Chlorbenzilate (S.O. 682 (E) dated 17th July 2001)
	9.	Chlordane
	10.	Chlorofenvinphos
	11.	Copper Acetoarsenite
	12.	Diazinon (S.O 3951(E) dated 8th August, 2018)
	13.	Dibromochloropropane (DBCP) (S.O. 569 (E) dated 25th July 1989)
	14.	Dichlorovos (S.O. 3951 (E), dated 08.08.2018)
	15.	Dicofol (S.O. 4294(E) dated 3rd October, 2023)
	16.	Dieldrin (S.O. 682 (E) dated 17th July 2001)
	17.	Dinocap (S.O. 4294(E) dated 3rd October, 2023)
	18.	Endosulfron (ad-Interim order of the Supreme Court of India in the Writ Petition (Civil) No. 213 of 2011 dated 13th May, 2011 and finally disposed of dated 10th January, 2017)
	19.	Endrin
	20.	Ethyl Mercury Chloride
	21.	Ethyl Parathion
	22.	Ethylene Dibromide (EDB) (S.O. 682 (E) dated 17th July 2001)
	23.	Fenarimol (S.O 3951(E) dated 8th August, 2018)
	24.	Fenthion (S.O 3951(E) dated 8th August, 2018)
	25.	Heptachlor
	26.	Lindane (Gamma-HCH)
	27.	Linuron (S.O 3951(E) dated 8th August, 2018)
	28.	Maleic Hydrazide (S.O. 682 (E) dated 17th July 2001)
	29.	Menazon

13 Directorate of Plant Protection, Quarantine & Storage, Department of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Govt of India.

	30.	Methomyl (S.O. 4294(E) dated 3rd October, 2023)
	31.	Methoxy Ethyl Mercury Chloride (S.O 3951(E) dated 8th August, 2018)
	32.	Methyl Parathion (S.O 3951(E) dated 8th August, 2018)
	33.	Metoxuron
	34.	Nitrofen
	35.	Paraquat Dimethyl Sulphate
	36.	Pentachloro Nitrobenzene (PCNB) (S.O. 569 (E) dated 25th July 1989)
	37.	Pentachlorophenol
	38.	Phenyl Mercury Acetate
	39.	Phorate (S.O. 3951 (E), dated 08.08.2018)
	40.	Phosphamidon (S.O. 3951 (E), dated 08.08.2018)
	41.	Sodium Cyanide (banned for Insecticidal purpose only S.O 3951(E) dated 8th August, 2018)*
	42.	Sodium Methane Arsonate
	43.	Tetradifon
	44.	Thiometon (S.O 3951(E) dated 8th August, 2018)
	45.	Toxaphene(Camphechlor) (S.O. 569 (E) dated 25th July 1989)
	46.	Triazophos (S.O. 3951 (E), dated 08.08.2018)
	47.	Tridemorph (S.O 3951(E) dated 8th August, 2018)
	48.	Trichloro acetic acid (TCA) (S.O. 682 (E) dated 17th July 2001)
	49.	Trichlorfon (S.O. 3951 (E), dated 08.08.2018)
B.	**Pesticide / Pesticide formulations banned for use but continued to manufacture for export**	
	1.	Captafol 80% Powder (S.O. 679 (E) dated 17th July 2001)
	2.	Dichlorvos (S.O. 1196 (E) dated 20th March 2020)
	3.	Nicotin Sulfate (S.O. 325 (E) dated 11th May 1992)
	4.	Phorate (S.O. 1196 (E) dated 20th March 2020)
	5.	Triazophos (S.O. 1196 (E) dated 20th March 2020)
C.	**Pesticides Withdrawn (Withdrawal may become inoperative as soon as required complete data as per the guidelines is generated and submitted by the Pesticides Industry to the Government and accepted by the Registration Committee. (S.O 915(E) dated 15th Jun,2006)**	
	1.	Dalapon
	2.	Ferbam
	3.	Formothion
	4.	Nickel Chloride
	5.	Paradichlorobenzene (PDCB)
	6.	Simazine
	7.	Sirmate (S.O. 2485 (E) dated 24th September 2014)
	8.	Warfarin (S.O. 915 (E) dated 15th June 2006)

* Regulation to be continued in the extant manner for non-insecticidal uses.

II. PESTICIDES REFUSED REGISTRATION

S. No.	Name of Pesticides
1.	2,4, 5-T
2.	Ammonium Sulphamate
3.	Azinphos Ethyl
4.	Azinphos Methyl
5.	Binapacryl
6.	Calcium Arsenate
7.	Carbophenothion
8.	Chinomethionate (Morestan)
9.	Dicrotophos
10.	EPN
11.	Fentin Acetate
12.	Fentin Hydroxide
13.	Lead Arsenate
14.	Leptophos (Phosvel)
15.	Mephosfolan
16.	Mevinphos (Phosdrin)
17.	Thiodemeton / Disulfoton
18.	Vamidothion

III. PESTICIDES RESTRICTED FOR USE IN THE COUNTRY

S. No.	Name of Pesticides	Details of Restrictions
1.	Aluminium Phosphide	The Pest Control Operations with Aluminium Phosphide may be undertaken only by Govt. /Govt. undertakings / Govt. Organizations / pest control operators under the strict supervision of Govt. Experts or experts whose expertise is approved by the Plant Protection Advisor to Govt. of India except 1Aluminium Phosphide 15 % 12 g tablet and [2]Aluminum Phosphide 6 % tablet. [RC decision circular F No. 14-11(2)-CIR-II (Vol. II) dated 21- 09-1984 and G.S.R. 371(E) dated 20th may 1999]. [1]Decision of 282nd RC held on 02-11-2007 and, [2]Decision of 326th RC held on 15-02-2012. The production, marketing and use of Aluminium Phosphide tube packs with a capacity of 10 and 20 tablets of 3 g each of Aluminium Phosphide are banned completely. (S.O.677 (E) dated 17th July, 2001)
2.	Captafol	The use of Captafol as foliar spray is banned. Captafol shall be used only as seed dresser. (S.O.569 (E) dated 25thJuly, 1989) The manufacture of Captafol 80 % powder for dry seed treatment (DS) is banned for use in the country except manufacture for export. (S.O.679 (E) dated 17thJuly, 2001)
3.	Carbofuran	All other formulations of Carbofuran except Carbofuran three percent Encapsulated granule (CG) along with the crop labels may be stopped from use (S.O. 4294(E) dated 3rd October, 2023)
4.	Chlorpyriphos	Chlorpyriphos is banned for use in Ber, Citrus and Tobacco. (S.O. 4294(E) dated 3rd October, 2023)
5.	Cypermethrin	Cypermethrin 3% Smoke Generator is to be used only through Pest Control Operators and not allowed to be used by the General Public. [Order of Hon,ble High Court of Delhi in WP(C) 10052 of 2009 dated 1407- 2009 and LPA-429/2009 dated 08-09-2009]
6.	Dazomet	The use of Dazomet is not permitted on Tea. (S.O.3006 (E) dated 31st Dec, 2008)

S. No.	Name of Pesticides	Details of Restrictions
7.	Dicohlro Diphenyl Trichloroethane (DDT)	The use of DDT for the domestic Public Health Programme is restricted up to 10,000 Metric Tonnes per annum, except in case of any major outbreak of epidemic. M/s Hindustan Insecticides Ltd., the sole manufacturer of DDT in the country may manufacture DDT for export to other countries for use in vector control for public health purpose. The export of DDT to Parties and State Non- Parties shall be strictly in accordance with the paragraph 2(b) article 3 of the Stockholm Convention on Persistent Organic Pollutants (POPs). (S.O.295 (E) dated 8th March, 2006) Use of DDT in Agriculture is withdrawn. In very special circumstances warranting the use of DDT for plant protection work, the state or central Govt. may purchase it directly from M/s Hindustan Insecticides Ltd. to be used under expert Governmental supervision. (S.O.378 (E) dated 26th May, 1989)
8.	Dimethoate	Dimethoate is banned for use in fruits and vegetables that are consumed as raw food items. (S.O. 4294(E) dated 3rd October, 2023)
9.	Fenitrothion	The use of Fenitrothion is banned in Agriculture except for locust control in scheduled desert area and public health. (S.O.706 (E) dated 03rd May, 2007)
10.	Malathion	Malathion is banned for use on Sorghum, Pea, Soybean, Castor, Sunflower, Bhindi, Brinjal, Cauliflower, Radish, Turnip, Tomato, Apple, Mango and Grape. (S.O. 4294(E) dated 3rd October, 2023)
11.	Mancozeb	Mancozeb is banned for use on Guava, Jowar and Tapioca. (S.O. 4294(E) dated 3rd October, 2023)
12.	Methyl Bromide	Methyl Bromide may be used only by Govt. /Govt. undertakings/Govt. Organizations / Pest control operators under the strict supervision of Govt. Experts or Experts whose expertise is approved by the Plant Protection Advisor. [G.S.R.371 (E) dated 20th May, 1999 and earlier RC decision]

S. No.	Name of Pesticides	Details of Restrictions
13.	Monocrotophos	Monocrotophos is banned for use on vegetables. (S.O.1482 (E) dated 10th Oct, 2005) 1) The use of Monocrotophos 36% SL formulation is to be discontinued and no new certificate of registration for its manufacture shall be issued after publication of S.O. 4294(E) dated 3rd October, 2023. 2) With an objective of providing alternatives of this formulation so that the farmers do not suffer losses due to non-availability of effective control against certain insect pests in specific crops, the label claims for other formulations of Monocrotophos may be extended in one-year period from the date of publication of S.O. 4294(E) dated 3rd October, 2023. 3) After this period, all the certificates of registration of Monocrotophos 36% SL will stand cancelled. Sale, distribution or use of Monocrotophos 36% SL shall be allowed only for clearance of existing stock till its expiry period. (S.O. 4294(E) dated 3rd October, 2023)
14.	Oxyfluorfen	Oxyfluorfen is banned for use on Potato and Groundnut. (S.O. 4294(E) dated 3rd October, 2023)
15.	Quinalphos	Quinalphos is banned for use on Jute, Cardamom and Sorghum. (S.O. 4294(E) dated 3rd October, 2023)
16.	Trifluralin	i. The Registration, import, manufacture, formulation, transport, sell and its all uses except use in wheat shall be prohibited and completely banned from 8th August, 2018. ii. A cautionary statement has to be incorporated in the label and leaflet that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area. (S.O 3951(E) dated 8th August, 2018)

Annexure VII-

WHO's List of Banned Pesticides

Aldrin
Benzene Hexa Chloride (BHC)
Calcium Cyanide
Chlordane
Copper acetoarbenite
Dibromocworopropane (DBCP)
Endrin
Ethyl Mercury Chloride
Ethyl parathion
Heptachlor
Manzona
Methomyl 24% Formulation
Nicotine Sulphate
Nitrofen
Paraquate dimethyl sulphate
Penta Choloro nitrobenzene
Penta cholorophenol (PCP)
Phenyl Mercury Acetate (PMA)
Sodium Methane Arsonate (MSMA)
Tetradifon
Toxaphene
Phosohamidon 85% SL
Methomyl 12.5% L
Aldicarb
Chlorbenzilate
Deildrin
Ethyl dibromide (EDB)
Maleic Hydrazide
Trichloro Acetic Acid (TCA)
Aluminium phosphamide
Carbofuran 505 WP
Captafal 80%
Malathian 25 DP & 50% EC
Methoxy ethyl mertcury chloride (MECE)

Extremely hazardous (Class Ia) technical grade active ingredients of pesticides (common name) not permissible in the project

Aldicarb
Brodifacoum
Bromadiolone
Bromethalin
Calcium cyanide
Captafol
Chlorethoxyfos
Chlormephos
Chlorophacinone
Difenacoum
Difethialone
Diphacinone
Disulfoton
Ethoprophos
Flocoumafen
Fonofos
Hexzchlorobenzene
Mercuric chloride
Mevinphos
Parathion
Parathion-methyl
Phenylmercury acetate
Phorate
Phosphamidon
Sodium fluroacetate
Sulfotep
Tebupirimfos
Terbufos

Highly hazardous (Class Ib) technical grade active ingredients of pesticides (common name) not permissible in the project

Acrolein
Allyl alcohol
Azinphos-ethyl
Azinphos-methyl
Blasticidin-S
Butocarboxim
Butoxycarboxim
Cadusafos
Calcium arsenate
Carbofuran
Chlorfenvinphos
3-Chloro-1, 2-prppanediol
Ethiofencarb
Famphur
Fenamiphos
Flucuthrinate
Fluoroacetamide
Formetanate
Furathiocarb
Heptenophos
Isazofos
Isofenphos
Isoxathion
Lead arsenate
Omethoate
Oxamyl
Oxydemeton-methyl
Paris green (C)
Pentachlorophenol
Pindone
Pirimiphos-ethyl
Propaphos
Propetamphos
Sodium arsenite
Sodium cyanide
Strychnine

Coumaphos
Coumatetralyl
Zeta-cypermethrin
Demeton-S-methyl
Dichlorvos
Dicrotophos
Dinoterb
Edifenphos
Mecarbam
Mercuric oxide
Methamidophos
Methidathion
Methiocarb
Methomyl
Monocrotophos
Nicotine
Tefluthrin
Thallium sulphate
Thiofanox
Thiometon
Triazophos
Vamidothion
Warfarin
Zinc phosphide

Moderately hazardous (Class II) technical grade active ingredients of pesticides (common name) not permissible in the project

Alanycarb
Anilofos
Azaconazole
Azocyclotin
Bendiocarb
Benfuracarb
Bensulide
Bifenthrin
Bilanafos
Bioallethrin
Bromoxynil
Bromuconazole
Bronopol
Butamifos
Butylamine
Carbaryl
Carbosulfan
Cartap
Chloralose
Chlordane
Chlorfenapyr
Chlorphonium chloride
Chlorpyrifos
Clomazone
Copper sulphate
Cuprous oxide
Cyanazine
Cyanophos
Cyflutrin
Beta-cyfluthrin
Cyhalothrin
Cypermethrin
Alpha-cypermethrin
Cyphenothrin
Deltamethrin
Diazinon
Difenzoquat
Dimethoate
Dinobuton
Diquat
Endosulfan
Endothal-sodium
Esfenvalerate
Ethion
Etrimfos
Fenazaquin
Fenitrithion
Fenobucarb
Fenpropidin
Fepropathrin
Fenthion
Fenthin acetate
Fentin hydroxide
Fenvalerate
Fipronil
Fluxofenim
Formothion
Fuberidazole
Gamma-HCH
Guazatine
Haloxyfop
Heptachlor
Imazalil
Imidacloprid
Iminoctadine
Ioxynil
Ioxynil octanoate
Isoprocarb
Lambda-cyhalothrin
Mercurous chloride
Metaldehyde
Metam-sodium
Methacrifos
Methasulfocarb
Methyl isothiocyanate
Metolcarb
Metribuzin
Molinate
Nabam
Naled
Paraquat
Pebulate
Permethrin
Phenthoate
Phosalone
Phosmet
phoxim
Piperophos
Pirimicarb
Prallethrin
Profenofos
Propiconazole
Propoxur
Prosulfocarb
Prothiofos
Pyraclofos
Pyrazophos
Pyrethrins
Pyroquilon
Quinalphos
Quizalofop-p-tefuryl
Rotenone
Sodium fluoride
Sodium hexafluorosilicate
Spiroxamine
Sulprofos
Terbumeton
Tetraconazole
Thiacloprid
Thiobencarb
Thiocyclam
Thiodicarb
Trizamate
Trichlorfon
Tricyclazole
Tridemorph
Vernolate
Xylylcarb

Annexure VIII-

List of permissible pesticides

Slightly hazardous (Class III) technical grade ingredients of pesticides (common name) permissible under IPM.

Acephate
Acetochlor
Acifluorfen
Alachlor
Allethrin
Ametryn
Amitraz
Azamethiphos
Bensultap
Bentazone
Bromofenoxim
Butroxydim
Chinomethionat
Chlormequat (chloride)
Chloroacetic acid
Chlorthiamid
Copper hydroxide
Copper oxychloride
Cycloate
Mefluidide
Cyproconazole
Metamitron
Dicamba
Metolachlor
Dichlorophen
Nitrapyrin
Dienochlor
N-octylbicycloheptene
Dimepiperate
Paclobutrazol
Demethipin
Pirimiphos-methyl
Dinocap
Propanil
Dodine
Pydridaben
Etridiazole
Pyrifenox
Fluazifop-p-butyl
Fluchloralin
Flufenacet
Fluoroglycofen
Flurprimidol
Flusilazole
Flutriafol
Fomesafen
Furalaxyl
Glufosinate
Hexzzinone
Hydramethylnon
Ipropenfos
Isoprothiolane
Isoproturon
Isouron
Malathion
MCPA-thioethyl
Mecoprop
Mecoprop-P
Cymoxanil
Metalaxyl
Desmetryn
Mthylarsonic acid
Dichlorobenzene
2-Napthyloxyzcetic acid
Diclofop
Octhilinone
Difenoconazole
Oxadixyl
Demethametryn
pimaricin
Diniconazole
Propachlor
Dithianon
Pyrazoxyfen
Esprocarb
Pyridate
Ferimzone
Quizalofop
Resmethrin
Sethoxydim
Simetryn
Sodium Chlorate
Sulfluramid
Tebuconazole
Tebufenpyrad
Tebuthiuron
Thiram
Tralkoxydim
Triadimefon
Triadimenol
Tri-allate
Triclopyr
Triflumizole
Undecan-2-one
Uniconazole
Ziram
Cyhexatin
Mepiquat
Dazomet
Metconazole
Dichlormid
Myclobutanil
Dichlorprop
Nuarimol
Diethyltoluamide
dicarboximide
Demethachlor
Pendimethalin
Dimethylarsinic acid
Prochloraz
Diphenamid
Propargite
Empenthrin
Pyridaphenthion
Fenothiocarb
Quinoclamine

Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (common name) permissible in the project

Aclonifen
Acrinathrin
Alloxydim
Amitrole
Ammonium sulfamate
Ancymidol
Anthraquinone
Asulam
Atrazine
Azimsulfuron
Azoxystrobine
Benelaxyl
Benazolin
Benfluralin
Benfuresate
Benomyl
Benoxacor
Bensulfuron-methyl
Bifenox
Bioresmethrin
Biphenyl
Bispyribac
Bitertanol
Borax
Bromacil
Bromobutide
Bromopropylate
Bupirimate
Buprofezin
Butachlor
Butralin
Butylate
Captan
Carbendazin
Carbetamide
Chlomethoxyfen
Chloramben
Chloransulam methyl
Chlorbromuron
Chlorfluszuron
Chloridazon
Chlorimuron
Chlorothalonil
Chlorotoluron
Chlorpropham
Chlorpyrifos methyl
Chlorsulfuron
Chlorthal-demethyl
Chlozolinate
Cinmethylin
Cinosulfuron
Clofentezine
Clomeprop
Clopyralid
Cloxyfonac
Cryolite [C]
Cycloprothrin
Cyclosulfamuron
Cycloxydi
Cyhalofop
Cyromazine
Diamuron
Dalapon
Daminozide
Desmedipham
Diafenthiuron
Dichlobenil
Dichlofluanid
Diclomezine
Dicloran
Diclosulam
Diethofencarb
Diflibenzuron
Diflufenican
Dikegulac
Dimefuron
Dimethirimol
Dimethomorph
Dimethyl phthalate
Dinitramine
Dipropyl isocinchomerate
Dithiopyr
Diuron
Dodemorph
Ethalfluralin
Ethephon
Ethirimol
Ethofumesate
Etofenprox
Famoxadone
Fanarimol
Fenbutatin oxide
Fenchlorazole
Fenclorim
Fenfuram
Fenhexamid
Fenoxycarb
Fenpiclonil
Fenpropimorph
Fenuron
Fenuron-TCA
Ferbam
Flamprop
Flucarbazone-sodium
Flucyclozuron
Flufenoxuron
Flumetralin
Flumetsulam
Fluometuron
Flupropanate
Flupyrsulfuron
Flurenol
Fluridone
Flurochloridone
Fluroxypyr
Fluthiacet
Flutolanil
tau-Fluvalinate
Flopet
Fosamine
Fosetyl
Gibberellic acid
Glyphosate
Hexaconazole
Hexaflumuron
Hexythiazox
Hydroprene
Hymexazol
Imazamethabenzmethyl
Imazapyr
Imazapyr
Imazaquin
Imazethapyr
Imibenconazole
Inabenfide
Iprodione
Iprovalicarb
Isoxaben
Kasugamycin
Lenacil
Linuron
Maleic hydrazide
Manozeb
Maneb
Mefenacet
Mepanipyrim
Mepronil

Metazachlor
Methoxychlor
Metobromuron
Metsulfuron methyl
1-Naphthylacetic acid
Neburon
Nitrothal-isopropyl
Oryzalin
Oxine-copper
Penconazole
Phenedipham
Phosphorus acid
Piperonyl butoxide
Probenazole
Prometon
Propaquizafop
Propineb
Pyrazosulfuron
Pyriproxyfen
Quinmerac
Quintozene
Simazine
Sulphur
Teflubenzuron
Terbuthylazine
Tetradifon
Thidiazuron
Tiocarbzil
Transfluthrin
Trietazine
Triflusulfuron-methyl
Validamycin
Methabenzthiazuron
Methyldymron
Metosulam
Monolinuron
Napropamide
Niclosamide
Norflurazon
Oxabetrinil
Oxycarboxin
Pencycuron
Phenothrin
Phthalide
Pretilachlor
Procymidone
Prometryn
Propazin
Propyzamide
Pyrimethanil
Pyrithiobac sodium
Quinoxyfen
Rimsulfuron
Spinosad
Tebutam
Temephos
Terbutryn
Tetramethrin
Thifensulfuron-methyl
Tolclofos-methyl
Triasulfuron
Triflumuron
Triforine
Vinclozolin
Methoprene
Metiram
Metoxuron
2-(1-Naphthyl) acetamide
Naptalam
Nicosulfuron
Ofurace
Oxdiazon
Oxyfluorfen
Pentanochlor
Phenylphenol
Picloram
Primisul furon
Prodiamine
Propamocarb
Propham
Pyrazolynate
Pyriminobac
Quinclorac
Pyrithiobac sodium
Siduron
Sulfometuron
Tecnazene
Terbacil
Tetrachlorvinphos
Thiabendazole
Thiophanate-methyl
Tolylfluanid
Tribenuron
Trifluralin
Triticonazole
Zine

Annexure IX- Waste Management Guidelines for Growth Centers/Processing centers

Agriculture is the main source of income in Uttarakhand. Under UCRRFP initiatives will be taken for increases the incomes of rural inhabitants in selected watersheds through agribusiness. In order to facilitate the production of marketable produce, formation of FIGs was introduced to facilitate the production, processing and marketing of high value crops. To full fill the objectives project will established Growth Centers, Processing centers. These activities are intervened for the economic strengthen of rural inhabitants. At the same time, these activities also cause some organic and inorganic residue. According to the Environmental and Social Management Framework of the project, safe disposal of this residue is necessary. Therefore the organic and inorganic residue left over due to these active should be disposed-off /re-used as under.

Growth Centers/Processing centers:

After processing of agro produce, Organic and Inorganic both type of waste material is available in the units. These are as follows.

Organic Waste:

- Bark & Seed of the Fruit.
- Pulp of Fruit and Vegetables
- Decayed Fruit, vegetables, Pulses etc.
- Waste water

Disposal /uses

All the organic waste should be re-used as compost for agricultural purposes. To convert the organic reduce into compost, a compost pit should be construct nearby each processing unit. The waste amassed during processing should collect in a pot and brought down to the compost pit. After decomposition, this material can be use as compost.

During processing, water us used massively for washing and other purposes. Thus proper drainage system should be assured in the processing units. The used water should be collected in a sock pit through a drainage pipe. So that, the waste water can percolates and recycled.

Inorganic waste

- Plastic /Glass Bottles, Packaging material
- Plastic Cans /Caps etc.

Disposal /uses

As far as possible the plastic cans and bottles should be re-used after proper washing. The damaged and unusable canes and bottles should be sanded for recycling. It is necessary to ensure that unused plastic/glass bottles, canes packing martial, sticker etc. should not spread over here & there in any situation.

Disposal of plastics waste from poly house / poly tunnel and LDP tanks

Under normal conditions the averages shelf life of the polyethylene sheets, used for poly houses and poly tunnels is 3-5 years. The low density polyethylene sheets used for LDP tanks can be used from 5-6 years. After that period the sheet itself become unusable. At this situation, after changing the older sheet by the new one, it should be given for recycling processes. It has to insure that the older sheet or its pieces should not be spread here & there in any condition.

Annexure X- Table-4: Details on IPNM, IWM and IPDM Approaches

	Integrated Plant Nutrient Management (IPNM)	**Integrated Weed Management**	**Integrated Pest & disease Management**
About the component	Integrated nutrient management is a system / an approach; where in the overall nutrient requirement of a crop is assessed / estimated on the basis of soil test crop response (STCR), accordingly the nutrients are supplied in an integrated manner (combination of organic, inorganic, biofertilizers, green manures, and micro nutrients.	Weeds are integral part of cropping system. Weeds are naturally selected and have the ability to survive under adverse condition. No-single method in the past has proved effective against weeds. IWM is a combination of mechanical, cultural, manual, biological and chemical method of weed control.	IPDM is a management tool for pests and disease management, where in mechanical, cultural, biological, chemical, use of resistant varieties, and quarantine methods are carefully combined to keep pest & diseases at below economic injure levels to obtain optimum crop yields.
Requirement of component	Assessment practices under IPNM helps farmers to know the exact nutritional requirement for a given crop. If proper IPNM practices are not followed there will be more possibilities of imbalance in the application of nutrients, as a result excess or deficit in the availability of nutrients reduces the plant's ability to utilize nutrients from the soil. It will also leads to improper metabolism of nutrients. This may result in the reduction of immunity of the plants, which may attract pests and diseases, resulting in poor yields. Additionally, excessive or unaccounted input application leads to increase the production costs.	Potential yields of any crop can be obtained only when the weeds are properly managed. Weeds compete for moisture, nutrients, space and they acts as hosts for many pests and disease. Therefore IWM is imperative.	IPDM is Eco & farmer friendly. Environmentally safe. Cost effective. If reduces the application of pesticides. Results are assured.
Where can it be practiced	IPNM is invariably practiced for cultivation of all crops in all soil types including the degraded shallow, soils resulting in poor crop yields.	IPNM the source of weeds are innumerable, for example weed can spread through FYM, soil, wind, water along with crop seeds and by birds. Therefore to manage the weeds we	IPDM will be practiced in nurseries and main field, pre sowings to post harvesting storehouses. Example: - Granaries, exports of planting and seed materials.

		must select well-decomposed weed seed free compost. Before sowing, after sowing, during crop period and after harvesting, weeds shall be controlled. Only certified seeds / planting materials, seeds shall be used.	
When can it be practiced	IPNM has to be planned on scientific basis, from the first day of land preparation, sowing to harvesting	Right from preparation of land i.e. pre-sowing, sowing, selection of seed and application of FYM, during the crop stage, at the time of harvest, after harvest, after harvest, during the time of threshing, processing and packing.	IPDM will be practiced from seed to seed, which includes pre- sowings to post harvesting of the crop.
Who can adopt the practice	It is joint responsibility of project staff and other project stakeholders i.e. WWMC, RVC, FIG members/farmers.	Extension staff, quarantine officers and farmers.	Farmers, extension workers, scientists, traders, quarantine officers, etc.
How is the practice adopted	By sensitizing area groups, creating awareness to farmers through publicity propaganda, organizing communities and training's. Demonstrations can be conducted on the lines of farmers field school (FFS). Application of nutrients based on STCR results. All decisions are taken by farmers in the fields with the help of extension staff, during the period of demonstration from pre sowing to post harvest (seed-to seed). Farmers can actively be involved in the field and they record all the observations and maintain the records during demonstration period.	Creating awareness among the farmers (users groups) by publicity, propaganda, and organizing communities. IWM shall be practiced through demonstrations on the lines of FFS.	The first step involved in IPDM planning is to sensitize the facilitators i.e. extension staff and the farmers in the watershed areas. This will be done by organizing Farmers Field Schools.

Annexure XI- Pesticide Management Plan

The aspects to be considered in the screening process are:

- Selective against target pests
- Safe for beneficial species
- Active for about 4 weeks
- Weather and u/v proof
- No toxic residues
- Safe for humans and livestock

Key Aspects

Four key aspects must be kept included in implementing the pest management plan.

i. It must comply with World Bank ESS3.The basic tenets governing the Operational policy has been presented earlier.

ii. Pest control strategy must promote the use of integrated methods including biological or safer chemical control methods and reduce reliance on synthetic chemical pesticides. If there are strong factors needing the use of synthetic chemicals then they must belong to only WHO class III and minimum hazardus category. The control of pest populations should be through IPM approaches, such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest. This should be built through participatory technology development using farmer's experience and knowledge and furthered through the farmer field school approach. IPM is also the strategy adopted by the Govt. of UK. and its expertise is available both in the extension wing of the Agriculture Dept. and the various research, training and agriculture centers in UK.

iii. As pest management strategy could affect agriculture or public health the screening process must ensure full compliance with Bank safeguards. It must address not only the farmer but also workers involved in various pesticide operations The task of the screening process must be to ensure that UCRRFP interventions do not contravene the Bank's environmental standards . Addressing this aspect and the effectiveness in safeguarding the Bank policies on pesticide management will depend on the capacities and knowledge of those undertaking and supervising the screening process. Thus those involved in this must be selected based on clear criteria and their skills upgraded through training and capacity building along with a monitoring framework. As the project would lead to intensification of cropping pattern, the audit process must look at the cumulative impact on soil, water and air and ensure that there are no negative impacts and the mitigation measures are in place and effective.

iv. More pro-active role in promoting healthy plants and safe environment. Healthy plants will come from adopting Integrated Plant Nutrient Management (IPNM) and a safe environment by

encouraging projects that promote and advocate organic and non-pesticide farming and the products and technologies that encourage and facilitate their adoption, so that IPM will succeed in not only reducing the application of pesticides but eliminate the same without reduction in yields.

Criteria for Pesticide Selection and Use

i. The procurement of any pesticide in a Bank- financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users. with respect to the classification of pesticides and their specific formulations, in reference to the World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification. The following criteria apply to the selection and use of pesticides in,

   (a) They must have negligible adverse human health effects.

   (b) They must be shown to be effective against the target species.

   (c) They must have minimal effect on non target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.

   (d) Their use must take into account the need to prevent the development of resistance in pests.

ii. It is required that any pesticides be manufactured, packaged, labeled, handled, stored, disposed of, and applied according to standards acceptable to the WHO. Formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if (a) lacks of restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store and apply these products properly are not permissible in the project. (Annexure- VII & VIII)

Awareness building

Awareness building on safe use among farmers and agriculture workers is another instrument that must be used for implementing the PMP in the project. This is an essential component in the GPS. Expert caters to the field staff and does not reach the farmers who have the highest exposure to pesticides and are compelled by poverty to work in unsafe conditions. All supports to pesticide sprayers and equipment must include making available a protective gear. Pamphlets and posters on safe use of pesticides which

deal from purchase, transport, storage, application to disposal must be provided to village organizations. In high pesticide use areas, cultural expressions like folk songs must be provided to village organizations.

A major impact of pesticide usage is on water. Reducing pesticide usage by adopting IPM/NPM and permitting only class III pesticides, while substantially reducing pesticide usage, the threat to water contamination reduction is possible. Educating the community not to spray pesticides during or just before a rain must be included in the awareness material. Monitoring the health on the people, especially workers, on a sample basis in high pesticide use area would be another task taken up by the project.

The project will provide help to resource persons and training personnel for TOT activities for IPM. It could also provide crop wise IPM materials and advice on the conduct of the GP level farmer's training.

IPM focuses on participatory technology development and not the conventional agriculture extension and advice to farmers. Therefore the project IPM personnel need to have capacities in participatory methods and enabling the farmer as well as GP's. Several agencies, govt. and non-govt. organizations have expertise in developing the IPM professional and their list is appended. Trained IPM professionals are available in the Govt. and the NGO sector. Many big corporations provide manuals for safe use of pesticides especially in mixing, dosage, application and spraying. These resources will be used for undertaking TOT in IPM. As IPM is not optimal in its effectiveness we need the TOT must include Integrated Nutrient Management (INM) in the syllabus.

The division level project authority could identify specific crops and ways to reduce pest incidence and increase the effectiveness of the control measures. Holding crop specific workshops to tackle high incidence and high resistant pests involving the department of agriculture, scientists and NGO's will help come up with specific measures that would be taken to reduce the overall use of pesticides and enhance its effectiveness.

Promoting Non-Pesticidal Management (NPM) for controlling pests is the only long term way to reduce farmer dependence on pesticides. The project works with the POP which cannot afford these costly inputs. By reducing the share of pesticides in the input costs, which are high, will serve the basic objective of the project. Further once the landscape is used to pesticides, reversing it is difficult and takes a very long time. Therefore a more rational and sustainable approach would be to encourage NPM in crops, especially those grown in dry land conditions. Hence training in NPM must be also being built into IPM capacity building. A proactive approach recommending crop wise NPM approach must be promoted in the GPS & Farmers. Exposure visits of farmers to NPM practice's is a useful way of strengthening the farmers & village organizations.

IPM Options

IPM involves a range of methods to control pests (a) reactive options such as—physical and mechanical methods, biological and chemical control. A sudden withdrawal of pesticides will invariably bring down the yields drastically which the farmer will ill afford. IPM recommends a gradual withdrawal of pesticides allowing time for both the plants (and the farmers) to adjust and build up internal strength, reserves and resilience. However the long term goal should be to promote (b) proactive options to grow perfectly good crops without the help of chemical pesticides. Crop rotations and creation of habitat for beneficial organisms permanently lower the carrying capacity of the farm for the pest. Cultural controls are also considered as proactive strategies, which includes maintaining healthy, biologically active soil (increasing below ground diversity), maintaining habitat for beneficial organisms (increasing above ground diversity) and using appropriate plant cultivars. Some of the ways that will be used to maintain biodiversity of the farm would include, increasing genetic diversity, species diversity, crop rotations, multiple cropping, inter cropping, use of disease free seed and planting material, use of resistant varieties, sanitation, plant spacing, altered planting dates, optimum growing conditions, use of mulch material, etc.

- Physical and mechanical methods are the oldest form of pest control involving devises to trap and kill pests-traps, insect screens, nets, baits, and plant guards.
- Biological control methods involve the use of parasites, predators, pathogens to control pests. In natural biological control the first step would be to assess populations of beneficial organisms and their interaction within the ecosystem. If provided with adequate habitat these organisms will make significant contribution to pest management. Habitat enhancement for beneficial insects, for example, focuses on the establishment of flowering annuals and perennials that provide nectar and pollens during certain parts of life cycle of insect. Habitat and food for beneficial insects and other beneficial should be a component of the IPM programme.
- Natural methods include use of bio-sprays, some physical components of the environment, such as temperature, humidity or light, detrimental to pests are exploited through tillage operations, soil solarization, plastic mulching, etc. The effectiveness of both proactive and active management approaches would depend on correct identification of pests.
- **Use of chemicals remain the last resort in the IPM programme and may be used only when other measures, such as biological or cultural controls, have failed to keep pest populations from approaching economically damaging levels. If they must be used, they should be least toxic and should not harm the non-target organisms. As per the ESS3, pesticides from only permissible classes from WHO classification are to be used (Class III and U onward)**

- Chemical control includes the synthetic pesticides widely in use today. Most of them work by absorption (contact poisons) or ingestion (stomach Poisons). Longer lasting pesticides are described as residual.

IPM is a holistic system that reduces damage caused by pests to tolerable levels through a mixture of all the above techniques. IPM does not recommend the use of chemical control except as a last resort and even then only the least toxic chemical is used.

Operational Aspects of IPM

- Growing a healthy crop involves the right varietals selection; appropriate seed bed management, plant nutrition, and plant nutrition, and plant physiology, water and weed management.
- Optimize natural enemies recognize beneficial insects in the field, learning insect population dynamics, life cycles, and food webs; understanding the effects of pesticides on beneficial populations, promoting survivorship of predators through habitat management and making local reference collections.
- Observe fields weekly for damage symptoms, changes in insect populations, to evaluate plant growth and physiology, relationship between plant stages and insect populations, effects of weather conditions, and water and nutrient management.
- Farmers as experts: agro-system analysis and decision making based on information directly observed and collected leads to farmers to make sound conclusions crop management decisions.

Pesticide Management in water

Drift of pesticides must be avoided when spraying. They should not be applied when rain is imminent and the users should follow the direction given in the container for pesticide handling safety precautions, application rates and proper disposal. To reduce contamination of surface water and ground water from pesticides:

Evaluate the pest problems, previous pest control measures, and cropping history;

Use integrated pest management (IPM) strategies that:

a. Apply pesticides only when an economic benefit to the producer will be achieved
b. Apply pesticides efficiently and at times when runoff losses are unlikely

c. When pesticide applications are necessary and a choice of registered materials exists, consider the persistence, toxicity, runoff potential, and leaching potential of products in making a selection

d. No use of pesticide belonging to category 1 &2 as classified in the pesticide code

The goal of this management measure is to reduce contamination of surface water and ground water from pesticides. The basic concept of the pesticide management measure is to foster effective and safe use of pesticides without causing degradation to the environment. Pesticide Management Plans (PMP's) identify;

- Identify areas vulnerable to pesticides;
- Monitor source water for pesticide contamination;
- Prevent pesticides from reaching ground water;
- Respond to pesticide detection.

IPM Module for Main Crops

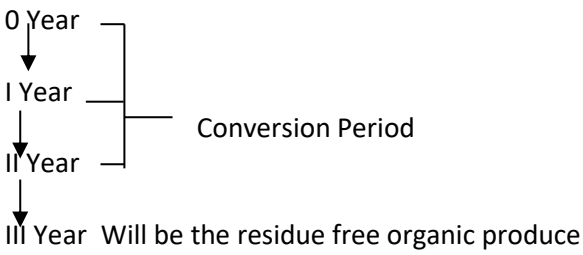
- Although the bio-pesticides and bio-agents are provided for the control of various pests, however, some of them are not effectively checked. To control these, some of the safe pesticides are recommended wherever necessary.
  - To minimize the infestation of insect, disease, weeds, etc. in practice:
  - Summer ploughing.
  - Avoid mono cropping: Use of bio-fertilizers and bio-pesticides.
  - Insect/disease resistant varieties.
  - Use of trap crops to minimize the insect damage.
  - Solarisation of nursery beds to minimize the disease incidence in seedlings.

Pesticide Residues

- Uses of pesticides in upper and mid hills region are almost negligible except in some fruits and off-season vegetables.
- To monitor the pesticide residues in the cereals, pulses, oil seeds, vegetables and fruit crops establishment of a residue analysis laboratory is essential in the state of Uttarakhand under the

supervision of GB Pant University of Agriculture & Technology Pantnagar. Till that time residue will be tested in IIT Roorkee or wherever the residue testing facility is available.

- Under the Directorate of Organic Seed Certification of Uttarakhand, a certification plan for the farmers interested to grow crops organically has been started in the following form to make their land and crop produce pesticide residue free:



- Directorate of Organic Seed Certifications and Uttarakhand Organic Commodity Board, as well as Agricultural University (Hill Campus, Ranchauri and Pantnagar) has already developed a training module for farmers.
- Project staffs along with the farmers have already been sent for exposure to within and outside the state where organic farming is under practice.

.Use of Plastic

- To minimize the use of pesticides as seed treatment to reduce the incidence of disease in nurseries, use of specific plastic sheet will be recommended for soil solarization.
- Plastic sheets will also be helpful in moisture conservation as mulch.
- Use of plastic in the form of poly tunnels and poly houses under adverse climatic conditions. This will also help in growing insect and disease free seedlings, off season vegetables and flowers to improve the economy of farmers. Thus minimizing the pesticide application.

Disposal of plastic waste:

In the project area the plastic waste is proposed to be sent to be plastic recycling and processing plants available in nearby vicinity in accordance of Waste Management Guidelines of WMD (Annexure-VIII).

Areas of Competence:

1. Prevention – Indirect measures
2. Observation- Decision tools
3. Intervention – Direct measures.

Prevention – Indirect Measures

A- Location

- Selection of place away from high humidity crops.
- Away from crops being alternate host for the major pest
- Tomato from Sunflower and Gram.
- Avoid fields having soil borne disease, pests, nematode infestation, etc.

B- Crop rotation

- No mono cropping.
- Crop rotation with legumes *(Cowpea, F. Beans, Peas).*
- Crop rotation of shallow and deep rooted crops (Onion and capsicum followed by cucurbits)
- Rotation of soil building crops with exhaustive crops (Potato followed by cabbage)

C- Selection of varieties/hybrids

- Use of resistant/tolerant varieties
- Use of Area, Crop and Season specific varieties.
- Use of varieties with wider genetic base.

D- Crop husbandry and hygiene

- No crop residues in the field
- Removal of affected plant parts and burying under the ground
- Avoid use of harmful waste as manure.
- Improperly decomposed manure.
- Avoid use of untreated sewage water for irrigation

Practice proper weed management.

E- Fertilization

- Increased use of organic manure.
- Use of balanced fertilizer.
- Practice fertilizer placement (Nutrient use efficiency and avoiding run off)
- Increased use of fertilizer mixtures.
- Minimize use of urea.
- Increased use of foliar fertilizers.

F- Irrigation

- Avoid flat irrigation
- Avoid excessive irrigation.
- Practice raised bed/furrow-ridge cultivation/irrigation
- Never submerged bed/ridge tops during irrigation.
- Use more of drip/sprinkler irrigation systems.

G- Border/Trap crops

- Mustard (Cabbage, Cauliflower)
- Marigold (Tomato)

- Maize, Cowpea (Cotton)

G- Harvesting and storage

- Harvesting at marketable stage.
- Removal of affected produce in the field.
- Sorting/grading of produce.
- Proper packing and transport
- Proper curing and storage. (Onion, Garlic, Potato, Pumpkin)

Observation – Decision tools

A- Crop Monitoring:

- For appearance of insect, pest and disease proper know how will be provided to the farmers through training, exposure visit and identification, so that, the farmer will identify the beneficial insect as well as harmful insect.
- To decide the critical stage of insect, pest and disease according to economic injury level (EIL). Farmers will himself decide to use the control measures. This will also possible through training, exposure visit, and identification of insect, pest and disease.

B- Whole area management

- Co-operative management of pests/disease

Intervention – Direct measures

A- Cultural and physical control

- Summer deep plugging
- Avoid monoculture.
- Optimum plant densities
- Avoid high nitrogenous fertilization]
- Avoid excessive irrigation

B- Pheromones

- Traps
- Lure

C- Biological control

(i)- Parasites

- Trichogramma
- Chrysoperla

(ii)-Predators

- Spiders
- Coccinellids
- Jaggery (Gurh)

(iii)-Uses of Bio-pesticides

- BTs (bacteria), Beauveria (fungus), Metarrhizium (fungus), Verticillium (fungus) and Nomuraea (nematode)

- Neuclear Polyhydrosis Viruses (NPVs), Granulosis Viruses (GV),Trichoderma (fungus) and Pseudomonas (bacteria)
- Use of Botanical Pesticide (Neem, Karanj, Chillies, Garlic)

D- Chemical Control

- Only relatively ecologically safe chemical pesticides
- Change of chemicals at each spray
- Use of recommended dose of chemical

Critical time of spray.

The Approach of IPM:

The approach of IPM is to encompasses the application of pesticides to manage serious outbreaks of insect pests only on a need basis or to limit the predicted outcome infestations.

Our priorities will be in the following order:

i) Biological method.

ii) Mechanical method.

iii) Chemical method.

Priority wise various control methods of IPM has been described in the following tabular form:

Procedure	**How it will be done**	**Remarks**
Biological	Conservation of all natural enemies & bio agents of all the harmful insect & pests eg. Birds, Parasites & pathogens, As these are farmer's friend, therefore all these are to be conserved. Use of parasites • Trichogramma Chrysoperla Use of predators • Spiders • Coccinellids • Jaggery	First and Prime priority will be of biological method of IPM.
Cultural	• Avoidance of monoculture in large belts • Improved disease resistant varieties. • Summer ploughing. • Optimum plant densities. • Avoiding excessive irrigation. • Avoiding high nitrogenous fertilization. • Trap crops	-
Mechanical	• Damage/Destroy all the eggs of the insect. • Destroy any material infested by insect, pest and diseases.	Second priority
Chemical	• If the loss is beyond ETL then only we will go for chemical control, and here only safe chemicals will be used.	This will be only last and ultimate priority and only, if crop loss is beyond ETL.

Strategy for Adoption:

Participants are selected through farmer group meetings, after formation they meet once a month for 4-5 hours in the field for the whole cropping season. The IPM provides an intensive opportunity for the farmers to master the basic skills that will enable them to make informed, confident field management decisions. After IPM farmers master the basic principles to field ecology in one crop they will extend it to other crops.

Pest Management needs to be integrated with resource mapping and inter- linkages established between different watershed activities with priorities given to those activities with clear environmental benefits.

Use of Bio-pesticides

- *Bacillus thuringiensis, Beauveria, Metarhizium, Verticillium & Nomuraea.*
- Nuclear Polyhedrosis viruses (NPV) & G.V.
- *Trichoderma, Pseudomonas*

I- Use of Botanical Products:

- Neem/Karanj/Chillies/Garlic

Need Based Use Of Chemical Pesticides

- Only relatively ecologically safe chemical pesticides.

II- Storage:

- Pesticides should be stored in a separate room under lock and key and not in the living room or cattle shed where household animals, women and children are likely to come into contact with them
- They should not be stored near the naked flame; nor where the electrical wiring is bad.
- Do not eat, drink or chew or smoke tobacco in the room where pesticides are stored.

III- Transportation:

- Pesticides should not be transported along with food or animal feed, passengers or livestock.
- They should not be transported with fertilizers and seeds.

IV- Timings:

- Pesticides should be use only if the crop damage level raised up to 50-60 percent.
- Pesticide application should not be done during rain showers.
- Pesticide application should be done 30 days prior to harvesting because the absorbed chemical takes time to dissolved and it should be left within plant parts.