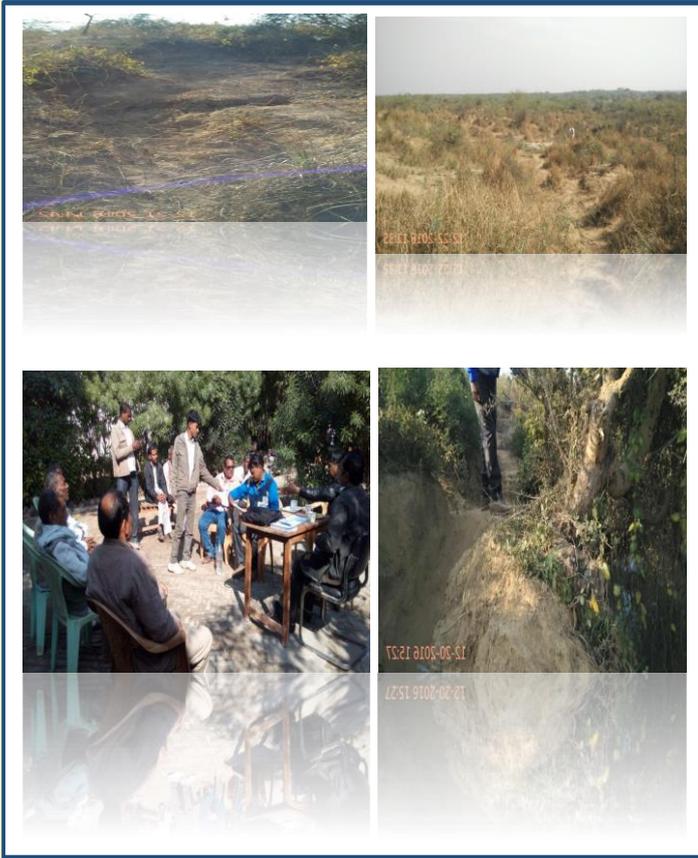


**DETAILED PROJECT REPORT  
ON  
ECOSYSTEM SERVICES BASED ADAPTATION TO CLIMATE  
CHANGE IN BUNDELKHAND REGION OF UTTAR PRADESH**



**Submitted to:**  
Ministry of Environment, Forest &  
Climate Change  
Government of India



**Submitted on behalf of**  
Forest and Wildlife Department  
Government of Uttar Pradesh



**Prepared By**  
**NABARD Consultancy Services**  
**Ltd.**

## Table of Contents

1.	PROJECT BACKGROUND.....	
1.2	<b>Project / Programme Objectives</b> .....	
1.3	<b>Details of Project/ Programme Executing Entity:</b> .....	
1.4	<b>Projected Calendar:</b> .....	
	a) Component-wise details and justification of the project components.....	
	(b) Details on Economic, social and environmental benefits project / programme .....	
	(c) Sustainability of intervention.....	
	d) Analysis of the cost-effectiveness of the proposed project / programme:.....	
	f) Alignment with the National and State Action Plans and other Policies / Programmes:.....	
	g) Component wise technical standards:.....	
	h) Duplication Check: .....	
	i) Details on Stake-holder consultation: .....	
	j) Learning and knowledge management component to capture and disseminate lessons learned for the proposed project .....	
	k) Sustainability of the project/programme outcomes has been taken into account when designing the project / programme .....	
	l) Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme. ....	
2.	Implementation Arrangements.....	
	a) Describe the arrangements for project / programme implementation.....	
	b) Describe the measures for financial and project / programme risk management (also include environmental and social risk, if any).....	
	c) Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan. (Monitoring and evaluation cost need to be included in executing entity management cost).....	
	d) Include a results framework for the project proposal, including milestones, targets and indicators.....	
	e) Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use and an explanation and a breakdown of the execution costs. ....	
	f) Include a disbursement schedule with time-bound milestones at the component level .....	
	Annexure .....	
	Annexure 1 – Sample data collection tool for Vulnerability Assessment .....	
	Annexure 2 Unit Cost of Raising 1 ha. forestry plantation .....	

Annexure 3A Integrated Nursery cum Climate Information centre.....

Annexure 3B Forest Nursery for Integrated Climate Centre.....

Annexure 3 C Horticulture nursery.....

## PROJECT SUMMARY

<b>Project Title :</b>	<b>Ecosystem services based adaptation to Climate Change in Bundelkhand region of Uttar Pradesh, India</b>
<b>Project Objectives :</b>	The main objectives of the proposal are :
	To carry out a baseline study to assess vulnerability, provide Orientation & Planning in identified villages of 4 Forest Divisions
	To improve forest ecosystem through community based restoration of degraded forest areas
	To improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry
	To create structures to arrest run-off of rain water (check dams, borewell recharge, ponds) in JFMC and other areas falling in the same catchment areas
	To document learnings for wider replication
<b>Project Sector :</b>	Forestry
<b>Name of Executing Entity:</b>	Forest and Wildlife Department, Government of Uttar Pradesh
<b>Beneficiaries:</b>	Farmers / members of 16 Joint Forest Committees / villages in 4 Forest divisions of Bundelkhand region in Uttar Pradesh
<b>Project Duration:</b>	4 years
<b>Start Date:</b>	2017
<b>End Date:</b>	2020
<b>Amount of Financing Requested:</b>	INR 20,56,76,155
<b>Project Location:</b>	16 villages of Banda, Hamirpur, Orai (Jalaun) & Chitrakoot forest divisions
<b>State:</b>	Uttar Pradesh
<b>District:</b>	Banda, Hamirpur, Jalaun & Chitrakoot
<b>Contact Details of Nodal Officer of the Executing Entity:</b>	<b>Chief Conservator of Forests (CCF), Projects</b> 17, Rana Pratap Marg Aranya Bhawan, Lucknow , Uttar Pradesh
<b>Email:</b>	<a href="mailto:ccfprojectcell@gmail.com">ccfprojectcell@gmail.com</a>
<b>Phone:</b>	0522-2204253

## 1. PROJECT BACKGROUND

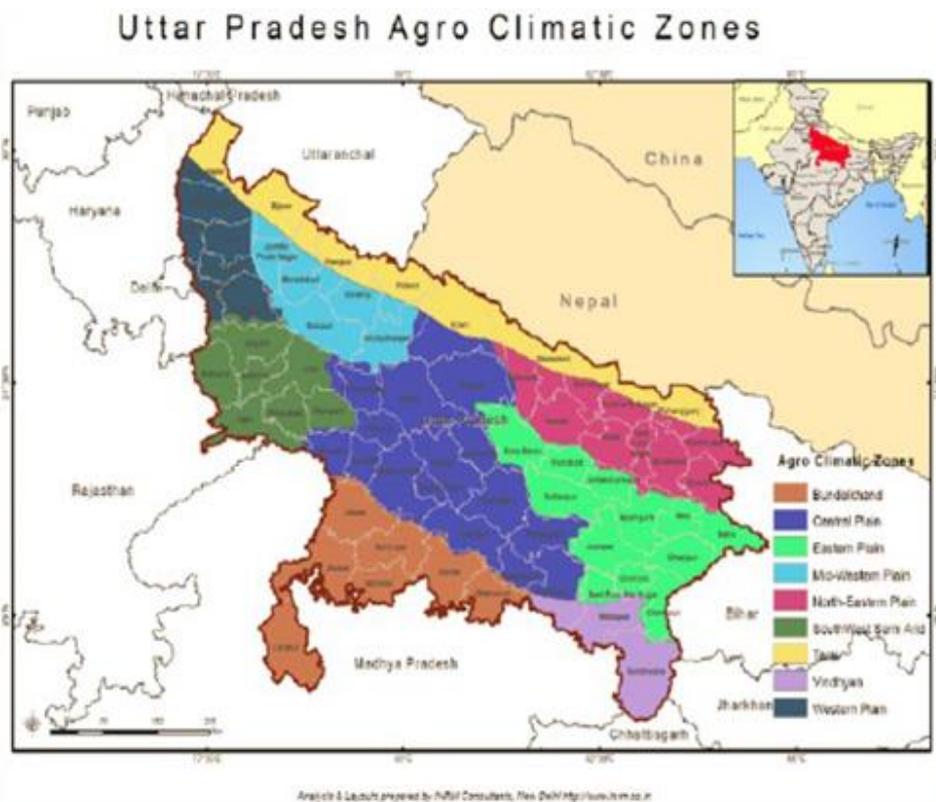
### 1.1 Project / Programme Background and Context:

#### *a) Provide brief information on the problem the proposed project/programme is aiming solve*

Climate change is a global phenomenon and has varying impacts on each and every one of us. Significant climate shifts have already been observed <sup>1</sup> over the past century. The 1901 to 2007 period has seen a significant warming trend of 0.51°C per 100 years in India's annual mean temperature. During the same period, India's maximum and minimum temperature increased at a rate of 0.71°C and 0.27°C per 100 years respectively. In rural areas of India, over 700 million are directly dependent on climate-sensitive sectors like agriculture, forests, fisheries and natural resources such <sup>2</sup> as water, fodder, and biodiversity for their livelihoods. Today uncertainties associated with climate variability pose great risks to the economic development all over the world. Regions in India like Bundelkhand has reasons to be concerned about climate change. Its large population depends upon climate-sensitive sectors like agriculture and forestry for its livelihood. Any adverse impact on water availability due to decrease in rainfall and increased flooding would threaten food security, pose risk to the natural ecosystems including species that sustain the livelihood of rural households, due to such increased extreme events. This aside, achievement of vital national development goals related to other systems such as habitats, health, energy demand and infrastructure investments would be adversely affected.

The long-term nature of climate change and the significant impact it can have on forests and agricultural systems requires activities that incorporate climate change knowledge and understanding in order to adequately respond to the reality of a changing climate process referred to as climate change adaptation. This entails mainstreaming climate change adaptation in the current planning process in order to address the issues of growing vulnerabilities and livelihood security of poor and vulnerable communities.

The Bundelkhand region of the state given its fragile geophysical condition is significantly sensitive to climate change. Bundelkhand region comprising seven districts of Uttar Pradesh

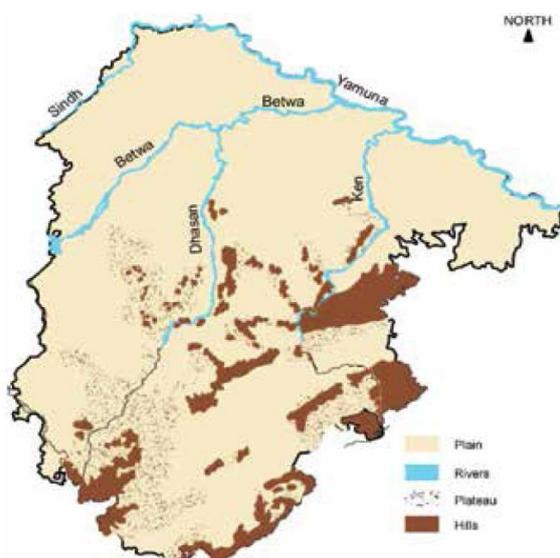


and six districts of Madhya Pradesh is one of the most backward regions of the country. Out of these seven districts of UP, four districts namely Hamirpur, Banda, Chitrakoot, Jalaun (Orai) are being considered for forest ecosystem based adaptation to climate change. Bundelkhand is a hard rock area with limited or inadequate ground water resources, lacks infrastructure and access to improved technologies. The region being largely rain fed is perturbed with variable precipitation trends. Drought conditions are frequent to the region. The continuous drought years in Bundelkhand have severely affected agriculture productivity and subsequently weakened the livelihood systems.

The annual rainfall in Bundelkhand region in the present century has been about 95 cm. Of this, nearly 85 cm falls over just four months, June to September - that too, in about 40 effective rainy days. The remaining 10cm falls in another 6 days distributed within the remaining eight months. Which means, some months remain completely rainless and some rainy days get heavy downpour. There is yet another peculiarity of the humid tropics which shows up in Bundelkhand is not merely the number of rainy days that is important, the number of rainy hours is equally, perhaps more, important. Out of the total 85 cm of monsoonal rainfall in Bundelkhand, about 40 cm may fall in Just 20 hours, which means an average of 2 cm per hour. On some occasions, the intensity goes up to 3-5 cm per hour, each spell lasting for 15 minutes to half an hour. Thus, the rainwater in Bundelkhand, like the rainfall in the humid tropics elsewhere, has little time to penetrate into the soil for recharging the groundwater. This project aims to resolve above problem. In view of this RF pattern, the vegetation cover is shrinking, agriculture income is coming down and encroachment in forest area resulting in cascading effect in changing micro climate leading to desertification, lifestyle changes- law and order issues. Normal course forest plantation is

done in monsoon season with limited irrigation up to two years. In this drought like scenario the irrigation frequency as well as period up to three years may be necessary for successful plantation.

The Bundelkhand region is characterized by a rocky physiography with elevations ranging from 600 m amsl to 150 m amsl. Most of the area is drained by the Jamni River and its tributaries which form its eastern boundary, separating it from Tikamgarh district in Madhya Pradesh. The Sajnam River is a tributary of the Jamni. The Rohini River originates in Mandwara block of Lalitpur district and merges with the Dhasan River in the same block. The region has rich biodiversity both in terms of flora and fauna. The drainage patterns in Bundelkhand make the area a rich source of natural resources (e.g. minerals, forests). Groundwater occurs in both consolidated and unconsolidated formations and its availability ranges between 10 m to 40 m below ground level. Forest area has decreased, while land put to use other than agriculture has increased. The region experiences varying climatic conditions e.g. deficiency in rainfall which triggers meteorological, hydrological and agriculture drought like conditions. A severe continuous four-year cycle of drought during 2004-2015 (more than 25% deficit against the annual average) lead to reduced sown area, loss of productivity, failure of crops already grown, and non-availability of forage, grass, and fodder. Moreover of the available 2 BCM of storage capacity available, filling of these reservoirs during this period progressively decreased to 17%. Also, various tanks, ponds, dug-wells dried and groundwater tables fell during this period. Bundelkhand is the poorest region in the state. Demographic features in project area indicates increasing population with adverse female to male ratio, higher literacy with reduced gap in male to female literacy. Though literacy rate improved and gap in male to female literacy rate reduced, it remained less than state's average. ST population is minimal though SC population is comparatively significant. The infrastructure base indicates increased metaled road network but erratic power supply for agriculture. Data also indicate growth of gross irrigated area but low irrigation intensity (100.3%). Dependence on canal irrigation decreased with increase in shift to tube well irrigation. UP is divided into nine different agro-climatic zones based on various ecological land classification components like soil, climate, topography, vegetation and crops. Bundelkhand agro-climatic zone in Uttar Pradesh is severe drought prone area and rated as one of the most vulnerable region. The total area of Bundelkhand is 29616.9 km<sup>2</sup> with a population of 64 million). Like other regions of UP, here also agriculture is the mainstay of the economy. Majority of farmers are small and marginal having very small land holdings aggravates the situation further.



**Physiography:** The Bundelkhand region is rocky and, mainly constitutes not readily cultivable. The region is broadly divided into four sub-regions: Bundelkhand Plain in the North, Bundelkhand Upland in the center and south; Sagar and Damoh (Vindhychal) plateaus in farther south. It is bounded by Vindhyan plateaus in South to river Yamuna in North, river Ken in East and river Betwa and Pahuj in West. The topography consists of mild ravines to leveled plains near Yamuna. Broadly there are four types of soils in the region namely (i)

red sandy soils (ii) shallow black soils (iii) mixed red and black soil and (iv) alluvial soils. Red sandy soil is shallow, having gravel texture, extremely porous with low organic matter, poor water holding capacity, prone to erosion and are thus not much suitable for agriculture.

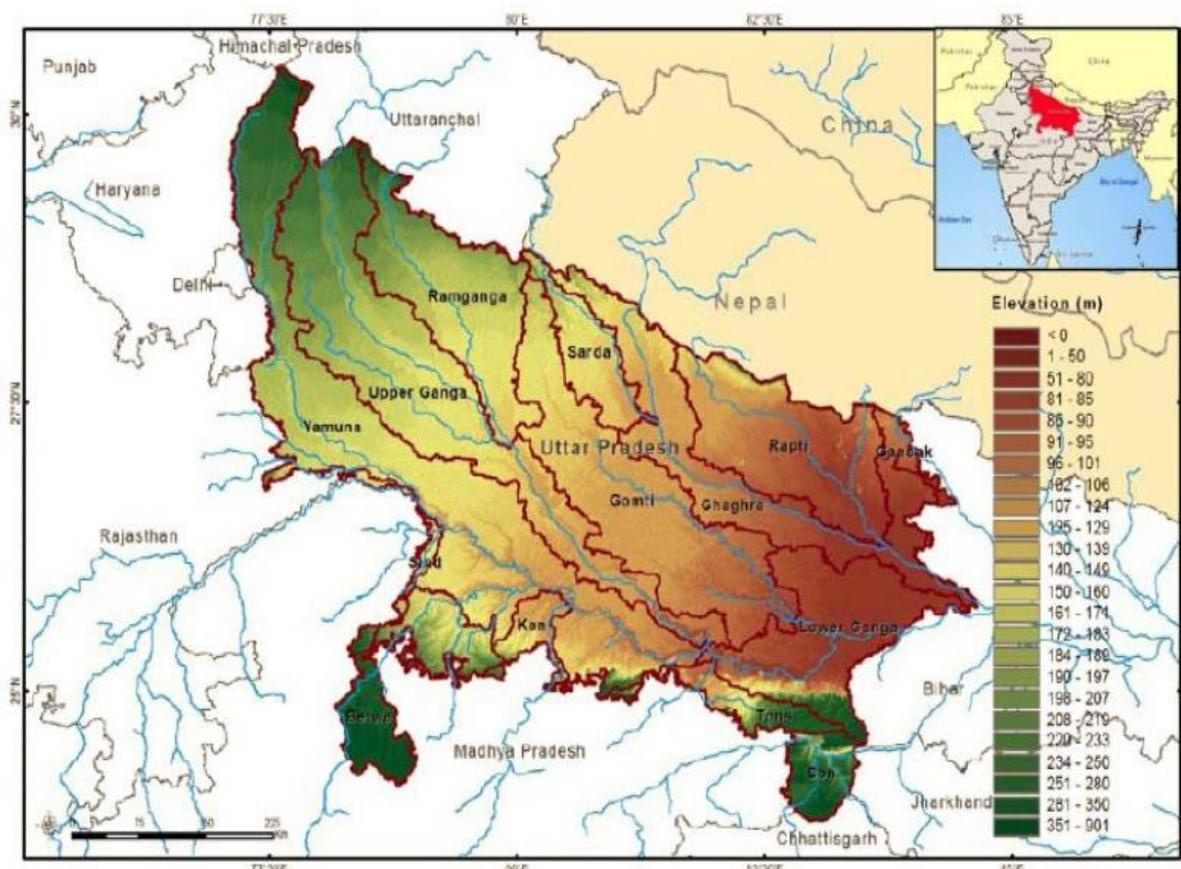


Fig. – Physiography of UP with elevations

**Climate:** Bundelkhand experiences a hot and semi-humid climate. Usually, the hottest days are during summer months especially in May and coldest days in December or January. In summer, the mean temperature range around 30°C and can rise beyond 40°C in May - June. The mean annual precipitation varies from 850 mm to 1044 mm, with around 901 mm being the average (Niti Ayog). Around 75% of rain falls in three months (July to September) and the total amount is highly variable and erratic. This uncertainty is responsible for the large number of famines, droughts and deluges experienced in the region since time immemorial.

**Water Resources:** For most of the year, the residents of Bundelkhand experience acute scarcity of water for irrigation and even for drinking. Water sources are varied and often seasonal, ranging from ponds, tanks, lakes and streams to open wells, bore wells and irrigation canals radiating out from large-scale dams. In the forest area construction of check dams and other Rain Water Harvesting structures are made to conserve water. Water resources may be utilized for gap plantation as well as critical irrigation for new plantation.

**Natural Vegetation:** Continuous drought due to failure of monsoon has resulted in depletion of surface water resources as well as decrease in ground water table. This has severely affected the natural vegetation of the area and a perceptible decrease in forest cover can be

clearly observed over a period of time. Most tribal population inhabiting forests areas adjacent to rivers have no choice but to continue to exploit forests for survival and cause further exploitation of resources.

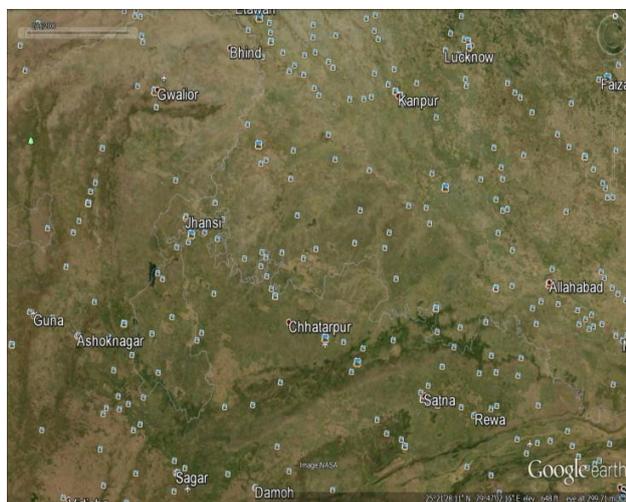


Fig. Forest Cover in 2000

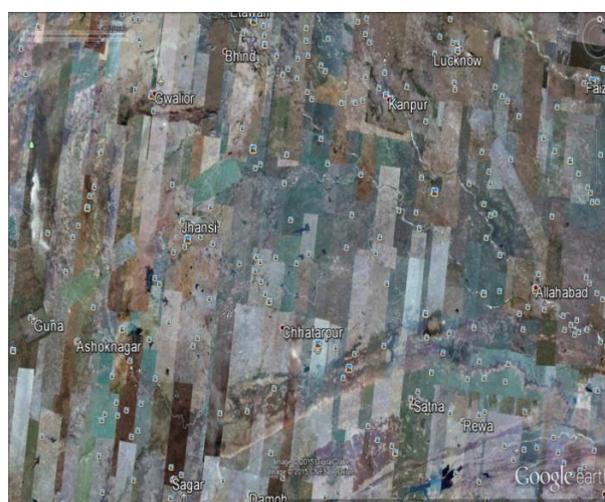


Fig. Forest Cover in 2015

**Minerals:** Quarrying and open cast mining are subjected to opening of large pits on the surface of the land to extract superficial and shallow deposits, stripping of exposed rock & mineral deposits involving blasting to lose the material. These activities cause a notable impact on the environment. The major environmental issues are land degradation; water, air & noise pollutions; depleting flora & fauna; health hazards and associated socio-economic impacts on rural poor.





**Fig. Field photograph shows mine wasteland Mining pit, cause of ground water pollution**

The region has rampant poverty and is in vastly under-developed. Agriculture and stone quarrying activities are the only livelihood option for majority of the people in the region. Recurring drought has left the people with no option other than to exploit natural resources in the area to make out their living.

This project aims to improve the forest ecosystem as well those of community / grazing lands so as to improve the microclimate and also provide succour to the livelihoods dependent on these resources. This project draws from the benefits of Uttar Pradesh Participatory Forest Management and Poverty Alleviation Programme (UPPFMPAP) wherein Joint Forest Management Committees (JFMCs) were successfully able to raise plantations in forest areas and manage them albeit with several learnings. This pilot project to be implemented through JFMCs will empower these bodies to adopt an approach wherein people are sensitised to climate variability in the region. Hence activities initiated at the village level would include taking up plantations of suitable species in degraded forest areas & community / grazing lands which not only improve the productivity but will also ensure that forest resources are not over-exploited because of the lack of means of livelihood due to unavailability of water and other resources. Suitable tree species (i.e. Sagaun, Dhaak, Chilbil & Babool etc.) will be planted to reclaim degraded forest lands / wastelands. Tree plantation will also help in top soil development, which will be an ecosystem based approach. This project proposes to arrest rainwater in the catchment area of lands being identified for development which can improve the water regime so as to ensure irrigation to cover more areas. This project is also expected to provide additional mandays to the local labor who are other-wise migrating in search of employment. Conservation of water resources is expected to reduce the probability of crop failure, more employment and ensuring food security for the people.

*b) Outline the economic, social development and climate change in line with the State Action plan on Climate Change and relevant Missions under National Action Plan on Climate Change*

The following points illustrate the actions proposed by national and state programs to address the development as well as climate risk related to agriculture and water.

- One of the key areas to be addressed under the National Mission for Sustainable Agriculture (NMSA) includes dry-land agriculture. The NAPCC also mentions one of its objectives as to devise strategies to make Indian agriculture more resilient to climate change by focusing on improving the productivity of rain-fed agriculture.
- National Water Mission seeks to develop new regulatory structures, combined with appropriate entitlements and pricing. It will seek to optimize the efficiency of existing irrigation systems, including rehabilitation of systems that have been run down and also expand irrigation, where feasible, with special effort to increase storage capacity. Incentive structures will be designed to promote water-positive technologies, recharging of underground water sources and adoption of large scale irrigation programmes which rely on sprinklers, drip irrigation and ridge and furrow irrigation. Efficient usage of water ensures less exploitation of water resources available in drought affected regions of Maharashtra and will help drought management. If water usage can be optimized through efficient agricultural practices and irrigation system, the additional water available can be utilized for additional area by more marginal farmers. This will help improve social equity.
- This is with reference to Mahatma Gandhi NREGA and Agriculture convergence guidelines issued in 2009 (Available on [www.mgnrega.nic.in](http://www.mgnrega.nic.in) under the icon "convergence"). Rural poor are most vulnerable to climate change, as their livelihood is directly dependent on environmental resources. As extreme events increase, the potentiality of longer and more severe drought, and increased water stress would be greater. These will have an adverse impact on agriculture, water sources, forest and coastal areas. Several studies have indicated that, as the surface temperature of earth rises, climate change will reduce crop productivity; this will be more pronounced in rain fed areas, and would further increase the vulnerability often the rural poor. A study on Environmental Benefits and Climate Change Vulnerability Reduction through MGNREGA has been conducted by Indian Institute of Science (IISc, Bangalore) and GIZ across 5 states, Rajasthan, Madhya Pradesh, Andhra Pradesh, Karnataka, Sikkim. The study showed that wherever MGNREGA is being implemented effectively it is generating multiple environmental benefits, leading to improved water availability, soil fertility and increased crop production. MGNREGA works are also helping reduce soil erosion and increase area under plantations. Overall the study concludes that MGNREGA works have contributed to improving the adaptive capacity of rural people and reducing their vulnerability to climate risks.

National Action Plan on Climate Change emphasizes on aligning the measures to promote national development objectives with co-benefits for addressing climate change effectively. It also advocates strategies that promote, firstly, the adaptation to Climate Change and secondly, further enhancement of the ecological sustainability of India's development measures. The State Action Plan for Climate Change in line with NAPCC, focuses on restoration of native bio-diverse species mix while at the same time enhancing

carbon sink in forests and other ecosystems, while being informed by sensitivity to the ecological nature and value of resources.

This project is aligned with the Uttar Pradesh State Action Plan on Climate Change. And National Action Plan on Climate Change the National Action Plan on Climate Change (NAPCC) under its Green India Mission in Uttar Pradesh aims for (i) Forestry, Bio-diversity conservation (ii) Enhancement of forest areas and (iii) Livelihood promotion and decreased dependency on forest.

The proposed project looks at achieving the objectives of Green India Mission.

The project is both a climate change mitigation and adaptation project and is aligned with climate change requirements under SAPCC. The SAPCC targets:

- Understanding and assessing the extent of vulnerability as and when required is important for responding climate change induced impacts. Micro-level analysis is required to facilitate the habitat to cope with climate change.
- **Promotion of Carbon Sequestration** - Some pilots like plantation of perennial fruit trees in degraded areas, shade plants, medium canopy floriculture, agro-forestry can be taken up apart from other management practices described.
- **Popularization of Agro-forestry**- In agro forestry, all the weather elements are modified and with proper selection of species and tree management techniques, it is possible to optimize the micro-climate of intercrops. Since, yield of field crops is affected by tree species, therefore, adequate knowledge about choice of tree species, tree canopy architecture, pruning intensity and other management practice has to be imparted. Considering the small size of land holdings and dominance of small and marginal farmers (91%) in the state, the agro forestry species should be suitable for boundary planting. Based on the choice of species, Agro-forestry as fence also serves several other functions- a windbreak, a habitat for beneficial birds source of forage, fuel and timber wood. Therefore, considering the advantages of agro forestry, it is proposed that various agro forestry systems developed by NRCA, Jhansi, IGRI, State Agricultural Universities and other research institutions be promoted with necessary refinements in different agro climatic zones of the state.
- **Increase in the area under forest**- The total of waste land and fallow land area available is 540 thousand hectares. This area can be brought under plantations by the land owners or by forest department by taking recourse under section 8 and 9 of UP Tree Protection Act, 1976
- **To endeavour for the reduction of siltation of water and reservoirs** and effects of floods and drought through control measures over soil erosion and denudation for soil and water conservation in the catchment areas of rivers, lakes and rivers, lakes and reservoirs;
- **To prepare and implement strategies for conservation and improvement of biodiversity** and wild life in the state; To promote mass movement in the state especially with the active participation of women and rural people residing near forest areas so as to meet all the above objectives.

c) *Include climate analysis and vulnerability analysis.*

**Climate Analysis:**

As per 2005 inventory, Uttar Pradesh is India's fifth largest state, most populous, highest emitting, emits and contributes nearly 14% of national greenhouse gases (GHG). Fossil fuel consumption, power generation and agricultural activities are the major factors responsible for this. Sonbhadra, Rae Bareilly and Gautam Buddha Nagar are the three highest emitting districts during 2005, contributing to 27%, 5% and 4% GHG emissions of the state respectively. The population in the state is largely rural and its occupation is agrarian. The climate sensitivity of agriculture is very high in the state and high level poverty, rapid urbanization coupled with flood, heat waves and cold waves makes it one of the most vulnerable areas in India. As per the projection, annual rainfall is predicted to increase by 15% to 20% in the 2050's as compared to the baseline and the increase is higher towards 2080's (25% to 35%). Inter annual variability is higher towards 2080's. There is also predicted increase in maximum temperature 1.8 deg C to 2.1 deg C during that period. Combined vulnerability index that is largely linked to natural resource driven sectors shows all the districts in the Bundelkhand and Vindhya regions are highly vulnerable to climate change. The less or moderately vulnerable districts were observed mainly in the western plains, Midwestern plains, Bhabhar and Tarai zones, and the south-western semi-arid regions.

Throughout the 19th and 20th century, there have been only twelve drought years from historical records in Bundelkhand with a frequency of once in 16 years. The frequency of drought gradually increased to thrice in 16 years during 1968-1992. The past years since 2004-05 are under going through drought (NRAA, 2008). As a result, various sectors of the region including the agricultural sector are accounted to suffer in recent days. Moderate to severe Agricultural drought were reported to be occurring for 2-4 years in the 13 districts of Bundelkhand in last 10 years with an increased frequency of mostly 2.5 times in 10 years.

Its population (166 million) exceeds the population of Japan and is many times the population of Norway, Ireland, Switzerland, New Zealand, Spain, and even the UK. Administratively the state had 83 districts, 901 development blocks and 112,804 inhabited villages. **The state is divided into four economic regions: western, central, eastern, and Bundelkhand.** The state has **nine agro-climatic zones:**

1. Bhabhar and Tarai Zone
2. Bundelkhand Zone
3. Central Zone
4. Eastern Plain Zone
5. Mid-Western Plain Zone
6. North Eastern Plain Zone
7. South Western Semi-Arid Zone
8. Vindhyan Zone
9. Western Plain Zone

The Bundelkhand region accounts for only 4 per cent of the state's gross value of agriculture output. This has strong linkages to the agroclimatic conditions in these regions. The reduction in agricultural production can lead to additional pressure on government resources. These resources could be meant for being utilized in other productive purposes. (Awosika et al.,1998; IPCC, 2007) stated that due to global warming, droughts are predicted to turn into more prominent in some of the dry regions of world. Research with adaptation and mitigation measures is a requirement, therefore, to understand more about droughts

and other climate change impacts and its impact on food security. The focus lies on need of assessment systems of Agricultural drought with better approaches than existing ones.

The table below shows the observations of various meteorological stations spread in Bundelkhand region. IMD has set up eight meteorological observation stations in the Bundelkhand region. Those are namely Datia, Jhansi, Hamirpur, Banda, Tikamgarh, Panna, Saagar and Damoh. The average annual rainfall for 36 years of observation (1975-2010) is shown in the table, according to which, the Meteorological drought years has been identified for the respective station. The Meteorological drought years has been categorized, if the rainfall of a year is less than 75% of average annual rainfall of 36 years in the corresponding meteorological station. All the years from 2000 to 2010 except 2003, were found to be Meteorological drought years for various stations. The interpretations of the meteorological observations in these stations wraps up that, the Meteorological drought years were found to be frequently occurring in the meteorological stations of Bundelkhand region.

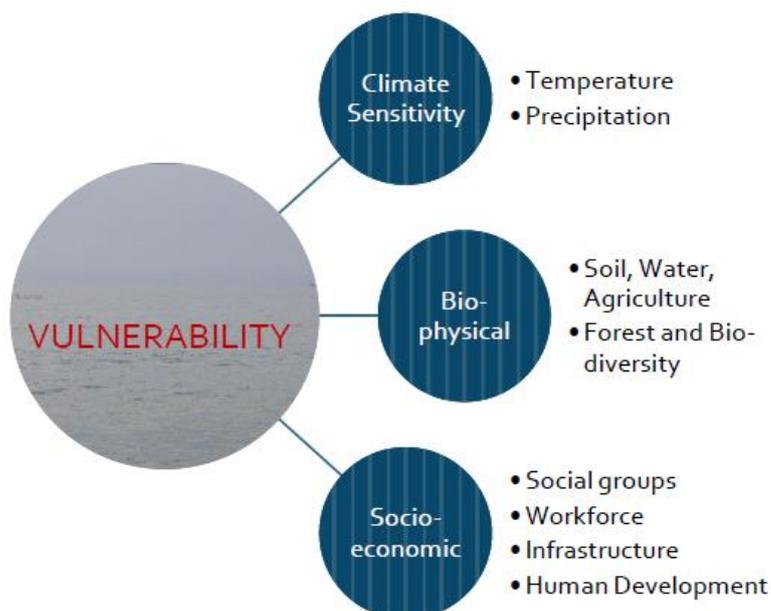
**Table Meteorological drought Years observed from 1975 to 2010 at the Meteorological stations Datia, Jhansi, Hamirpur and Banda:**

Station Code	42460	42463	42469	42473
Station Name	DATIA	JHANSI	HAMIRPUR	BANDA
Average annual rainfall (mm)	729.84	831.34	621.59	889.64
<b>Drought years</b>	1979	1979	1986	1979
	1981	1986	1988	1981
	1982	1996	1991	1984
	1983	1998	1993	1998
	1997	2005	1994	2007
	2005	2006	1995	2009
			2001	
			2002	

The total of rainfall observed in all stations of Bundelkhand, is used for identification of rainfall deficit years and Meteorological drought years. The mean of annual average rainfall for 36 years in Bundelkhand region is found to be 898.25 mm. The deviation of rainfall from this mean for a year decided the rainfall deficit, if annual average rainfall is less than that of the mean. The Meteorological drought year is recognized, if deficit is less than 75% of the mean. As per a report by the Central govt., it has been shown that since 2000, the region is subjected to frequent drought like situations. According to these Indian Meteorological Department (IMD) observations, the region have observed only two Meteorological drought years since 2000, i.e. 2006 and 2009. But the years 2000, 2002, 2004, 2005, 2006, 2007, 2009 and 2010 are the rainfall deficit years observed.

#### **Vulnerability Analysis:**

Vulnerability in this context is defined as, “the degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes” and adaptation as, “adjustments in ecological, social or economic systems in response to actual or expected stimuli and their effects or impacts. This term refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change” (IPCC 2001).



The four districts in Bundelkhand region i.e Hamirpur, Banda, Chitrakoot, Jalaun (Orai) are more vulnerable and have lesser adaptive capacities, due to:

- Overpopulation (relative to current productivity, income and natural resources)
- Debilitated ecological base (land degradation and fragmentation)
- Over-dependence on climate-sensitive sectors: agriculture, forestry, fisheries
- Level of economic wealth
- Inequities in access to resources and wealth among groups
- Weak socio- cultural (rigidity in land-use practices, social conflicts) infrastructural, financial/market (uncertain pricing, availability of credit, lack of credit), legal and governance structures
- Technological, skills and human resource bottlenecks
- Poor pre-existing health conditions

Reducing vulnerability involves reducing exposure through specific measures, or increasing adaptive capacity through proposed activities that are closely aligned with development priorities.

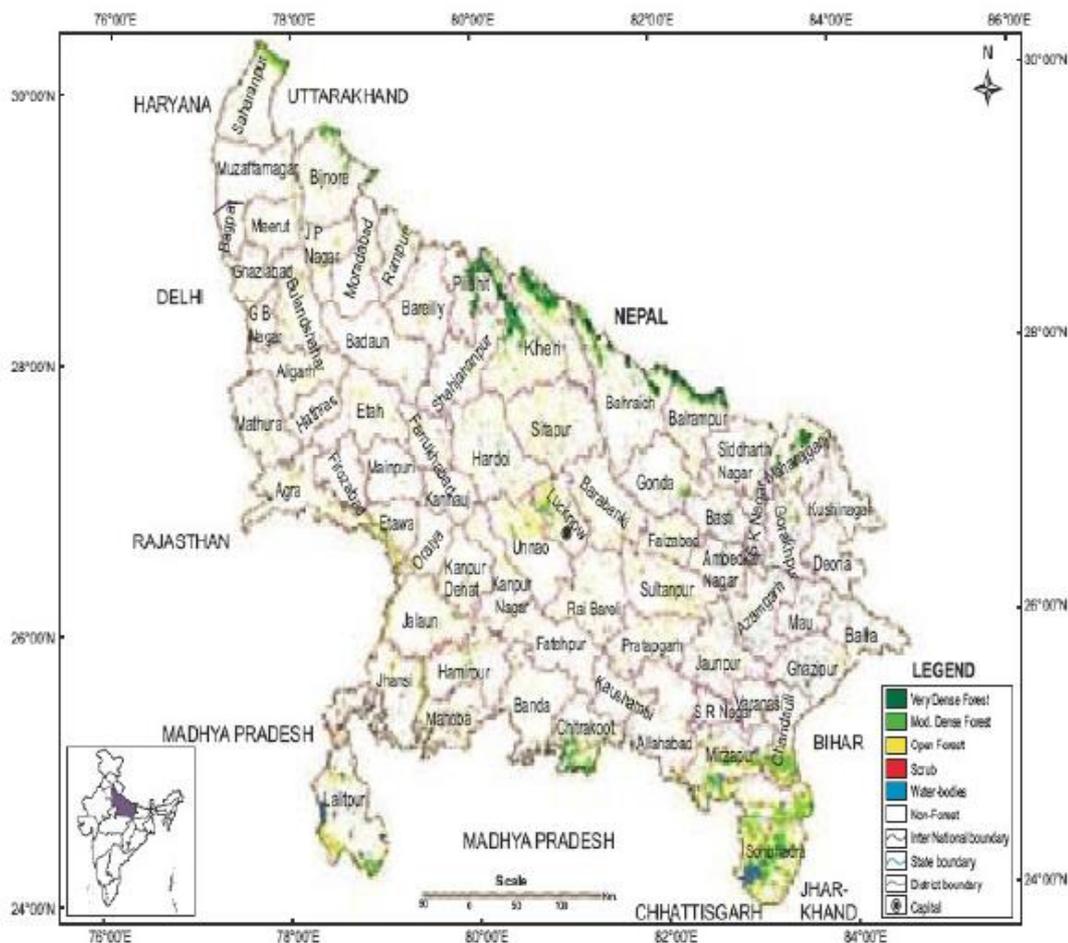


Fig. – Forest Cover Map of UP

The parched geography of Bundelkhand is one of the most underdeveloped regions of the country being low on human development indices. In addition to undulating terrain and climatic variabilities the drought prone region suffers from high socio economic vulnerabilities marked by increased climatic sensitivities and low adaptive capacities. The semi-arid geography of Bundelkhand is highly perturbed with variable climatic conditions intensified by ravines and undulating topography, resource exploitation, weak socio-economic conditions, lack of access to improved technologies and frequent migration. It is largely rainfed and is perturbed with drought conditions frequent in the region leading to unstable socioeconomic conditions and food insecurity. The economy of Bundelkhand is predominantly agrarian; agriculture, livestock rearing and seasonal out migration provides for more than 90% of the rural income in Bundelkhand. The growing population and parallel increase in demand for natural resources has left the agricultural and water resources in the region susceptible to increasing climate change risks affecting the livelihoods of the communities. As the climate change impacts are likely to be faced most severely by such vulnerable regions of developing countries like India, there is an urgent need to integrate adaptive strategies at the local level and work towards strengthening national capacities.

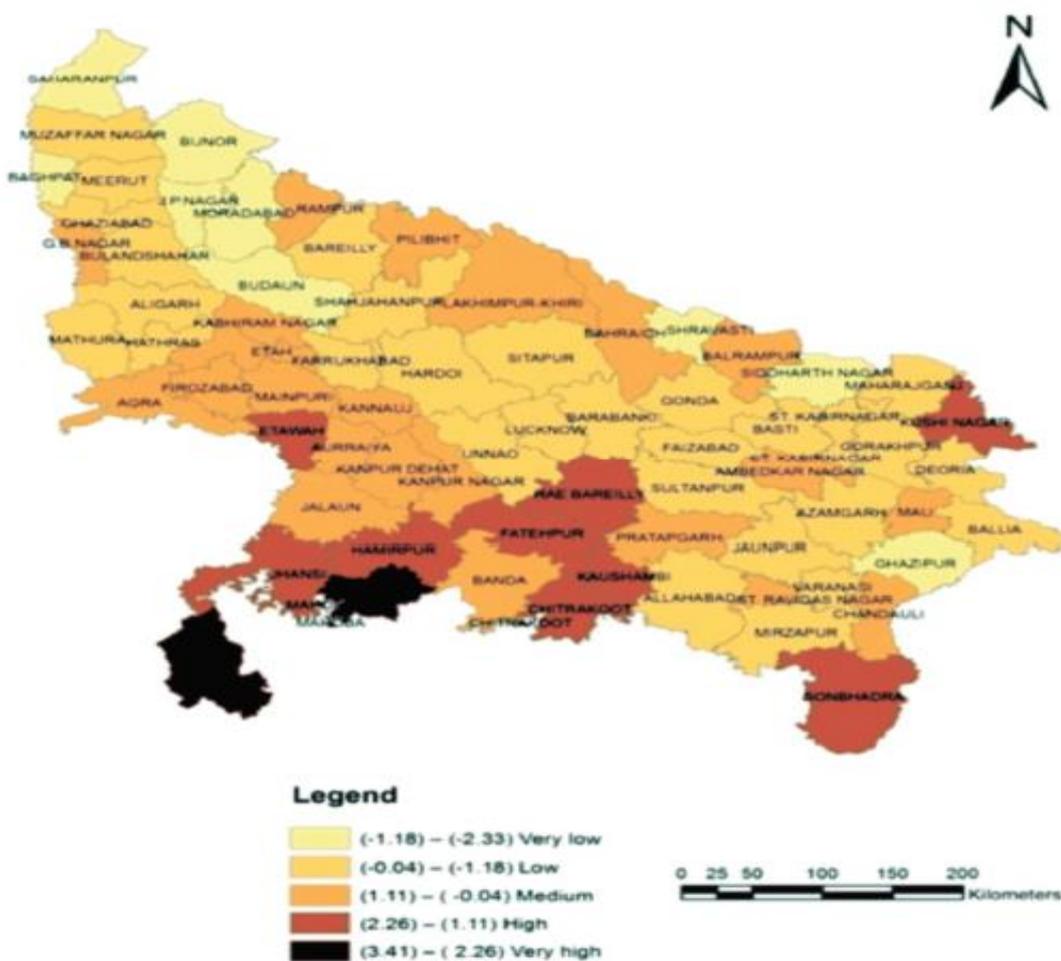


Fig. – Exposure related vulnerability (Source: SAPCC)

### High Sensitivity of Natural Resources:

The 13 districts of Bundelkhand region consists of 7.08 million hectares of ravines and undulating terrain making the region prone to high run off rates and loss of soil fertility. About 8.8% of Bundelkhand region of Uttar Pradesh consists of forest cover and scrubs. Additionally, population growth, increase in cultivable land, increased extraction of fuel wood, anthropogenic pressures and climatic changes have overall affected the quality of the forest in the region. The losses in the agricultural produce due to the variable climate have also increased people's dependency more on forests for other livelihood options.

The Bundelkhand region is rocky and has high percentage of barren and uncultivable land. According to the Wasteland Atlas of India 2005, approximately a total of over 11,000 sq km comprising over a sixth of the area of Bundelkhand (M.P and U.P) falls under four broad categories of wasteland. Wastelands found in Bundelkhand can be grouped as:

- land affected by shallow, medium or deep gullies;
- wastelands with or without scrub in lowlands or uplands;
- degraded notified forest lands
- barren, rocky and totally uncultivable land.

District	Micronutrients							
	N	P	K	Sulphur	Zn	Fe	Mn	Cu
Banda	VL	VL	M	M+	M+	S	S	S
Chitrakoot	VL	VL	M	M+	M+	M	S	S
Hamirpur	L	VL	H	D	M+	S	S	S
Jalaun	L	VL	H	D	M+	S	S	S
Jhansi	L	VL	H	M+	M+	S	S	S
Lalitpur	L	VL	H	D	M+	S	S	S
Mahoba	L	L	H	D	M+	S	S	S

Table: Fertility status of soils in various districts of U.P. Bundelkhand zone

District	Year	Geographical Area (GA)	Very Dense Forest	Moderate Dense Forest	Open Forest	Total	% of GA	Change	Serub
Banda	2011	4532	0	26	77	103	2.27	0	29
	2009	4532	0	26	77	103	2.27	-1	29
	2005	4532	0	27	76	103	2.27	0	29
Chitrakoot	2011	3092	0	358	203	561	18.14	0	15
	2009	3092	0	358	203	561	18.14	0	15
	2005	3092	0	346	208	554	17.92	0	14
Hamirpur	2011	4282	0	66	108	174	4.06	0	39
	2009	4282	0	66	108	174	4.06	-2	39
	2005	4282	0	67	111	178	4.16	0	38
Jalaun	2011	4565	0	65	179	244	5.35	0	48
	2009	4565	0	65	179	244	5.35	1	48
	2005	4565	0	68	179	247	5.41	0	49
Jhansi	2011	5024	0	33	167	200	3.98	0	121
	2009	5024	0	33	167	200	3.98	0	121
	2005	5024	0	34	168	202	4.02	0	119
Lalitpur	2011	5039	0	128	442	570	11.31	0	41
	2009	5039	0	128	442	570	11.31	0	41
	2005	5039	0	146	426	572	11.35	0	42
Mahoba	2011	2884	0	22	73	95	3.29	0	96
	2009	2884	0	22	73	95	3.29	1	96
	2005	2884	0	20	74	94	3.26	0	95

### Forest Cover in Uttar Pradesh

The forest and tree cover in the state of Uttar Pradesh is 9.06%, which is below the national average of 23.57%. It is observed that the forests are in degraded condition and have poor quality since the open forest cover out of the forest area is 57.5%. The forest areas in UP are mostly located in southern part of the state and in Terai region. The local people including SCs and STs in these areas depend on forests, partly or fully, for their livelihood and forest based livelihood options available are limited in the State. It causes degradation of the

forests. This further reduces the potential of the forests to meet the demands of local people from them.

### High Water Stress

Sensitivities in the Bundelkhand are aggravated further due to water stress in the region. It is mainly due to inadequate and erratic rainfall, high run off rates and poor water retention capacity of the soil. Loss of traditional water management practices and insufficient water harvesting structures have further added to the stress. The average annual rainfall in Bundelkhand region in the present century has been about 95 cm. Of this, nearly 85 cm falls over just four months, June to September – that too, in about 40 effective rainy days. The remaining 10 cm falls in another 6 days distributed within the remaining 8 months. Which means some months are completely rainless and some rainy days get heavy downpour. The region witnessed continuous meteorological, hydrological and agricultural drought for six years in the period 2003-2009.

Increasing temperatures have also led to high evapotranspiration rates which when greater than the received precipitation leads to loss of soil moisture and reduction in ground water recharge and surface water levels. The vulnerability assessment of the region reveals that the region is also facing the brunt of depleting groundwater resources. Drying up of 70% of the tanks, ponds and dug-wells and fall in ground water table in the region clearly indicated the hydrological drought situation. About 44% of the net sown area (NSA) is irrigated by canals, dug wells, shallow tube wells, lift irrigation and other flows. Major portion of this, i.e 31.7% of NSA is irrigated by ground water. The irrigation heavily relies on the availability of water through rainfalls which further increases the sensitivities to climate change (Ref: Report on drought mitigation strategy for Bundelkhand region of Uttar Pradesh and Madhya Pradesh, Inter Ministerial Central Team, GoI, 2008).

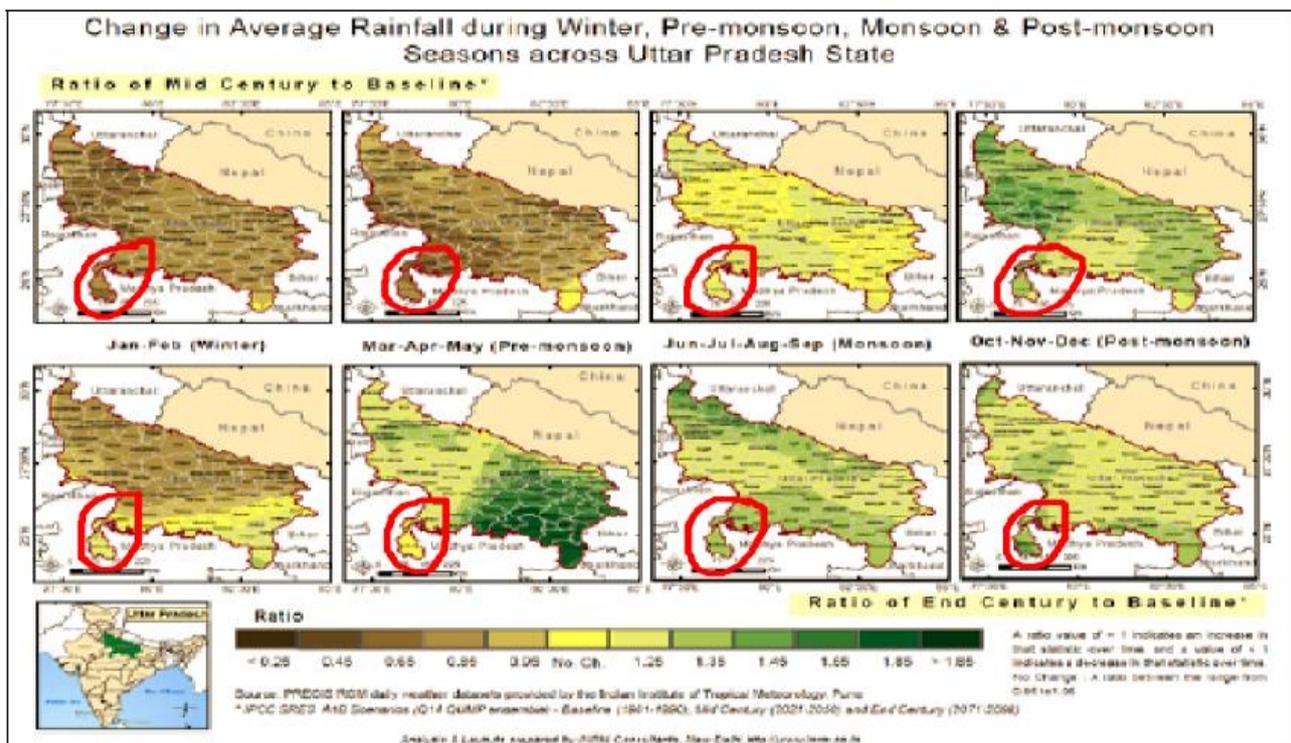


Fig. Climate Change Scenario temperature Statistics: Maximum and Minimum Temp.

A large portion of irrigation depends on extraction of ground water through diesel based pump sets which is heavy on the pockets of small and marginal farmers. With ground water levels falling and lakes and ponds drying up, the overall water availability for irrigation has drastically reduced. Furthermore the area witnesses inefficient water management practices such as inadequate rainwater harvesting, flood irrigation and insufficient groundwater recharging structures.

### Rainfall parameters (1975 to 2010) in Bundelkhand region

Season	Statistics	Value	Contribution in Annual Rainfall (%)
<b>Annual</b>	Average (mm)	946.07	
	Inter-annual variation (CV <sup>5</sup> )	0.30	
	Range - Average (mm)	501.2 - 1444.25	
	Range- Inter-annual variation	0.49 - 0.19	
<b>Winter (JF)</b>	Average (mm)	33.66	3.6
	Inter-annual variation (CV)	0.94	
	Range - Average (mm)	14.85 - 116.17	
	Range- Inter-annual variation	0.58 - 1.75	
<b>Pre Monsoon (MAM)</b>	Average (mm)	66.77	7.1
	Inter-annual variation (CV)	0.92	
	Range - Average (mm)	8.41 - 875.52	
	Range- Inter-annual variation	0.27 - 1.81	
<b>Monsoon (JJAS)</b>	Average (mm)	798.83	84.4
	Inter-annual variation (CV)	0.36	
	Range - Average (mm)	42.67 - 1260.26	
	Range- Inter-annual variation	0.2 - 1.25	
<b>Post Monsoon (OND)</b>	Average (mm)	46.81	4.9
	Inter-annual variation (CV)	1.11	
	Range - Average (mm)	18.32 - 85.61	
	Range- Inter-annual variation	0.78 - 1.76	

*Source: IMD Gridded rainfall data (1971-2005)*

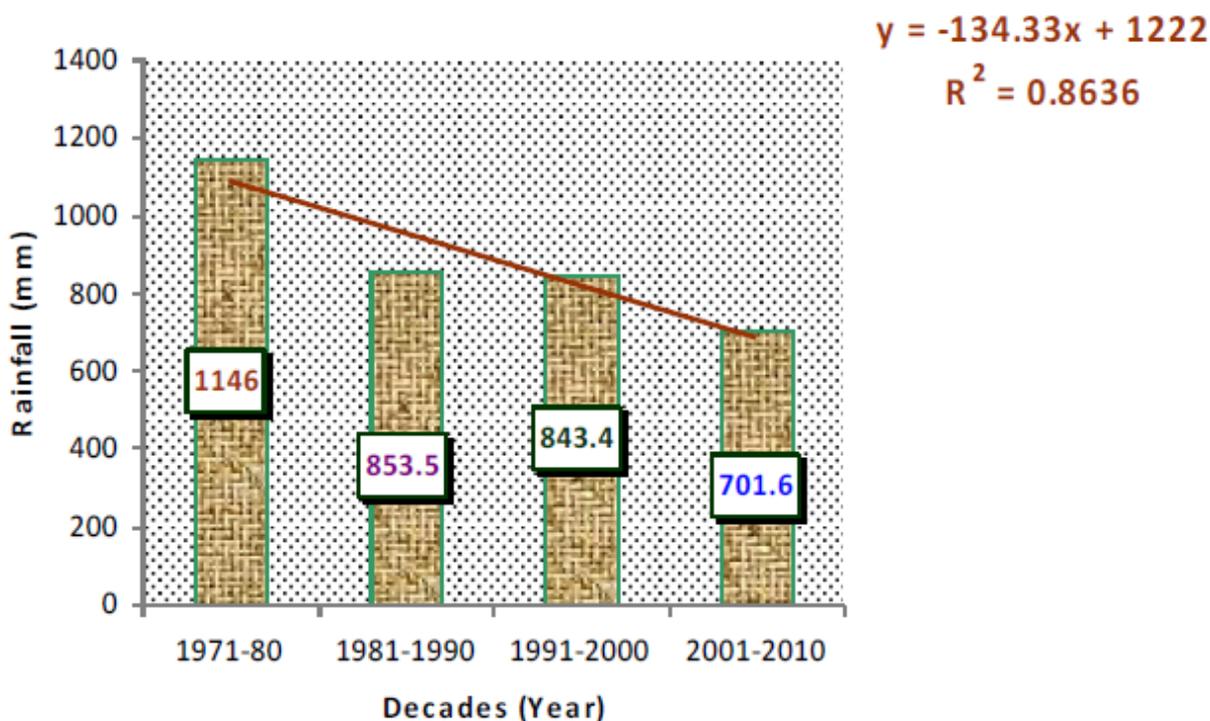
**Table: Rainfall deficit Years and Meteorological drought Years observed from 1975 to 2010 for Bundelkhand Region**

Annual rainfall (mm)	Year	Rainfall deficit from the mean of annual rainfall	Year	Metrological drought as per IMD
1155.19	1975	Normal	1975	Normal Year
912.83	1976	Normal	1976	Normal Year
1118.89	1977	Normal	1977	Normal Year
1023.86	1978	Normal	1978	Normal Year
753.78	1979	Deficit	1979	Normal Year
1185.96	1980	Normal	1980	Normal Year
620.15	1981	Deficit	1981	Drought Year
1051.89	1982	Normal	1982	Normal Year
1001.66	1983	Normal	1983	Normal Year
815.16	1984	Deficit	1984	Normal Year
1151.44	1985	Normal	1985	Normal Year
844.99	1986	Deficit	1986	Normal Year
870.30	1987	Deficit	1987	Normal Year
645.76	1988	Deficit	1988	Drought Year
726.35	1989	Deficit	1989	Normal Year

Annual rainfall (mm)	Year	Rainfall deficit from the mean of annual rainfall	Year	Metrological drought as per IMD
1276.95	1990	Normal	1990	Normal Year
995.29	1991	Normal	1991	Normal Year
925.40	1992	Normal	1992	Normal Year
919.75	1993	Normal	1993	Normal Year
856.79	1994	Deficit	1994	Normal Year
916.70	1995	Normal	1995	Normal Year
914.00	1996	Normal	1996	Normal Year
671.41	1997	Deficit	1997	Drought Year
892.41	1998	Deficit	1998	Normal Year
1097.20	1999	Normal	1999	Normal Year
844.41	2000	Deficit	2000	Normal Year
962.43	2001	Normal	2001	Normal Year
806.20	2002	Deficit	2002	Normal Year
1072.40	2003	Normal	2003	Normal Year
800.10	2004	Deficit	2004	Normal Year
858.14	2005	Deficit	2005	Normal Year
552.18	2006	Deficit	2006	Drought Year
778.33	2007	Deficit	2007	Normal Year
1124.53	2008	Normal	2008	Normal Year
457.63	2009	Deficit	2009	Drought Year
736.60	2010	Deficit	2010	Normal Year

**The mean of annual rainfall in Bundelkhand region in 898.25 mm**

### Decadal variation of rainfall in Bundelkhand region



**Fig.:** Rate of decrease in rainfall in Bundelkhand region

In the last 25 years the region faced challenges due to promotion of cash crops, changing agri cycle, degradation of forest, over exploitation of ground water and damage to traditional water bodies. As a consequence this has led to drying up of natural land moisture.

#### Socio-Economic Vulnerabilities: High Sensitivity and Low Adaptive Capacities

The dry topography of Bundelkhand is coupled with underprivileged socio economic conditions. The incidence of poverty in the state is among the highest in the country, with people living below the poverty line increasing from 44.6% in 1993-94 to 48.6% in 2004-05. This is more so in rural than in urban areas ( 53.6% in rural areas as against 35.1% for urban areas in 2004-05). Agricultural losses and frequent droughts force the vulnerable communities to migrate to the cities. The drought period of 2003-09 witnessed a migration of 40% of region’s population. About 50 % of the indigenous cattle production is unproductive with hardly 0.5% of cross-bred as compared to 15% of the national average. ( Ref - Report on drought mitigation strategy for Bundelkhand region of Uttar Pradesh and Madhya Pradesh, Inter Ministerial Central Team, Gol, 2008) . Lack of fodder availability and water has reduced the interest of communities in livestock rearing which has further lowered their adaptive capacities. Water for drinking and for other household purposes is fetched from far off sources by the women of the households adding to their normal work load in the drought prone circumstances of the Bundelkhand. The region is also starved with timely information and technological interventions.

Today, there are no major industries in the Bundelkhand region. Beedi making is the single largest source of non-agricultural employment. Beedi industry provides direct employment to over 2,00,000 persons, mainly women. In the upland of the region, stone quarrying is

widespread and has grown rapidly since 1990s. The Human Development Index is lowest among all the other regions in the state.

**Table: Comparative development of Bundelkhand and other districts of Uttar Pradesh based on scoring of 36 indicators**

S. No.	Development Category	Score	Districts
1	Very High	125-388	Gautam Buddha Nagar, Ghaziabad, Meerut, Lucknow ( W Uttar Pradesh)
2	High	105-125	Jhansi (Bundelkhand)
3	Medium	90-105	Jalaun, Mahoba (Bundelkhand)
4	Low	78-90	Lalitpur, Hamirpur (Bundelkhand)
5	Very Low	Below 78	Banda, Chitrakoot (Bundelkhand)

**Table: HDI of Bundelkhand (UP), 2005**

S. No	District	HDI
1	Jhansi	0.6214
2	Jalaun	0.6059
3	Chitrakoot	0.5907
4	Mahoba	0.5690
5	Hamirpur	0.5678
6	Banda	0.5456
7	Lalitpur	0.5345

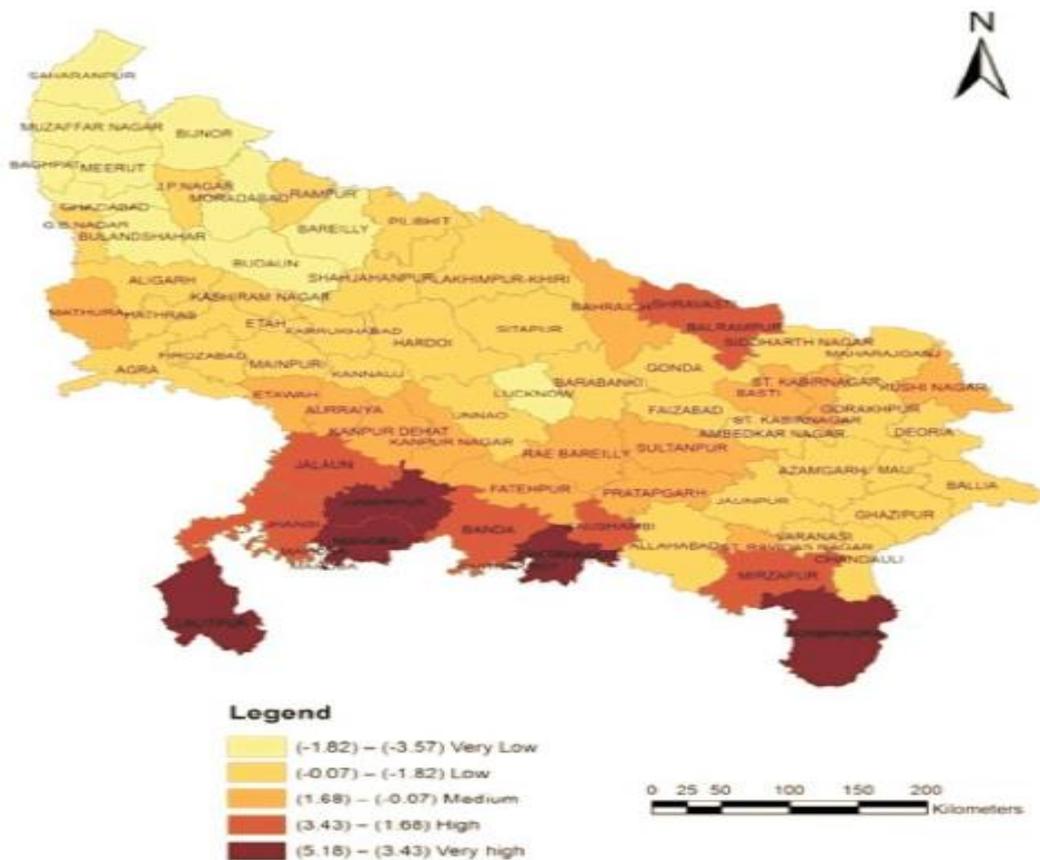


Fig. – Climate Vulnerability Index (combined) for UP

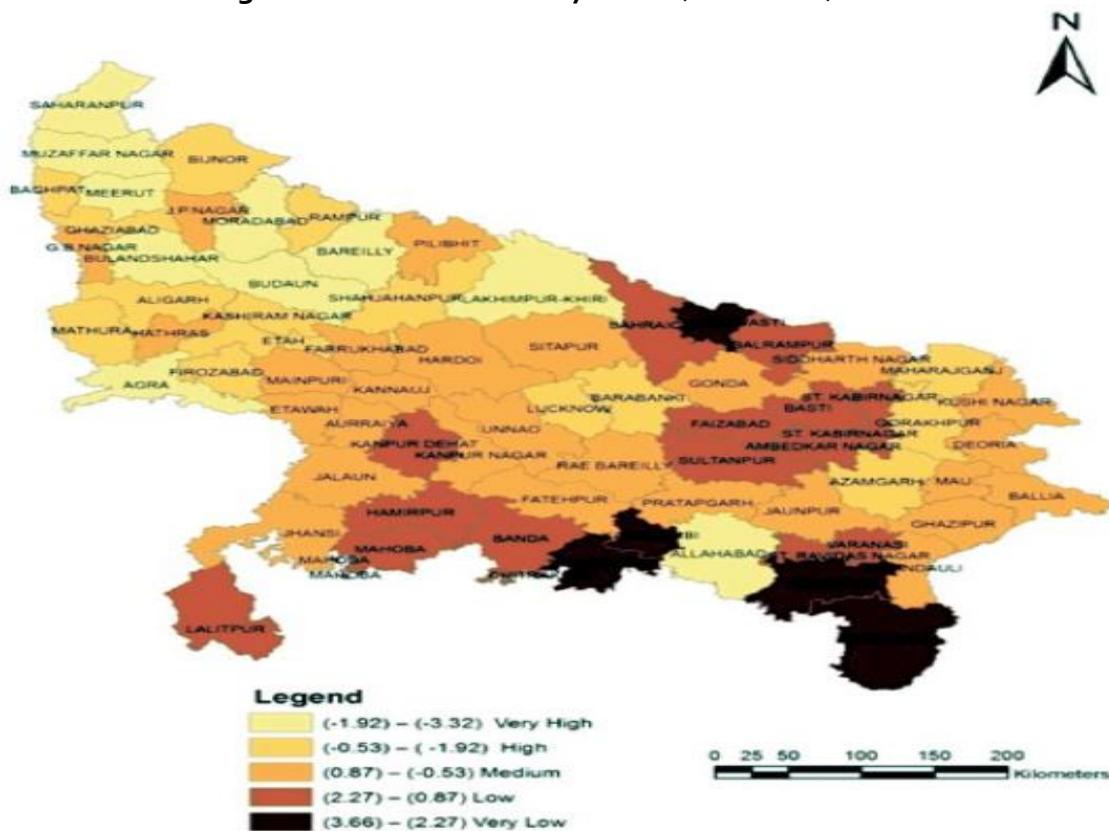


Fig. – Adaptive Capacity

Based on the above analysis, it seems all the districts in the Bundelkhand and Vindya regions are highly vulnerable to climate change, as is Kaushambi from the central plains and two districts of the north-eastern plains. The less or moderately vulnerable districts were observed mainly in the western plains, Midwestern plains, Bhabhar and Tarai zones, and the south-western semi-arid regions. Mixed pattern is seen in the central, eastern, and north-eastern plains. However, many districts in the above regions are moderately vulnerable to climate change and variability. The analysis suggests that low adaptive capacity and high exposure to climate change and variability are mainly responsible for the high vulnerability to climate change.

#### *d) Project Location details – villages, block/ mandal, district*

The project locations are in four districts of Uttar Pradesh viz. Hamirpur, Jalaun, Banda, Chitrakoot which fall in the Bundelkhand region. In this section, geographical details, land use, irrigation pattern, agriculture in the district, climate analysis and project locations (villages of selected clusters) have been presented. A brief profile of the districts are presented hereunder:

##### **1. Hamirpur :**

Hamirpur district is a part of Chitrakoot Division. The district occupies an area of 4,121.9 km<sup>2</sup>. The district has a population of 1,042,374 (2001 census). As of 2011 it is the third least populous district of Uttar Pradesh (out of 71), after Mahoba and Chitrakoot. Two major rivers Yamuna and Betwa meet here. On the banks of river Betwa lies the "Coarse sand" which is exported to many parts in UP.

##### **Economy**

In 2006 the Ministry of Panchayati Raj named Hamirpur one of the country's 250 most backward districts (out of a total of 640). It is one of the 34 districts in Uttar Pradesh currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

##### **Demographics**

According to the 2011 census Hamirpur district, Uttar Pradesh has a population of 1,104,021, roughly equal to the nation of Cyprus or the US state of Rhode Island. This gives it a ranking of 417th in India (out of a total of 640). The district has a population density of 268 inhabitants per square kilometre (690/sq mi). Its population growth rate over the decade 2001-2011 was 5.78%. Hamirpur has a sex ratio of 860 females for every 1000 males, and a literacy rate of 70.16%. (Ref- District Census 2011". Census2011.co.in. 2011)

##### **Agriculture**

##### Land & Soil:

The soils consist of the well known bundelkhand varieties, Mar, Kabar, Parua and Rakar. Mar is often called black cotton soil. It varies greatly in colour. It contains small lumps of kankar. Kabar range from a rich dark black to light brown. Its chief characteristics is its extreme adhesiveness, which causes it to quickly dry and cake in to hard blocks. Parua is a light coloured sandy soil, found in many forms. It is usually less rich in organic matter, but its finer texture makes it more responsive to manure and irrigation. Raker is refuse soil which occurs on sloping ground, where the action of water has tended to denude the earth of all its better qualities.

### Land Use Pattern:

Category	Area in Hectare	Percentage Area
<b>Total Reporting area</b>	415948	100
<b>Area under forest</b>	23520	5.6
<b>Non Agricultural Area</b>	31094	7.4
<b>Net Sown Area</b>	324935	78.1

### Irrigation:

Only 27.7% land are irrigated land in Hamirpur. The distribution of area of land irrigated by different sources of irrigation are as under. Canals are the main source of irrigation and are constructed by the different rivers like Yamuna, Betwa, Dashan, Barma, Ken, Chandrawal and Pandwaha.

Sources	Area Irrigated (Hectare)	Percentage Area
<b>Canal</b>	24920	28.7
<b>Tubewells</b>	34049	39.2
<b>Wells</b>	22805	26.3
<b>Ponds</b>	539	0.6
<b>Other Sources</b>	4561	5.2
<b>Total</b>	<b>93302</b>	<b>100.0</b>

### Crops:

There are three harvests, the autumn or Kharif have usually known as siyari, and the spring or Rabi as Unhari. The Zaid or extra harvest is insignificant in this area. Gram, Wheat, Barley, Peas, Arhar and Masoor are the main crops of Rabi. Jowar, Rice, Bajra, Urad, Moong and Masoor are the main crops of Kharif. Melon, water-melon, bitter guard, pumpkin are the main crops of Zaid.

Crop	Area Sown (Hectare)	Percentage Area
Gram	93974	26.5
Wheat	83658	23.6
Masoor	58208	16.4
Jwar	36657	10.3
Urd	23318	6.6
Pea	19558	5.5
Tilhan	15657	4.4
Arhar	12995	3.7
Others	10740	3.0

### Climate:

The Climate of the district is characterised by an intensely hot summer, a pleasant cold season. The summer season from March to about middle of June is followed by the south-west monsoon season from mid-June to the end of September. October and first half of November constitute the post-monsoon period. The cold season is from mid-November to February.

### Temperature:

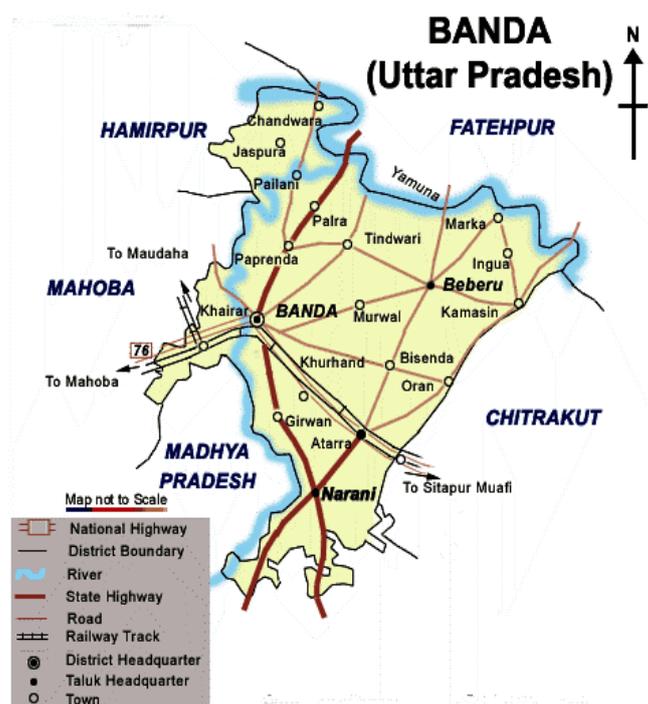
May and the beginning of June are generally the hottest period of the year and maximum temperature in May is about 43° C and minimum about 28°C. The heat during the summer is intense. The maximum temperature on individual days sometimes reaches 45°C or more. During Cold season minimum temperature sometimes drops down to about 2 or 3°C.

## 2. Banda:

Banda is a part of Chitrakoot Division. The district largely consists of irregular uplands with outcrops of rocks intermingling with lowlands, which are frequently under water during the rainy season. The Baghein River traverses the district from south-west to north-east. Other important rivers are the Ken River in the east and the Yamuna to the north. The dominant communities of this area are of Kshatriyas, Patels, Chandrauls, Chandelas, Bundelas etc.

### Economy

The economy is predominantly agricultural, with the main crops being paddy rice, wheat and vegetables. In 2006



the Ministry of Panchayati Raj named Banda one of the country's 250 most backward districts (out of a total of 640). It is one of the 34 districts in Uttar Pradesh currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

### Demographics

According to the 2011 census Banda District has a population of 1,799,541, roughly equal to the nation of The Gambia or the US state of Nebraska. This gives it a ranking of 265th in India (out of a total of 640). The district has a population density of 404 inhabitants per square kilometre (1,050/sq mi). Its population growth rate over the decade 2001–2011 was 17.06%. Banda has a sex ratio of 863 females for every 1000 males, and a literacy rate of 68.11%.

### Agriculture:

The economy of Banda district is based mainly on agriculture. The soils here are mostly fertile and in spite of many projects of irrigations as seen in the previous pages, the uncertainty of irrigation and its dependence on rains has made this tract adopt mostly the traditional farming. This is one area where despite the Govt's push for hybrid seeds and commercial agriculture and despite several droughts and floods which affect the seeds most, the farmers have been able to save some of their traditional seeds.

### Land Use Pattern :

1. Geographical area	438.9 Sq. Km.
2. Cultivable area	389.9 Sq. Km.
3. Forest area :	5.4 Sq. Km.
4. Land under non agricultural use :	31.9 Sq. Km.
5. Permanent pastures :	0.4 Sq. Km.
6. Cultivable wasteland :	12.6 Sq. Km.
7 Land under Misc.tree crops & Groves :	1.5 Sq. Km.
8 Barreb and uncultivable land :	11.3 Sq. Km.

### Crops:

There are two main crops : Kharif and Rabi; the one between July and October and the other between November and March. The old records in the imperial gazetteer or the district gazetteer mentions cotton as one of the major crops here. But that has vanished bow. **The main crops grown presently are as follows:**

**Kharif:** Paddy, Jowar, Bajra, Til, Moong, Urd, Arhar asnd Sanai are the maincrops taken these days. Paddy is normally taken as mono crop while others are mixed sown. 100 years ago cotton was taken as a mixed crop along with other crops in Kharif. Presently Government is pushing Soyabean replacing all other Kharif crops. This tendency ultimately will starve this district.

**Rabi :** Wheat, barley along with gram, linseed, mustard, Masoor and Peas are the major crops. There is a tendency for mixed cropping and regional variation in choices of the crops depending upon the geographical situation and the availability of irrigation.

**Zaid :** the third crops are usually taken in the river beds; that includes Kakri. Tarbooj (water melon), Kharbooja and some vegetable.

### Climate and Soil:

The average annual rainfall is 902.00 mm. The climate is typical subtropical penetrated by long and intense summers. About 80% of the annual rainfall is received from southwest monsoon. May is the hottest month with mercury shooting upto 47.00C. With the advance of monsoon by mid June, temperature starts decreasing. January is usually the coldest month with temperature going upto 5.80C. The relative humidity is highest in August about 85% and lowest in April. The district is characterised by alluvial, hard rock as well as marginal alluvium.

The district can be broadly classified into three physiographic units.

- (i) The alluvial Plain
- (ii) Marginal Alluvial,
- (iii) High Land Area.

In Banda district loose sediments as well as black cotton soil is found. Black cotton soil is prominent in the central part. Four major type of soil are dominant in the district (a) Rakar, (b) Mar, (c) Kabar& (d) Padua. The district is characterised by alluvium, marginal alluvium and hard rock terrain. Ground water occurs in porous formation the sand gravel act secondary porosity of fractures / joints.

### 3. Chitrakoot

Chitrakoot district is a part of Chitrakoot Division. The district occupies an area of 3,45,291 km<sup>2</sup>. The district has a population of 990,626 (2011 Census). As of 2011 it is the second least populous district of Uttar Pradesh (out of 71), after Mahoba.

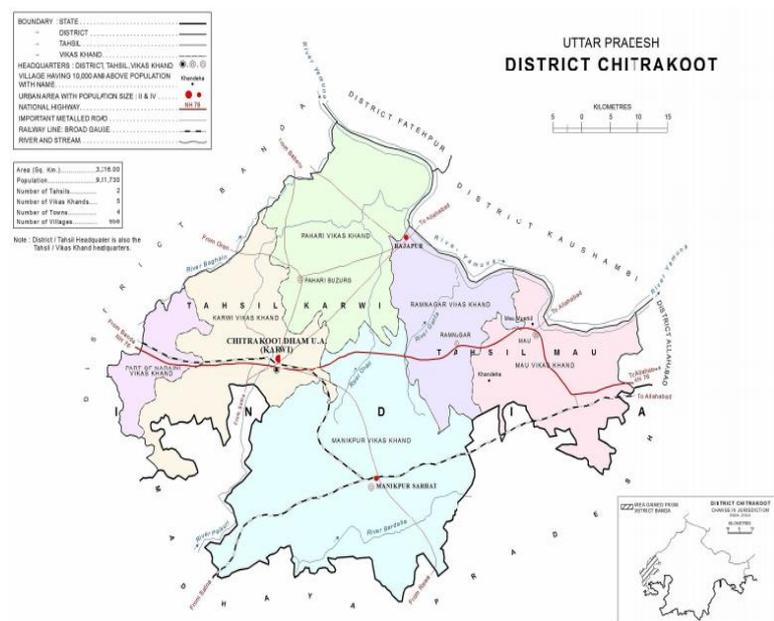
#### Economy

In 2006 the Ministry of Panchayati Raj named Chitrakoot one of the country's 250 most backward districts (out of a total of 640). It is one of the 34 districts in Uttar Pradesh currently receiving funds from the Backward Regions Grant Fund Programme (BRGF). Successive governments have often ignored the district's development and hence has become one of the most remote and cut-off districts in India.

#### Demographics

According to the 2011 census Chitrakoot district has a population of 990,626, roughly equal to the nation of Fiji or the US state of Montana. This gives it a ranking of 448th in India (out of a total of 640). The district has a population density of 315 inhabitants per square kilometre (820/sq mi) . Its population growth rate over the decade 2001-2011 was 29.29%. Chitrakoot has a sex ratio of 879 females for every 1000 males, and a literacy rate of 66.52%.

#### Agriculture:



Mostly people are depends on farming, there are three types of crops, which are as follows:

Khariif : In this period, Main production of Agriculture goods like Dhan,Urd, Macca, Jawar, Bajra,Til, Moug,Reuncha, Sanva, Kakun etc.

Rabi : In this period, Main production of Agriculture goods like Wheet, Channa, Jau, Pease, Mustard etc.

Jayad : In this period, Main production of Agriculture goods like Water Melon, Kakri, Musk Melon, Mango, Jamun,Lemon etc.

**Soil:**

There are mainly five types of Soil in the district, which are following as:Kankirili Soil, Kabar Soil, Balui Soil, Rakad Soil&Padua Soil

**Rivers:**

The important rivers of district Chitrakoot are:

- Yamuna River
- Mandakini(Paishwani) River
- Gunta River
- Bagein River
- Ohan/Balmiki River
- Bardaha River

**4. Jalaun**

Jalaun District is a part of Jhansi Division. The district has an area of 4565 km<sup>2</sup>, and a population of 16,89,974 (2011 census), with a population density of 370 persons per km<sup>2</sup>. The district lies entirely within the level plain of Bundelkhand, north of the hill country, and is almost surrounded by the Yamuna River, which forms the northern boundary of the district, and its tributaries the Betwa, which forms the southern boundary of the district, and the Pahuj, which forms the western boundary. The central region thus enclosed is a dead level of cultivated land, almost destitute of trees, and dotted with villages. The southern portion presents an almost unbroken sheet of cultivation. The Non River flows through the centre of the district, which it drains by innumerable small ravines. The districts of Etawah and Kanpur lie to the north across the Yamuna, while Hamirpur District lies to the east and southeast, Jhansi District lies to the southeast, and Bhind District of Madhya Pradesh lies to the west cross the Pahuj. Garry Anderson is the famous personality of the city.



The district has been under severe drought for the last four years with the average rainfall being about 399 mm which is way behind the average of about 800 mm.

**Economy**

In 2006 the Ministry of Panchayati Raj named Jalaun one of the country's 250 most backward districts (out of a total of 640). It is one of the 34 districts in Uttar Pradesh currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

### Demographics

According to the 2011 census Jalaun district has a population of 1,670,718, roughly equal to the nation of Guinea-Bissau or the US state of Idaho. This gives it a ranking of 296th in India (out of a total of 640). The district has a population density of 366 inhabitants per square kilometre (950/sq mi). Its population growth rate over the decade 2001–2011 was 14.87%. Jalaun has a sex ratio of 865 females for every 1000 males, and a literacy rate of 75.16%.

### Agriculture

Agriculture is the main economic activity of farmers in the district. The three main cropping seasons in the district are kharif, rabi, zaid. The main crops raised in the district include wheat, gram, pea, lentil, arhar, mung, Jowar and bajra.

S.No.	Crops	Area (ha)	Production (MT)	Productivity (t/ha)
1	Wheat	117831	370251	3.14
2	Pulses	209597	276017	1.32
3	Jowar	7483	12114	1.62
4	Bajra	12000	10668	0.89

(Source: Department of agriculture, UP)

Cropping intensity of the district is very low because of the unavailability of assured irrigation, therefore majority of farmers are unable to take more than one crop in a year. Around 85 percent of the area under rabi season and 15 percent under kharif season is under cultivation. Roaring price of diesel and erratic power supply are major causes for very low utilization of irrigation facility. Different types of soils like coarse-grained red soil, brown coloured sandy loam, black soil with clayey texture and sandy loam in Yamuna bed occur in this district. There is good potential for cultivation of horticulture crops. The climate of the district is suitable for cultivation of ber, aonla, custard apple, phalsa, karonda, and acid lime. Likewise, cucurbits, tomato, brinjal, okra etc have good potential. Some of the progressive farmers have benefited from cultivation of mentha. The major constraints being faced in the development of the district are the non-availability of essential inputs such as quality seeds, fertilizers, planting material, depletion of ground water level etc. apart from this basic infrastructure like power supply, proper road connectivity and poor marketing facilities are not available.

**Forests & flora of Bundelkhand** is of the tropical dry deciduous type. In the Bundelkhand plain sub-region areas of Banda, Hamirpur and adjoining districts are along the banks of rivers like Pahuj, Betwa and Yamuna. Species like acacias babul (*Acacia nilotica*), khair (*Acacia catechu*), palash (*Butea monosperma*), ber (*Ziziphus* varieties), tendu (*Diospyros melanoxylon*), mahua (*Mahuca indica*), semal (*Salmalia malabarica*) and kardhai (*Anogeissus pendula*) are found. In the Bundelkhand Intermediate sub-region, salai (*Boswellia serrata*), seesham (*Dalbergia sissoo*), dhau (*Anogeissus latifolia*), jamun (*Syzygium cumini*), seja (*Lagerstroemia parviflora*), karaunda (*Carissa spinarum*), various shrubs and occasionally teak (*Tectona grandis*) are observed.

### The area under forest cover in the 4 districts in sq.km for this project

District	Geographical Area	2013-14 Assessment				% of GA	Change	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
<b>Banda</b>	4532	0	26	77	103	2.27	0	29
<b>Chitrakoot</b>	3092	0	358	216	574	18.56	11	25
<b>Hamirpur</b>	4282	0	66	108	174	4.06	0	39
<b>Jalaun</b>	4565	0	65	180	245	5.37	0	49
<b>Grand Total</b>	<b>240928</b>	<b>2195</b>	<b>4060</b>	<b>8206</b>	<b>14461</b>	<b>6</b>	<b>112</b>	<b>803</b>

### The project location details in the 4 Forest divisions of the 4 districts is as follows :

S. No	Division	Name of villages	Total geographical area (ha)	Pasture land (ha)	Forest area (ha)	Wasteland / Fallow land (ha)	Net sown area (ha)
1	Chitrakut	Ameenpur Chhiwlaha	252.53	0	176.9	24.69	146.54
2	Chitrakut	Duguwa	691.00	0	415.00	16.1	174.05
3	Chitrakut	Pathraundi	453.224	0	255.9	142.73	117.05
4	Chitrakut	Jhari	735.372	0	549.99	52.204	207.70
5	Hamirpur	Bihunukhurd	3099.82	0	89.82	15	2995.00
6	Hamirpur	Gohanai-Panwadi	1384.74	0	234.74	10	1140.00
7	Hamirpur	Benda-Danda	1193.36	0	650.36	9	534.00
8	Hamirpur	Devkhari	663.28	0	453.28	3	207.00
9	Banda	Amara	1383.436	15	76.11	15	1277.326
10	Banda	Sadha	1820.3	4.913	441.7	214.23	1089.469
11	Banda	Kartal	1398.688	0	127.53	166.546	765.12
12	Banda	Dadhawamanpur	2812.24	0	89.88	210	1409
13	Banda	Mancha	838.23	0	125.1	17.003	690.131
14	Jalaun	Teekar	1869.64	0	893	53.052	817.403
15	Jalaun	Aata(Ragauli)	1224.32	0	241.11	37	731.72
16	Jalaun	Tandwa	350.627	0	279.57	16.635	326.388
		<b>Grand Total</b>	<b>20170.807</b>	<b>19.913</b>	<b>5099.99</b>	<b>1002.19</b>	<b>12627.897</b>

#### *d) Demographic details of the population – total population (for area in operation), Gender-disintegrated data, small and marginal, etc.*

According to the Census 2011, Bundelkhand has a total population of 18.3 million (7 districts in UP having a population of 9.6 million and 6 districts of MP having 8.6 million). The sex ratio or number of females to males is 877 women to 1000 men in UP and 930 in MP, both lower than the national average of 940 for India, showing a bias against the girl child in the region. The average density of population in the 7 UP Bundelkhand districts is 277 per square km, much lower than the state average of 828 persons / sq km; and density in MP Bundelkhand districts is 233 persons /sq km more or less equal to the state average of 236 for MP. There is higher population density in the Bundelkhand Plain areas (Jalaun, Hamirpur,

Banda), and Bundelkhand Intermediate region areas (Jhansi, Tikamgarh), and lower population density in Bundelkhand Upland (Panna) and the southern Damoh and Sagar plateaus.

**Population Density:** Density of population in districts of Bundelkhand region has been very low due mainly to the adverse topographic conditions. As per the census of 1991, the population density (person/km<sup>2</sup>) for Lalitpur was 149 persons in Lalitpur followed by 170 in Chitrakoot, 192 in Mahoba, 215 in Hamirpur, 267 in Jalaun, 285 in Jhansi, 304 in Banda against the state average of 473. As per the provisional figure of census 2011, density of population in all 7 districts of Bundelkhand still remained far behind (range between 242 per sq. km and 408 per sq. km) against the state's average of 828 per sq. km. **Sex Ratio:** As compared to the Sex Ratio of the state during 1991 of 879 and during 2001 it was 898. However, for the region, the number of female per thousand male at both census periods remained considerably low, ranging between 829 and 863 in census 1991 and between 842 and 882 in census 2001.

Basic demographic data of Bundelkhand (Census 2001 and 2011) of Bundelkhand districts and comparison with State level and national data

District	Population 2001	Population 2011	Sex ratio 2011	Persons		Rural Population		% Growth Rate
				/sq Km	(%)	2001-11		
				2001	2011	2001	2011	
Jhansi	17,44,931	20,00,755	885	347	398	59.20	58.20	14.66
Lalitpur	9,77,734	12,18,002	905	192	242	85.50	85.60	24.57
Jalaun	14,54,452	16,70,718	865	319	366	76.60	74.90	14.87
Hamirpur	10,43,724	11,04,021	860	232	275	82.50	81.00	11.09
Mahoba	7,08,447	8,76,055	880	263	279	79.50	78.80	15.52
Banda	15,37,334	17,99,541	863	337	408	83.70	84.60	19.84
Chitrakoot	7,66,225	9,90,626	879	250	308	90.50	90.20	25.53

Table: Distribution of small and marginal farmers in UP-Bundelkhand (2005-06)

District	Marginal Farmer				Small Farmer		Large farmer					
	<0.5 ha		0.5 to 1 ha		1 to 2 ha		2 TO 4		4 to 10		> 10 ha	
	Farmer	Avg. plot size	% Farmer	Avg. plot size	% Farmer	Avg plot size	% Farmer	Avg plot size	% Farmer	Avg plot size	% Farmer	Avg. plot size
Lalitpur	35.78	0.27	22.77	0.74	20.45	1.46	13.32	2.82	6.96	6.08	0.71	14.00
Jhansi	35.97	0.26	25.71	0.71	20.44	1.40	10.96	2.74	5.69	5.97	1.24	16.22
Jalaun	21.87	0.30	26.12	0.81	27.23	1.56	14.77	2.81	8.95	5.91	1.05	13.01
Hamirpur	40.37	0.33	19.09	0.72	18.79	1.43	13.58	2.78	7.61	5.94	0.57	12.70
Mahoba	26.34	0.27	27.96	0.71	23.18	1.44	14.77	2.78	7.26	5.83	0.50	13.28
Banda	26.22	0.30	23.56	0.72	23.92	1.44	15.92	2.76	9.29	5.88	1.09	13.22
Chitrakoot	16.93	0.29	24.13	0.73	23.65	1.46	14.30	2.78	7.49	5.92	0.83	13.96
UP Bundelkhand	29.61	0.29	24.13	0.73	23.65	1.46	14.30	2.78	7.49	5.92	0.83	13.96

The demography / population details in the Project area is as follows :

<b>S. No</b>	<b>Division</b>	<b>Name of villages</b>	<b>No. of HHs</b>	<b>Total population</b>
1	Chitrakut	Ameenpur Chhiwlaha	275	1680
2	Chitrakut	Duguwa	317	1785
3	Chitrakut	Pathraundi	365	2163
4	Chitrakut	Jhari	31	148
5	Hamirpur	Bihunukhurd	1204	1935
6	Hamirpur	Gohanai-Panwadi	460	2760
7	Hamirpur	Benda-Danda	217	1396
8	Hamirpur	Devkhari	42	330
9	Banda	Amara	850	9200
10	Banda	Sadha	1927	10150
11	Banda	Kartal	1650	9665
12	Banda	Dadhawamanpur	3250	10600
13	Banda	Mancha	306	2100
14	Jalaun	Teekar	266	1490
15	Jalaun	Aata(Ragauli)	223	1677
16	Jalaun	Tandwa	193	1146

## 1.2 Project / Programme Objectives

Tropical dry forests are very sensitive to changes in rainfall, which can affect vegetation productivity and plant survival (Hulme 2005, Miles 2006). A slight annual decrease in precipitation is expected to make tropical dry forests subject to greater risk from forest fires in the immediate future. Prolonging the dry seasons would enhance desiccation, making the forest system more exposed and sensitive to fires. The vulnerability of tropical forests is also increased by non-climatic pressures, such as forest conversion and fragmentation.

Adaptation is fundamentally local (Adger et al. 2005a, Agrawal and Perrin 2008), but is influenced by factors from higher scales (e.g., national policies or management at the landscape scale).

Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (UPPFMPAP) has been implemented in 20 Forest Divisions spread over 14 districts namely i. Terai (5 districts) ii. Bundelkhand (5 districts) and iii. Vindhyaachal (4 districts) of Uttar Pradesh. This project, being funded by the Japan International Cooperation Agency (JICA), aimed at restoring degraded forests, augmenting forest resources, improving livelihoods and empowering the local forest dependent communities. The empowerment was done by promoting sustainable forest management including Joint Forest Management (JFM) plantations and community development initiatives, for improving the environment and alleviating poverty. The project operational since 2008 was implemented for a period of 8 years. The Project mainly envisaged restoration of degraded forests for augmentation of forest resources, secure sustainable forest management by improving forest administration community organizations and other stakeholders and Improvement of income and livelihoods of the forest dependent population. The project targetted some 800 Joint Forest Management Committees (JFMCs) and 140 Eco – development Committees (EDCs) including 2680 Self Help Groups (SHGs).

Monitoring and evaluation of this programme by NABCONS brought out that empowered JFMCs were able to restore degraded areas and secure sustainable management of forests. Based on this premise, the current project aims to empower these JFMCs to restore additional degraded forest areas and sustainably manage these forests which could result in a better microclimate.

The main objective of the programme is to improve the ecosystem of forests and community / grazing through increase in tree cover by social and agro forestry plantation on community, degrade forest areas and wastelands and also improvement of water regime.

### **Objective 1 : Baseline Survey, Assessment and Planning**

To carry out an integrated socio-economic and ecological baseline survey for assessment of vulnerability to climate change. Assessing the vulnerability of forests and forest-dependent people requires that such cross-scale factors be taken into account. Second, time horizons must be relevant for the decision to be taken (e.g., long term for a long rotation plantation, or more short term for local social adaptation) (Füssel 2007). Third, as the vulnerability of forest people to climate change depends on the state of their forests, and the vulnerability of forests depends on the people's decisions, vulnerability assessment should integrate social and biophysical dimensions and be interdisciplinary. Fourth, the participation of forest stakeholders is essential in vulnerability assessments. Vulnerability assessments performed only by scientists are likely to fail to facilitate adaptation processes (Füssel 2007) because

stakeholders involved in vulnerability assessment are more likely to participate in adaptation planning and implementation. Participatory vulnerability assessments are a way to engage stakeholders into a process of adaptation and, therefore, can be a means as well as an end. Participation can also help to integrate different views on vulnerability, especially the perception of local indigenous. The baseline data will provide the basis for adaptation planning, identification of specific locations, farmer households for easy implementation. Specific tools will be used to carry out the baseline survey and assessment.

**Activity 1.1: Villagewise PRA for assessing Climate change Vulnerability:** Village wise Participatory Rural Appraisal for assessment of current socio-economic and ecological scenario and carry out an analysis to identify risks under climate change and the key challenges to be addressed to implement this project.

**Activity 1.2: Socio-economic HH survey for assessing vulnerability** - Socio-economic Baseline survey to assess the current status of households and the vulnerabilities at the household level to climate change, based on land and livelihoods. Assessment on expectations from the project and the preparedness towards adaptation. Household survey to also cover details on assistance received from various ongoing State Govt. schemes and also convergence support available through various State govt. This information would lead to avoiding overlaps / duplication of any kind.

**Activity 1.3: Orientation / Training / Workshops on Climate Resilience, Adaptation & Community mobilisation**

Orientation / Training / Workshops will be held to sensitise the inhabitants of the 16 villages on the various resilience and adaptation measures to be implemented under this pilot project. This will lead to community mobilisation for facilitating implementation of the project and phase out project measure over a period of 4 years based on priority. Priority planning is expected to be a major outcome of this activity.

**Activity 1.4 : Database creation and maintenance**

Data collected through Household Survey and also through group discussions will lead to creation of database and further analysis which will lead to better planning.

**Objective 2 : Improve forest ecosystem through community based restoration of degraded forest areas**

There are several approaches to restoring and rehabilitating vast areas of degraded, fragmented and modified forests which cover much of the world. It is argued that by applying best practice at the site level, it is possible to enhance socio-economic and ecological gains at the landscape level. This approach is consistent with the ecosystem approach called for in the Convention on Biological Diversity. The ecosystem approach is based on the realization that:

- Land management has on-site and off-site impacts on ecosystems and people and therefore must be undertaken within the limits of ecosystem functioning;
- Viable species populations and healthy ecosystem processes cannot be contained within small units of land measured in tens or hundreds of square kilometres, particularly when these areas are disconnected; and
- Conservation planning and action must take place across whole landscapes and involve multiple interest groups.

IUCN – The World Conservation Union and WWF through both practical projects and the provision of credible policy advice, aims to promote ecological integrity and enhance human well-being in deforested or degraded forest landscapes by:

- producing a wide range of goods and services, rather than simply planting trees;
- linking forest restoration and rehabilitation activities at the site level with the environmental, social and economic needs at the landscape and eco-regional level;

**Activity 2.1: Orientation and awareness for forest protection, watch & ward, institutionalisation of systems / penalties/ rights etc.**

A number of orientation activities would be supported under this component to build human resource capacities for improved forest management. These would include: (i) training for strengthening local self-governance institutions, including Joint Forest Management Committees (JFMCs), to establish Community Reserves for co-management, monitoring and sustainable and equitable access to NTFP resources; (ii) generation of baselines for realistic assessment of the dependencies/ livelihoods on NTFPs, (iii) orientation of JFMC members about their rights and inculcating a system of penalties in a way to curb violations and bring about a positive change in behaviour.

The activities envisaged are orientation programmes, exposure visits, meetings, workshops, brainstorming sessions, role play exercises, maintenance of books, grievance redressal etc. The budget will be for meeting incidental expenses related to mobilisation villagers and publicity.

**Activity 2.2: Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing per trench) trenches/ha)**

This would involve taking up block plantations / Plantation- cum- Stand Improvement in degraded forest lands which are mainly open forest areas with less than 40% crown density/ wastelands. Development of degraded forest lands / wastelands will be done by growing traditional forestry species of economic value as per the Working Plan which would also provide firewood, fodder, timber and other non-timber forest produce. This on one hand will increase the forest cover and help in carbon sequestration and on the other hand will provide additional livelihood opportunities out of the degraded land. Thus, simply protecting forests which is already there and utilizing wastelands areas with fresh planting of species like babul (*Acacia nilotica*), khair (*Acacia catechu*), palash (*Butea monosperma*), ber (*Ziziphus* varieties), tendu (*Diospyros melanoxylon*), mahua (*Madhuca indica*), semal (*Salmalia malabarica*), kardhai (*Anogeissus pendula*), salai (*Boswellia serrata*), seesham (*Dalbergia sissoo*), dhau (*Anogeissus latifolia*), jamun (*Syzygium cumini*), seja (*Lagerstroemia parviflora*), karaunda (*Carissa spinarum*), chilbil (*Holoptelia integrifolia*), bacain (*Melia azadirachta*), neem (*Azadirachta indica*) and teak (*Tectona grandis*). With ever increasing demand for forest produce such as fuel wood, timber, fodder, this project activity is expected to be immensely beneficial.

A total area of 732 ha. is to be covered through plantation. In each of the villages, the Departmental plantations could be planned to a maximum of 25% of the available area which can serve as demonstration (as regards species mix and technical norms since traditional species are to be grown) for the JFMCs to take up plantation in the remaining 75% or more area available.

Valuable NWFP species in general will be mixed with high value species in terms of timber quality for seed sowing/ planting subject to locality factors. 200 staggered contour trenches

&500 pits (per hectare) will be dug at a spacing of 3m x 3m. In each of the trenches, 3 (three) seedlings will be planted. The various items of works and costs are given in the **Annexure**.

**Activity 2.3: In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas**

In addition to basic soil and moisture conservation taken up through plantation activities, it was brought out that there is a need to have soil and moisture conservation in specific patches of forest areas which require some treatment. These measures could be in the form of (i) series of gully plugs (ii) brushwood dams (iii) nala bunds with / without stone pitching (iv) Diversions drains (v) Stone outlets (vi) Soil reclamation etc. These measures may also be taken up in peripheral areas which have an affect on the area being considered for planting.

**Activity 2.4: Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas**

Protection is the key for increased survival percentage of trees raised through plantations especially in Bundelkhand wherein 'Anna pratha' (free grazing) is widely observed and accepted by the local community. Hence, protection in the initial years is a must. Considering that there could be some form of existing protection in the identified degraded forest areas therefore provisions in the form of widening / deepening / renovation / maintenance of existing Cattle Proof Trenches / Stone Walls are being made. However, this would also include construction of new CPTs / Stone Walls wherever required. This activity could be critical since it has been found that projects implemented earlier missed out on the vital component of 'maintenance of protection structures'.

**Objective 3: Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry**

The target for next 20 years as mentioned in UP State Action Plan for Climate Change, is to bring 1/3<sup>rd</sup> area under agro forestry. This will be achieved by providing saplings of multipurpose trees to all the farmers in the villages as per their land availability. 15000 plants per village will be distributed for coverage in 30 ha. area. Hence, a total of 480 ha. is expected to be covered through as an adaptation measure to tackle the fluctuation in climatic conditions and also taking into account the needs of the.

**Activity 3.1: Promote agro forestry** - Planting trees of economic value with community participation. As such the forest department in coordination with agriculture department and other appropriate agencies will plan and undertake agro forestry initiatives. This will also include the training of the land owners or farmers for post plantation care, visit by forest department staff, agroforestry specialists/scientists from institutions, universities, etc.

**Activity 3.1.1 Integrated central nursery cum climate resilient technology centre comprising conventional/clonal/Polyhouse /Root trainer + Vermicompost model + SWP well for irrigation + Nursery for raising medicinal plants & crop and its seed production and Agroforestry dissemination centre (within 5 ha.)**

**Integrated nursery-cum-Climate information centre** - This infrastructure will comprise two types of nurseries ie. Forestry nursery & Horticulture nursery. The area will have 2 sections wherein one section shall be occupied with a forest nursery and the other section shall have a horticulture nursery. This centre will also have an Administrative building, 2 classrooms with audio visual facilities having capacity of 30 persons and workers shed / covered godown.

**Forest nursery-** A forest nursery will be set up wherein 1.25 lakh seedlings can be raised. The nursery would be on a gently sloping land to ensure proper drainage. Site preparation will be done by ploughing and hoeing the land. Initially the nursery will be raised in mother beds and will be pricked out in polybags. This nursery would have perennial source of water to ensure adequate supply in hot weather. The shape of the plot would be rectangular and would measure 100m x 25 m. Ten seed polybeds would be raised of 10m x 1m i.e. 10 sq m. The number of polybeds required at this stage is at 1:12ratio i.e. 12 polybeds for each of the primary/seed polybeds. The 1.25 lakh seedlings will be raised in a total of 120 polybeds (1000 seedlings per polybed) of which 1.20 lakh seedlings would be raised in polybags and remaining 5000 will be naked rooted seedlings. The seedlings will be hardened in the nursery by reducing the water supply over a period of time and exposing them to sunlight over different durations. This would make them capable of facing adverse weather conditions once they are transplanted onto the field. The nurseries would be temporary in nature and of five year duration. During the summer months, shading would be provided by using polythene sheets or shading nets. Bamboo mats can also be used for providing shade. Protection measures would be taken like fencing the area with barbed wire. The nursery will aim to produce healthy plants covering timber, fuel, fodder, fruits, non-wood forest produce and even ornamental species having good demand in the area. Besides this, the prevailing agro-climatic conditions in the area would be taken into consideration while selecting the species. Since the saplings would be ready for plantation anywhere from the 6th month to 12th month depending on the species, returns can be generated from the first year onwards.

**Horticulture nursery** - For a horticulture nursery with a capacity to produce 25000 to 30000 quality plants (grafts or layers of perennial fruit crops per annum, an area of about 2 acres (0.80 ha) with assured irrigation facilities would be required. This nursery will have production components which comprises of mother plant garden, rootstock nurseries, poly tunnels, mist chambers, etc., different types of irrigation systems such as:

- Drip irrigation system for Mother Plants;
- Manual watering with rose cans or micro sprinklers for root stock nursery beds and shade net areas;
- Micro sprinkler for poly tunnels for vegetable nursery production where envisaged;
- Water storage tank (masonry structure or HDPE tanks of 10000 L capacity)
- A well laid out pipe line distribution system across the nursery unit to meet the above requirements.

The unit shall comprise of a mother plant garden of descript varieties of commercial significance to meet bud-wood / scion requirements. Root stock will be raised in the nursery unit with compatible species preferably with disease tolerant and /or dwarfing rootstocks. Improved methods of propagation like veneer, epicotyl /stone grafting/softwood grafting would be adopted.

Plant growing structures like mist chambers, poly house, and shade net facilities would be provided to improve success rate and production of better quality planting material. Provision made for related infrastructure facilities like irrigation (water storage tank, drip/micro sprinklers/ misting), store house for inputs, work area for pot mixture and potting operations, fencing, etc.

Some of the important varieties that are in demand are indicated below for reference. The list is only indicative. Varieties shall be identified / selected considering the preferences / demand in targeted market regions. Aonla, Berry, Custard Apple, Guava, Karondha, Lemon, Kinnow, Orange, citrus varieties etc. can be grown.

**Medicinal & Aromatic Plants nursery** – The project envisages distribution of seedlings / treated seeds / cuttings / slips for cultivation. These will be taken up in the nursery so that higher germination is achieved as also sufficient hardening in the nurseries so that there is a better survival rate in farm lands.

**Vermicompost Demonstration Unit** – In this demonstration set-up, the optimum size of beds, sheds as also the package of practices will be demonstrated. Further, the worms available after multiplication will be available for distribution at a cost, so that interested farmers should be able to take up this activity.

**Administrative building, Classrooms and worker sheds** - An administrative building accompanied by two classrooms with audio visual facilities shall be constructed to in this centre. The administrative building shall have an office room of dimension 10\*15 sqm, two classrooms of 10\*12 sqm dimensions and a 10\*10 sqm worker shed.

**Activity 3.1.2 : Horti-silviculture : horticulture+ trees in community / grazing / other govt. lands** Multipurpose perennial & semi perennial food and fruit trees, plant varieties which can be a regular source of fodder, firewood and herbs can be taken up for plantation in fallow / waste lands. Fast growing, nitrogen-fixing and multipurpose trees will be planted to act as carbon sink, produce fodder and consequently provide more green manure for preparing vermicompost etc. which can reduce the need of chemical fertilizers that produce NO gases contributing to global warming. Chia & Quinoa cultivation will also be taken up as an intercrop in 25% of the area on site suitability basis.

**Activity 3.1.3 : Water resource / Spring development / Well / Small pond** – For sustenance of plantations in community / grazing lands, irrigation support may be required. This would be through Dugwell / Small pond (depending on site suitability) which will provide supplementary irrigation support to the freshly planted seedlings.

**Activity 3.1.4 : Live hedge fencing along community lands** – This would be critical in reducing man-animal conflict wherein cattle and other animals (Nilgai, wild pigs) destroys plants. Various xerophytic species such as *Opuntia* and others would be planted. Besides this, *Dedonia* could also be planted on the periphery. Karondha is a preferred local species which is planted on the boundaries. Subabool can also be considered for planting on the boundary.

**Activity 3.1.5 : Support to JFMCs for raising nurseries for multipurpose trees** – To ensure people's participation living in the fringe areas, support will be extended to JFMCs in the form of a revolving fund, which can be further be given as credit to SHGs for raising seedlings in nurseries. The seedlings raised will be of multipurpose (fruits, fuelwood etc.) species which the JFMC members and other interested farmers can plant in the periphery of their farm lands. Marginal and landless farmer can use these seedlings and plant them on the land. At least 12-15 varieties of trees (including Tissue cultured bamboo, clonal varieties of *Melia dubia*, *Simarouba*, *Kadam*, *Acacia* etc.) & 6-8 types of shrubs/herbs can be planted on the periphery of farm lands. Multipurpose perennial & semi perennial food and fruit trees, plant varieties can be a regular source of fodder, firewood and herbs, which can sustain in the high temperature and drought conditions. The saplings raised through these nurseries will also be used for plantation in JFMC areas as also for Horti-silvi pasture plantation.

**Activity 3.1.6 : Vermicompost making** - Support will be extended to JFMCs in the form of a corpus, which can further be given as credit to SHGs for vermicompost making. The vermicompost prepared can be used for raising plantation in degraded forest areas / community lands. The SHGs may even consider selling vermicompost to JFMC members /

farmers. It is assumed that due to large number of cattle in this region, availability of cowdung wouldn't be a challenge.

### **Activity 3.2 : Building climate resilience for livestock through plantation of green fodder & developing Fodder storage**

Rise in temperature and abrupt monsoons influence existence of grasslands. Moist deserts and dry grasslands (characteristic in the Bundelkhand region) are very similar and if temperatures increase, the resulting change in rainfall patterns could lead to some of these marginal grassland ecosystems becoming deserts. Further, because of prevalent 'Anna pratha' in the region, these type of lands are under intense pressure.

Hence, use of community lands for fodder production during droughts/floods and improved fodder/feed storage methods can build some resilience within the community during periods of climatic stress. Considering the continuous pressure on cultivable lands, it is imperative to look for alternate land use systems. Silvopastures integrate pasture and/or animals with trees. Under poor soil, water and nutrient situations where cropping is not possible such systems can serve the twin purposes of forage and firewood production and ecosystem conservation. The grazing intensity in our country is as high as 12.6 ACU (Adult Cow Unit) /ha. as against 0.8 ACU/ ha in developed countries. Therefore, the task is twofold viz. improvement of pasture and judicious implementation of grazing management. Under different pasture utilisation systems viz. rotational, deferred rotational, continuous and cut & carry; the highest run-off and soil loss has been recorded in a continuous system while minimum run-off has been recorded in a rotational system. However, minimum soil loss has been recorded in cut & carry system. This intervention will be taken up with the help of Department of Animal Husbandry.

#### **Activity 3.2.1 - Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing / other govt. lands**

Leguminous species such as berseem, lucerne, cowpea, dolichos and stylos are very good forages which can be promoted alongwith grasses like Bothriochloa, Dicanthium, Cynodon, Panicum, Pennisetum, Cenchrus, Lasiurus etc. and browsing plants such as Leucaena, Sesbania, Albizzia, Bauhinia, Cassia, Grewia etc. Grassland development in identified grazing lands near 'Goushalas / proposed goushala' can be taken up with different species combinations. JFMCs can actively manage the developed grasslands through 'cut & carry' system or any other suitable method. Support from Department of Agriculture / IGFRI / Krishi Vigyan Kendras, will be taken.

#### **Activity 3.2.2 - Development of Fodder Storage-cum-bank facility**

It is widely believed that changes in temperature, rainfall regime, and CO<sub>2</sub> levels will affect grassland productivity and species composition in dynamics, resulting in changes in animal diets and possibly reduced nutrient availability for animals (Izaurrealde et al.,2011; Thornton and Herrero, 2014). During the wet season cultivated lands provide adequate forage whereas during the dry season, the quantity and quality of forage greatly decreases and is generally low in nutritional value and livestock sustained on such diets are less productive. Other than providing quality feed & concentrates, a practical option is to establish fodder bank cum storage which will have planting material of high-quality fodder species which can provide high biomass in short time and bridge the forage scarcity. These fodder banks can also help in preservation and storage of surplus fodder, make available nutritious fodder during the period of fodder scarcity.

A Fodder storage godown is proposed to be set up for primary processing and storing generated fodder. An area of 60 sq. mt. will be required which shall be provided by the FPOs/FCs / FIGs/ SHGs which shall run the storage on a rental basis. It shall have a height of 1.5 meter plinth level with 2.75 meter wall over the plinth. A Pre-Engineered Building (PEB) structure shall be mounted for the roof. The front side shall contain a loading/unloading dock and the structure shall be equipped with minimum power supply. The structure shall have a storage capacity of 100 MT. Support for establishment of these fodder bank cum storage facility will be extended for setting at least one in the project villages and the Gram Panchayats may appoint bodies / society to manage this infrastructure sustainably. Support from Department of Agriculture / IGFRI / Krishi Vigyan Kendras, will be taken.

**Activity 3.2.3-Knowledge and capacity building of farmers on IGFRI models and Fodder development & management** – Through this project, technical orientation to farmers / JFMC members will be provided on Forage Crop Improvement (including integrated pest management & animal nutrition), crop sequencing (incl. integration of forage crops in the existing cropping systems), fertiliser management (use of biofertiliser & organic manure) for increasing herbiage production per unit area, maintenance of soil health, scientific management of water and management of grazing resources. Further, these farmers would also be trained for operationalisation of the Fodder storage-cum-bank facility.

**Activity 3.3 :Building adaptive capacity of farmers through adoption of medicinal, aromatic & nutritional plants / crops (Alsi, Aloe vera, Arandi, Kulthi, Tulsi, Quinoa, Chia, Lemongrass) cultivation**

This activity is mainly aimed at building adaptive capacity of farmers residing in the project villages by enhancement of their livelihood incomes by cultivating medicinal and aromatic plants as intercrops.

**Activity 3.3.1 :Fencing support for areas for growing medicinal plants and crops in farm lands** – This activity will seek to promote growing of medicinal, aromatic and nutritional plants in the farm lands for a group of 4 to 5 farmers having contiguous land. Individual farmers/ JLGs / SHGs cultivating the medicinal plants will need protection from cattle grazing. Cattle proof stone wall/Cattle proof trench will be constructed through forest department/JFMCs. This fencing may have shikakai/Arandi live hedges also.It has been assumed that every acre may require 100 rmts of fencing if the plots are contiguous. Hence, in every village of the project area, for an area of 8 ha. to be brought under medicinal/aromatic/nutritional plant cultivation, provision for fencing has been considered.

**Activity 3.3.2 : Transportation of seedlings / slips / cuttings / seeds of MAP/Cs & distribution** - The seedlings/slips/cuttings/ treated seeds to be developed in the Central Nurseries in each of the divisions are to be distributed to the farmers which will require transportation by trailers / trucks and would also include loading and unloading. Significantly, this has to be properly organised and scheduled so that farmers receive the planting material at the right time.

**Activity 3.3.3 : Training to farmers on cultivation, processing, value addition, packaging and marketing of medicinal/aromatic/nutritional plants / crops** – Farmers will be trained in cultivation, processing, value addition, packaging and marketing of medicinal/aromatic/nutritional plants / crops. The list of institutes/ agencies for training and maket linkage is as follows :

- Fragrance and Flavour Development Centre. (website-www.ffdcindiaorganisation)/ Central Institute of Medicinal & Aromatic Plants (CIMAP)/ Indian Grassland and Fodder

Research Institute (IGFRI)/ Chandra Shekhar Azad University of Agriculture and Technology/ Forest Research Institute, Kanpur/ Local Cultivators / NGO.

- Organic India/ Himalaya/ Patanjali/ Indian Pharmacy Graduates' Association (IPGA)/ Fragrance and Flavour Development Centre

**Activity 3.3.4 :Value addition, drying, ware-housing and augmenting marketing infrastructure etc. support to JFMCs / FPOs from NMPB (Rs. 15 Lakh) in each cluster**

For primary processing by drying and storage of harvested produce, Workshed and storage godown is proposed to set up with support from National Medicinal Plants Board (NMPB) in each of the clusters.

**Activity 3.3.5 : Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres**

Volunteers will be identified from the project villages. Willing community leaders from the villages could also be selected as volunteers and their capacity building will also be taken up. The volunteers for this project could be farmers / members of JFMCs. These volunteers will be trained on the 'package of practices' for medicinal, aromatic and nutritional plants and also linked to KVKs for receiving the agro-advisories based on climate data. These volunteers will be responsible for dissemination of information as also in acting as a link for the farmers. These volunteers will also be responsible for operationalisation of Value Addition Centres

**Activity 3.3.6 :Support to Community Based Organisation (CBO) for Processing Plant facility at project level** : Cultivation of medicinal and aromatic plants would require secondary level processing, which can only be taken up through equipments (Plant & Machinery). This can be taken up at the project level wherein support for procurement of P&M can be provided from this project. A mature FPO may be considered for running this as a viable unit. Additional requirements for establishing this unit will be from contribution from farmers & bank loan, if required.

**Objective 4 : Water conservation structures to arrest run-off of rain water (check dams, Ponds and Wells) in JFMC and other areas falling in the same watershed catchment**

Soil moisture and water conservation work is proposed in forest areas of different watershed catchment area of the region. The main purpose of such works is to achieve drought proofing through in-situ moisture conservation, conservation of ground water and make more water available for agricultural and other use by various village communities. This involves construction of water harvesting structures, check dams, ponds and wells taking into account the projected rainfall intensity in forest areas as well as outside forest areas. JFMCs will take decisions with respect to the location of the structure, however priority will be for the most vulnerable group of people.

**Activity 4.1 : Construction of Check Dams (5m to 10m / 10m to 20m span) –** Construction of these check dams in forest areas and especially in adjoining / peripheral areas will enhance not only surface storage but will also have the potential for groundwater recharge. These can help in providing irrigation to plantations also. The nos. of Check Dams is as per average cost for 10m to 20m Cement Concrete Check Dam. Depending on site suitability the nos. of check dams and the length could vary, however, any increase or decrease can be considered proportionately to the average unit cost proposed.

**Activity 4.2 : Construction of Check Dams (20m to 30m span)** – These Check Dams in lower reaches will greatly help the farmer community in irrigation. The nos. of Check Dams is as per average cost for 20m to 30m Cement Concrete Check Dam. Depending on site suitability the nos. of check dams and the length could vary, however, any increase or decrease can be considered proportionately to the average unit cost proposed.

**Activity 4.3 : Construction of water harvesting structures such as farm ponds (with Solar Water Pumps)** of size 22m X 20m X 3m. For the maximum availability of water into the pond, 20 % of the area will be of depth of 4 to 4.5 m. For extraction of water Solar Water Pumps has been considered.

**Activity 4.4 : Well deepening / digging with water lifting device (Solar Water Pump)** for group irrigation – Since groundwater availability is at an average depth of more than 150 ft, hence well deepening along with artificial recharge structure can greatly enhance the availability of water for agriculture.

**Objective 5 : Awareness, Knowledge Management and Template for Replication**- This is very important component of the proposed project, as without awareness and knowledge management among the community people the activities cannot be carried out successfully. Hence for the same following activities are proposed:

- Awareness films
- Printing materials, Newsletter, Journals, brochure, pamphlets
- Website design & regular updating
- Farmers Convention / Melas
- Mass Awareness Events
- Sharing & Awareness generation workshops at District, Division and State level
- Reporting and documentation will include mid term assessment of the project and development of framework for template of replication.

### 1.3 Details of Project/ Programme Executing Entity:

**Name and other details.**

Name: Uttar Pradesh Forest & Wildlife Department

Registration No. :

Registered Address: Aranya Bhawan, 17 Rana Pratap Marg, Lucknow-226016

a) *Available technical manpower for the proposed project implementation:*

**Technical Manpower**

S. No.	Designation
1	Principal Chief Conservator of Forest
2	Additional Principal Chief Conservator of Forest (Projects)
3	Chief Conservator of Forest (Projects)
4	Chief Conservator of Forest (Bundelkhand)

S. No.	Designation
5	Chief Conservator of Forest, Jhansi
6	Chief Conservator of Forest, Chitrakoot
7	DFOs posted in the 4 Divisions of Bundelkhand region and Range Officers & Staff will be technically handling the implementation.

*b) Three largest Climate Change Adaptation Projects handled (if already implemented)*

**ARCDM project** - The project funded through a loan provided by the Japan International Cooperation Agency (JICA) in 2008-09 was for the duration of 8 years starting from 2008-09 to 2015-16. The SSC A/R CDM project comprises of eight Joint Forest Management Committees (JFMCs) areas falling within the Renukoot Forest Division of UPPFMPAP. The local people including socially and economically backward classes in these areas are heavily dependent on the forests for their livelihood. This has caused huge degradation of the forests and reduced the potential of the forest resources to fulfil the demands of local people. The project aimed to restore the degraded areas and enhance forest cover through reforestation activities in order to improve the livelihood and empower local people. A total of twenty native tree species were proposed for reforestation activities within the project areas. The SSC A/R project activity focussed on promoting Sustainable Forest Management (SFM) through the involvement of local communities thereby improving environment and alleviating poverty. The project also focussed on women empowerment, training and capacity building of front line forest staff, JFMC members, Forest User Groups (FUGs), and Self Help Groups (SHGs) etc.

*c) Three largest community based NRM based projects handled*

**1. Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project** - It is under implementation in the 20 forest divisions spread over 14 districts of the state of Uttar Pradesh. The project is being funded through a soft loan provided by the Japan International Cooperation Agency, JICA (formerly Japan bank for International Cooperation). It aims at restoring degraded forests, augmenting forest resources and improving livelihood for and empower the local forest dependent communities. The empowerment is sought to be achievement by promoting sustainable forest management including JFM plantation and community development, thereby improving environment and alleviating poverty.

**2. Bundelkhand Package** - This project is aimed at intensive management and eco restoration of ravine areas of Bundelkhand. The activities include watershed management in forest land, soil & moisture conservation works, assisted natural regeneration works etc.

*d) Three largest Climate Change Adaptation / NRM projects of State / Central Government*

**1. National Plan for Conservation of Aquatic Ecosystem** - This is also a centrally sponsored scheme in which Ministry of Environment and Forests, Govt. of India releases financial help for conservation and management of identified wetlands of state. Thirteen major wetlands have been declared as Wildlife Sanctuaries for better management and conservation of

wildlife specially birds of these areas. In these sanctuaries management and conservation activities are carried out according to approved management plan. Apart from these wetlands there are many more wetlands outside the jurisdiction of Forest Department. State level wetland steering committee of Uttar Pradesh directed the district level committees to identify the important wetlands in the district by the help of concern departments. There are around 1808 such wetlands which will also be taken up under this project. In these wetlands habitat manipulation activities, tourism development activities, protection and conservation activities. Awareness & people participation activities will be carried out. Such important activities include catchment area treatment; protection & monitoring; restoration measures; desilting & dredging; water management; biodiversity conservation; sustainable resources development; weed infestation & its control; alternate livelihood; environmental education & awareness.

### 2. Integrated Development of Wildlife Habitat -

Under this centrally sponsored scheme management and conservation of wildlife sanctuaries of the state are taken up.

**3. Project Tiger-** This is a centrally sponsored scheme where in management of important tiger habitat like Dudhwa Tiger Reserve and its buffer is being carried out. Activities like strengthening of infrastructure, maintenance of Wildlife Habitat, development of ecotourism activities etc. are being taken up in areas under the project.

e) *Comment of availability of suitable infrastructure for implementation proposed projects (vehicles, computers, required software/ tools, etc.)*

Enough Infrastructures is available for the project implementation in the department

*Whether Executing Entity (EE) was blacklisted, barred from implementation of projects, faced any charges / legal cases related to mismanagement of project and funds. (Please list any such incidences and reasons):*

No

### 1.4 Projected Calendar:

Milestone	Date
Project Start Date	01/10/2017
Completion of First Annual Cycle	01/10/2018
Completion of Second Annual Cycle	01/10/2019
Midterm Review	31/12/2019
Completion of Third Annual Cycle	01/10/2020
Completion of Fourth Annual Cycle	01/10/2021
Final Review	31/12/2021

### 2. PROJECT JUSTIFICATION:

## a) Component-wise details and justification of the project components

### i. *What is the business-as-usual development for the targeted sector?*

Business as usual development was carried out previously through various projects / schemes as under:

**Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project:** The main objective of the project was rejuvenation and management of the degraded forests and to improve the earning capacity of local communities through public participation. The project is being implemented in 20 forest divisions in Pilibhit, Uttar Pradesh, Lakhimpur Khiri, Bahraich, Sravasti, Balrampur, Jhansi, Lalitpur, Hamirpur, Mahoba, Chitrakoot, Allahabad, Mirzapur, Sonbhadra and + districts. These districts have been selected in view of the degraded forests in the Bundelkhand, Terai and Vindhya region. Under this scheme the works like rehabilitation of degraded forests, enhancement of forest resources, conservation and better management of wild-life and improvement of income and living choices of the forest dependent people were carried out. JICA project sites were visited by the project team members to analyse the situation of the progress of the project so as to understand the challenges faced and possible risks in future under the same activity.

**Rashtriya Krishi Vikas Yojana (RKVY) :** RKVY, launched in 2007, provides 'additional central assistance' to Central Government and state schemes related to agriculture. Among the projects funded by RKVY is region-specific agriculture research and preparation of district agriculture plans, taking into account local needs and conditions.

**Bundelkhand Package:** This project is aimed at intensive management and eco restoration of ravine areas of Bundelkhand. The activities include watershed management in forest land, soil & moisture conservation works, assisted natural regeneration works etc. Massive portion of the funds was to be allotted for the already existing schemes of watershed management, irrigation, drinking water, animal husbandry and environment.

**State CAMPA:** Under the provisions of Forest Conservation Act, 1980 various agencies who get permission to use forest land for non-forestry purposes pay for compensatory afforestation and also the Net Present Value of the land as per orders of Hon Supreme Court. This money is with Ad- Hoc CAMPA Committee of GOI and state share is released to State CAMPA on yearly basis. Different forestry and other activities are undertaken in this program.

**Apart from these various rural development programmes in Bundelkhand region are as follows:**

- Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
- Pradhan Mantri Gram Sadak Yojana (PMGSY)
- Swarnjayanti Gram Swarozgar Yojana (SGSY)
- Rural Housing (IAY)
- National Social Assistance Programme (NSAP)
- Total Sanitation Campaign (TSC)
- Accelerated Rural Water Supply Programme (ARWSP)/ National Rural Drinking Water Supply Programme (NRDWP)
- Integrated Watershed Management Programme (IWMP/ DPAP/Hariyali)

However, in all these programmes we do not see any major improvement in quality of life of the beneficiaries in the region. With several initiatives taken for Soil and Water Conservation, promotion of agriculture and livelihood activities, the climate change issues

faced in the project areas are still unaddressed. A minor deficit in rainfall becomes cause for the drought and affects the agriculture produce of the farmers. Over 70% of population in the region is dependent on agriculture, livestock, usufructs from forest, hence making the development of the region highly dependent on the rains. The drought is not new to Bundelkhand region but the frequency is increasing for last few decades due to climate change. The vulnerable group of people living in the villages especially those living in forest fringe villages have not been addressed.

Also, specific focus on climate resilient farming system is lacking whereas focus in the sector has been more on augmenting production and productivity. Use of scientific package of practices in different crops is lacking due to various reasons where capacity gap is prominent. As agriculture sector has become more market driven, focus has shifted from environmental friendly sustainable agricultural practices to commercialization of production system with unregulated practices that have negative impact on soil and local environment. The concept of vermicomposting can be used to make the agriculture practice more sustainable and qualitative.

As there is abundant land available which is either waste or is not cultivated by farmers due to lack of water resources or fear of being destroyed by the animals (anna cows or neel gai). Hence practices of agro forestry or farm forestry can be considered, by growing drought tolerant species of trees with grass species. The fodder banks-cum-storage structures will be developed in these districts so that drought in the region do not affect livestock development and prevent forest degradation.

Famous 'Anna Pratha' tradition in the region, in which farmers abandon their cattle from the onset of summers till the sowing of the next crop, is also one contributing factor. Various schemes discussed above are implemented without considering such local issues, which results in no visible output of the schemes to the beneficiaries.

So, it would be appropriate to say that the current level of measures are more focused to improve the agricultural production system which is somehow forced to compromise with the sustainable climate resilient farming system. Recently, the State Government seems initiating different measures to deal with the climate variability and related problems arising out of climate change action plan. This project proposed is part of the overall initiative of the State Government to deal with adaptation to the climate variability situations.

*(ii) What are the specific adaptation activities to be implemented to reduce the climate change vulnerability compared to the business-as-usual situation?*

#### **Baseline Survey, Assessment, Orientation and Planning**

##### *Adaptation Activity*

Extreme weather and climate events such as severe droughts, subtle changes like rainfall variability and temperature variations often shock the farming community, leading to decline in agricultural production. In addition, farmers are expected to manage the insidious effects of long term climate change that may now be occurring at an unprecedented rate. These existing pressures demand the development and implementation of appropriate methods to address issues of vulnerability to weather and climate.

##### *Comparison with the business as usual situation*

No such baseline data is generated with respect to vulnerability to climate change in the identified location.

## Improve forest ecosystem through community based restoration of degraded forest

### *Adaptation activity*

Degraded forest areas will be adequately stocked with multipurpose tree species which will lead to an improved ecosystem and can provide various services. In addition to this, activities like awareness for forest protection, watch and ward, institutionalising systems, penalties, rights, etc will be done. Plantation (applicable models) will be done in the degraded forest lands. Activities for in-situ soil and moisture conservation in forest lands (in areas other than plantation areas), widening/deepening/renovation/maintenance of existing cattle proof trenches to increase their effectiveness will be carried out in the project areas.

### *Comparison with the business as usual situation*

The interventions taken up earlier under various programmes in the region have been limited and based on programme / project budgets. Due to various local constraints, such as *Anna Pratha*, soil erosion, soil salinity, continuous drought, the programmes have not proved to be successful till date. The adaptation activity under this project keeps these issues in focus and targets them with reasonable effort.

## Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry

### *Adaptation activity*

Delineated degraded lands in the area, which is lying unutilized due to various constraints, will be developed as grassland/grazing lands for the cattle population. Plantation of drought resistant species of trees and grass will be done by consulting with scientist from IGFR (Indian Grassland and Fodder Research Institute), Jhansi. Sustainable agro forestry and farm forestry practices are proposed to be executed in the project areas for solution to the emerging problems related to agriculture and allied sectors in the region. Live fencing as a supporting measure can be an effective protection against 'Anna Pratha'. Multipurpose perennial & semi perennial food and fruit trees, plant varieties which can be a regular source of fodder, firewood and herbs, which can sustain in the high temperature and drought conditions, will be taken up for plantation in fallow / waste lands. The models could be :

- Agri-horti-silviculture (wadi model): crops + horticulture+ trees,
- Horti-silvipasture-culture: horticulture / trees + fodder crops
- Vermicompost produced could be supplied to other farmers in the project areas at a reasonable price. Vermi-compost units will also help in converting the agricultural and other organic wastes of the village.

**Fodder Bank cum storage** : Availability of fodder has become very low in the region. The people in the project area show gross negligence towards fodder cultivation. The scope for collection of fodder from the wild has reduced with diminishing of forest cover caused by erratic rainfall, deforestation, longer summers, low soil moisture etc.

In view of the above problem, the project will encourage plantation of fodder trees, so that in lean season, beneficiaries are able to feed green leaves to the livestock. Fodder banks in 16 villages will be supported as part of the project. Crop based fodder cultivation will also be promoted at individual household level.

These activities will act as a cushion to withstand climate stress and provide round the year supply of food for both humans and livestock without succumbing to the vicious cycle dominated by the money lenders etc. Market dependence of the farmers for inputs like seeds will be reduced which in turn will help them to become self-reliant and meet the challenges posed by the climate stress.

#### *Comparison with the business as usual situation*

Various projects are carried out for afforestation practices in the region such as JICA and CAMPA but there was no specific initiatives for development of community / grazing lands or for promoting agro forestry and farm forestry in the region. Fodder bank cum storage has not been set up in the villages of the project area. However, to cope with disaster risks, seed and fodder banks need to be set up in all the climate stressed villages of the project area. Further, storing of indigenous seeds and varieties and operationalization of these banks by the community to help cope with the climate change will be taken up under this project.

#### **Creating structures to arrest run-off of rain water (check dams, borewell recharge, ponds) in JFMC and other areas falling in the same watershed catchment**

Construction of structures i.e check dams, borewell recharge etc. are proposed for arresting the run off rain water in the project areas. Following are the activities proposed to be done :

- CC Nala Bund / Check Dams in series (10 - 20m)
- CC Nala Bund / Check Dams in series (20 - 30m)
- Well deepening / renovation
- Construction of Farm Ponds - It is an innovative and affordable model for sustainable water access. There are a number of factors that can make farming sustainable, but none of them can be as simple and elegant a solution as digging a farm pond. The aim is to introduce water harvesting in a way that provides adequate, reliable, and long-term water supply over which farmers have a sense of ownership. Farm ponds will provide resilience to the farmers from the vagaries of drought and help them in keeping their farm activity ticking. A pond of size 22m X 20m X 3m can store water for supplementary irrigation.

#### *Comparison with the business as usual situation*

The farm pond concept is not new to India. The interventions taken up earlier have been limited and based on programme / project budgets. The requirements of the project area considering the climatic stress have not been fully met. Hence, through this project, the objective will be to ensure sustainable and efficient water use to overcome climatic stress in the entire project area.

#### **Knowledge Management and template for wider replication**

This is very important component of the proposed project, as without awareness and knowledge management among the community people the activities cannot be carried out successfully. Hence for the same following activities are proposed:

- Awareness films

- Printing materials, Newsletter, Journals, brochure, pamphlets
- Website design & regular updating
- Farmers Convention / Melas
- Mid term review to assess outcomes
- Mass Awareness Events
- Sharing & Awareness generation workshops at District, Division and State level
- Reporting and documentation

*Comparison with the business as usual situation*

The interventions taken up earlier have been limited and based on programme / project budgets and does not adequately cover dissemination of learnings. Hence, through this activity, the objective will be to ensure the access to learnings from the project activities.

*(iii) Please justify with regards to components as on the concrete adaptation activities of the project, and how these activities contribute to climate resilience ?*

The components of the adaptation activities have been detailed in the previous section (ii), and the following brings out how these activities contribute to climate resilience:

- **The baseline integrated socio-economic and ecological survey for assessment of vulnerability to climate change and planning** for land use and water budgeting will provide the basis for adaptation planning, identification of specific locations, farmer households for easy implementation. Specific tools will be used to carry out the baseline survey and assessment.
- **Improve forest ecosystem through community based restoration of degraded forest**  
Plantation of multipurpose and locally grown trees is expected to increase resilience of the ecosystem and contribute towards a favourable microclimate. Provisioning for adequate soil conservation measures and strengthening of protection measure is expected to increase resilience of the ecosystem
- **Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry**

Delineated degraded lands in the area, lying unutilized due to various constraints, to be developed as grassland/grazing lands for the cattle population is expected to reduce pressure on forests and thereby increase resilience. Sustainable agro forestry and farm forestry practices to be promoted in the project areas will also reduce pressure on forest ecosystems. Live fencing as a supporting measure can be an effective protection against 'Anna Pratha'. Multipurpose perennial & semi perennial food and fruit trees, plant varieties which can be a regular source of fodder, firewood and herbs, which can sustain in the high temperature and drought conditions can provide additional livelihood income and therefore increase resilience.

Use of vermicompost improves soil fertility and reduces use of chemical fertilizer. It also increases the rate of organic matter in the soil while strengthening the capacity of carbon sequestration by the soil, thereby increasing resilience of the soil. Disaster coping mechanisms such as Fodder banks cum storage facilities will act as a cushion to withstand

climate stress and provide round the year supply of food for both humans and livestock without succumbing to the vicious cycle dominated by the money lenders etc. Market dependence of the farmers for inputs like seeds will be reduced which in turn will help them to become self-reliant and meet the challenges posed by the climate stress.

- **Creating structures to arrest run-off of rain water (check dams, borewell recharge, ponds) in JFMC and other areas falling in the same watershed catchment**

Creation of these structures increases the resilience of the community dependent on rainfall for agriculture.

(b) Details on Economic, social and environmental benefits project / programme

*(Reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations)*

Activities	Key benefits		
	Social	Economic	Environmental
Component 1: Baseline Survey and Integrated socio-economic and ecological assessment and planning			
<b>Baseline Survey &amp; socio economic survey</b>	Micro planning involving community, Involving Panchayat in ownership building and realization of the plan	Planning for judicious use of natural resources, increased productivity and increased income.	<b>Assessment of existing resources, water harvesting, improved use of seasonal and permanent fallows, adaptability to climate variability, increased surface water utilization.</b>
Component 2: Improve forest ecosystem through community based restoration of degraded forest			
<b>Awareness &amp; plantation of fruit bearing, climate resilient species of trees for forest restoration, watch &amp; ward, institutionalising systems / penalties/ rights</b>	Vegetative cover increases, increase in awareness among people, work opportunity created for the landless people or people highly dependent on single source of income.	Usufruct rights, non-timber forest produce, ecosystem services – less soil erosion, better water regime	<b>Contributes to Sustainable development of natural resource management practices and policies</b>
Component 3 : Improve ecosystem of Community lands and farm lands through agroforestry			

Activities	Key benefits		
	Social	Economic	Environmental
<b>Water conservation</b>	Better management of land & water, increase in vegetative cover, work opportunity created for landless people.	Increased income opportunity by increasing the cropping intensity by 200%.	<b>Increased availability of water in drought prone areas, increased water use efficiency, increased production, and productivity and increased survival of species.</b>
<b>Agro-forestry</b>	Sources of income diversified and employment opportunity created.	Risks and cost recovery will be distributed over various sub-systems, whereby the wastes of one will be used as input for the other. Total production of the farm will increase.	<b>Vermi-compost improves soil health. Plantations will also act as carbon sink hence making the environment clean.</b>
<b>Plantation of green fodder &amp; developing Fodder bank and Seed bank</b>	Opportunity created to conserve indigenous varieties of seeds that gives community the power to control agriculture.	Community reserves for lean periods increase. They do not have to pay exorbitant rates of interest to local moneylenders.	<b>Free grazing will be reduced, thereby reducing the perennial problem of common lands getting denuded of vegetation inviting soil erosion.</b>
<b>Component 4 : Creating structures</b>			
<b>Creating of forest bunds, check dams on free streams, gully plugs etc</b>	Community will have combined ownership and responsibility of the structures	Better quality of output from any various livelihood practices, more income from natural resources	<b>Sustainable resource management</b>
<b>Component 6 : Knowledge Management for wider replication</b>			
<b>Mass awareness generation about climate change</b>	Rural community, children, PRI members are better prepared about the climate change impacts Access to project learnings		<b>Best practices of sustainable natural resource management identified for replication and scaling up.</b>

Activities	Key benefits		
	Social	Economic	Environmental
Knowledge generation and dissemination	Recognition of the community as a key stakeholder in policy development for climate adaptation	Priority areas for economic investments identified	Contributes to the development of Sustainable natural resource management practices and policies

### (c) Sustainability of intervention

#### *i) How will the project assure that the benefits achieved through its investments are sustained beyond the lifetime of the project?*

Climate change is one of the all-encompassing global environmental changes likely to have deleterious effects on natural and human systems, economies and infrastructure. Adaptation aims to alleviate the adverse impacts through a wide-range of system-specific interventions. Sustainability of the interventions primarily depends upon three important factors, i.e., Institutional (institutional arrangement), Financial (return to the farmers from the adaptive practices) and Environmental (minimized degradation of local environment and optimal use of natural resources in a scientific manner without over exploitation). For the sustenance of the proposed intervention, beyond the life of the project, current and proposed institutional arrangement will ensure its follow-up under different other schemes.

Project implementation will be mainly through the Joint Forest Management Committees (JFMCs) hence, even after the project comes to an end, the climate volunteers can be maintained by the JFMCs through its own funds.

The learning from the project will be documented and shared widely and the present / proposed institutional arrangement will take up such learning in other locations for higher benefit to farming community. Different schemes that are being implemented or will be implemented in future will also be designed strategically from climate resilient perspective. Return to the farmers from adaptive practices is essential and it is expected that with good return from the proposed coping measures, farmers will continue to adapt to the practices for a long-term gain. Apart from that, environmental concerns that are existing are present will reduce further which will act as an input for the farmers and local people to continue such practices for a longer period. The lessons learnt from this pilot will also be an input for the policy makers to make it a part of future action in climate change adaptation.

d) Analysis of the cost-effectiveness of the proposed project / programme:

*Cost effectiveness will compare alternative options available and how the proposed components/ intervention are best for given climatic conditions. It will also how the community has preferred the selected interventions and their views / concerns are addressed while designing the project / programme. The proposal should compare to other possible interventions that could have taken place to help adapt and build resilience in the same sector, geographic region, and/or community.*

Sub- component	Current addressing mechanism and loopholes	How this project trying to address this	Cost effectiveness
<b>Community based restoration of degraded forest</b>	Although UPPFMPAP aims at restoring degraded forests augmenting forest resources and improving livelihood, it does not cover the aspect of climate change widely.	Protecting, restoring and enhancing forest covers while also responding to climate change by a combination of climate change and mitigation measures is important. A holistic view of greening that covers other ecosystems too is the pre-requisite. Also required is a system that addresses the issue of environmental accountability and rights.	<b>Increasing forest tree cover shall improve the quality of forest, carbon sequestration and storage shall have temporal usefulness while livelihood of forest communities shall also be enhanced</b>
<b>Soil &amp; Water Conservation</b>	Soil water conservation taken up under RKVY, IWMP. However, such programmes have not been considered or implemented in a wider scale and has not include climate concerns in the design and implementation mechanism.	From the baseline survey, specific points would be identified for water resource development through Spring development / Well / Jalkund. Climate concern as component design, wherein the stored water will reduce the uncertainty of rain-fed farming, improve cropping intensity, productivity.	<b>Existing learning from community based water conservation based projects / programmes would be incorporated. The stakeholders would be involved in planning, execution and monitoring, use of locally available material would be encouraged.</b>
<b>Agro-forestry</b>	Efforts are not integrated and holistic. Location specific design are not popularized. Integration of climate concerns in farming systems is lacking.	A sustainable livelihood plan developed with respect to change in climate parameters shall be taken into account. Selection of species for plantation shall be based on location and weather situation, it will address the issues related to carbon management practice and shall also envisage floods and drought control measures.	<b>Alternative livelihood shall reduce the risk of failure of crops, increase food security and opportunity cost shall be low.</b>

Sub- component	Current addressing mechanism and loopholes	How this project trying to address this	Cost effectiveness
<b>Development of Fodder Storage facility</b>	The component has been covered under RKVY, KVK schemes. However, such measures are not available on large scale or are limited due to which availability of seed as well as fodder during stress periods is limited. The fact that climatic factors shall alter grassland productivity has not been envisaged in the schemes.	To mitigate with the disaster situation the fodder & seeds will be stored at low cost at the time of harvest. Fodder bank cum storage which will have planting material of high-quality fodder species which can provide high biomass in short time and bridge the forage scarcity.	<b>The storage structures will be made using locally available materials so that those can be maintained locally. Farmers will themselves store seeds and will be able to sow at proper time. The local methods, practices and materials will be combined with appropriate knowledge to reduce the cost in long term.</b>
<b>Orientation of the community and youth</b>	The component has been accounted in various schemes/programmes of RKVY, KVKs, NMMI and NHM. However, very few community members are aware or have technical knowledge to deal with climate change related effects.	Such schemes/programmes provide traditional knowledge, skills for agriculture. This component shall impart scientific knowledge of climate resilient medicinal & aromatic plants cultivation. Package of practices will be popularised so as to ensure adoption.	<b>The community will be equipped to take appropriate measures in appropriate time. This is expected to minimize the loss of farmers and also optimize input and thereby its costs.</b>

A comparison of the chosen options vis-à-vis alternative options has been provided in the table below:

Activity	Proposed Alternatives	Benefits (of Proposed Activity)
Vulnerability analysis, specific to agriculture and allied sectors, including irrigation sector;	General assessment instead of scientific assessment of sector and community vulnerability	Generating Scientific data on climate change and adaptation for future measurement in agriculture sector
Plantation of diverse species in degraded forest lands, community lands and grasslands	Natural regeneration and Aided Natural Regeneration	Microclimate improvement and ecosystem services (better soil and water regime, biodiversity, NTFP). Enhancement in farm productivity
Farm level water management in rain-fed & water stress areas through well deepening/jalkunds, springs, etc.,	Common / flood irrigation system	Irrigation management, efficient water use, better yield from marginal land, minimize conveyance loss.
Training / Orientation of target farmers on climate resilient agriculture / horticulture;	General training without any reference to climate	Better adaptive capacity, well informed to take decisions with respect to climate change.
Promotion of Agro-forestry to improve ecosystem in community / grazing lands, grasslands and adjoining lands	Farming as usual, mono cropping	Risk sharing during climate stress situation through supportive livelihood.
Developing Fodder storage and providing technical support for feed management	General cultivation of fodder without storage does not guarantee year around availability of fodder.	Better adaptive capacity to drought like situation.
Water harvesting structures such as & Farm Ponds in the water stress / rain-fed areas;	Using common irrigation system or rain-fed farming does not address climatic stress	Better water availability, soil moisture retention, minimizing dry spell impact.
Documentation of project learning & dissemination;	Usually not recorded systematically	Improved learning of other farmers, dealing with bottlenecks through appropriate strategies.
Institutional Arrangement: Constitution of Steering Committee (PSC) and Task Force for Monitoring	General implementation frame like most of the current schemes	Better technical advice, measurement & tracking of climatic factors, translating adaptation mechanisms in to learning

e) Weighting of project activities:

*How much funding will be allocated to 'investment activities', 'capacity building activities' and 'project management activities' respectively?*

Type of Activity	List of Activities	Funding Requirement
<b>Investment Activities</b>	JFMC & Deptt plantation in degraded forest areas & community lands	<b>183005187</b>
	in-situ soil & moisture conservation	
	Integrated Nursery & Climate Information Centre & JFMC nurseries	
	Live hedge fencing & Widening / Deepening of Trenches / CPTs	
	Fodder bank-cum-storage & Vermicompost	
	Creation of water conservation structures	
	Grassland development	
<b>Capacity Building Activities</b>	Baseline survey, Assessment & Planning	<b>7272400</b>
	Identification & training of Youth	
	Capacity Building, Training and Orientation of farmers	
	Learning and Knowledge Management	
<b>Project Management Activities</b>	Monitoring and evaluation of the project	<b>15398568</b>
	Co-ordination between various stakeholders	
	Supervision of operational activities	
	Mid-year and Final Review	

f) Alignment with the National and State Action Plans and other Policies / Programmes:

*(Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist)*

National Action Plan on Climate Change emphasizes on aligning the measures to promote national development objectives with co-benefits for addressing climate change effectively. It also advocates strategies that promote, firstly, the adaptation to Climate Change and secondly, further enhancement of the ecological sustainability of India's development measures. The State Action Plan for Climate Change in line with NAPCC, focuses on restoration of native bio-diverse species mix while at the same time enhancing carbon sink in forests and other ecosystems, while being informed by sensitivity to the ecological nature and value of resources.

This project is aligned with the Uttar Pradesh State Action Plan on Climate Change. And National Action Plan on Climate Change The National Action Plan on Climate Change (NAPCC) under its Green India Mission in Uttar Pradesh aims for (i) Forestry, Bio-diversity conservation (ii) Enhancement of forest areas and (iii) Livelihood promotion and decreased dependency on forest.

The proposed project looks at achieving the objectives of Green India Mission.

The project is both a climate change mitigation and adaptation project and is aligned with climate change requirements under SAPCC. The SAPCC targets:

- Understanding and assessing the extent of vulnerability as and when required is important for responding climate change induced impacts. Micro-level analysis is required to facilitate the habitat to cope with climate change.
- **Promotion of Carbon Sequestration** - Some pilots like plantation of perennial fruit trees in degraded areas, shade plants, medium canopy floriculture, agro-forestry can be taken up apart from other management practices described.
- **Popularization of Agro-forestry**- In agro forestry, all the weather elements are modified and with proper selection of species and tree management techniques, it is possible to optimize the micro-climate of intercrops. Since, yield of field crops is affected by tree species, therefore, adequate knowledge about choice of tree species, tree canopy architecture, pruning intensity and other management practice has to be imparted. Considering the small size of land holdings and dominance of small and marginal farmers (91%) in the state, the agro forestry species should be suitable for boundary planting. Based on the choice of species, Agro-forestry as fence also serves several other functions- a windbreak, a habitat for beneficial birds source of forage, fuel and timber wood. Therefore, considering the advantages of agro forestry, it is proposed that various agro forestry systems developed by NRCA, Jhansi, IGFR, State Agricultural Universities and other research institutions be promoted with necessary refinements in different agro climatic zones of the state.
- **Increase in the area under forest**- The total of waste land and fallow land area available is 540 thousand hectares. This area can be brought under plantations by the land owners or by forest department by taking recourse under section 8 and 9 of UP Tree Protection Act, 1976
- **To endeavour for the reduction of siltation of water and reservoirs** and effects of floods and drought through control measures over soil erosion and denudation for soil and water conservation in the catchment areas of rivers, lakes and rivers, lakes and reservoirs;
- **To prepare and implement strategies for conservation and improvement of biodiversity** and wild life in the state; To promote mass movement in the state especially with the active participation of women and rural people residing near forest areas so as to meet all the above objectives.

#### g) Component wise technical standards:

*(Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, standards related to pollution control, etc. The details need to be provided for each of the interventions proposed)*

S.No.	Activity	Applicable Standard	Application to Project
1	Baseline survey	Based on the tools developed for the survey	As per standard methods
2	Plantation (applicable)	Standard models undertaken	As per standard methods

S.No.	Activity	Applicable Standard	Application to Project
	models) in degraded forest lands, Community / grazing lands and grasslands	under Social Forestry, JICA and CAMPA projects / porgammes and those developed by IGFRl	
3	Vermicompost units, Fodder bank-cum-storage	Standardised techniques developed by KVKs	As per standard methods
4	Development of Farm Ponds with solar water pumps	Standard size of 22m x 20 m x 3 m	As per standard methods
5	Water Conservation structures	Standardised techniques under IWMP and by local NGOs	As per standard methods

#### h) Duplication Check:

- (Describe if there is duplication of project / programme with other funding sources, if any)*

No.	Project Activities	Complementarity	Geographical Coverage/ Agency
1.	Restoration of forest ecosystems (Plantation in degraded forest lands & wastelands)	Although the project is aligned with UPPFMPAP, climate change mitigation and adaptation has also covered in its ambit. The following shall be covered in the project: (i) Forestry, Bio-diversity conservation (ii) Enhancement of forest areas and (iii) Livelihood promotion and decreased dependency on forest.	Coverage of 822 hectares of land for plantation across 16 villages
2.	Agroforestry and Vermicompost	Complimentary to that done under National Agroforestry Policy. However, different sites where such interventions have not been taken up shall be considered.	All the 16 villages of 4 districts viz. Hamirpur, Chitrakoot, Jalaun, Banda
3.	Fodder banks and Storage facilities	Complementarity to the schemes under RKVY. However, sites where such interventions have not been adopted shall be considered.	Suitable locations in all the 16. villages in of 4 districts viz. Hamirpur, Chitrakoot, Jalaun, Banda

No.	Project Activities	Complementarity	Geographical Coverage/ Agency
4.	Water conservation	Complementary to the measures taken under RKVY, IWMP	At suitable locations in 48 clusters of 4 districts viz. Hamirpur, Chitrakoot, Jalaun, Banda
5.	Development of Farm Ponds	Complementary to the Bundelkhand Farm Pond scheme at few sites of the region, but absent in the identifies project villages	At suitable locations in 13 clusters of 4 districts viz. Hamirpur, Chitrakoot, Jalaun, Banda
6.	Vulnerability assessment	Land use records with respect to climate, Socio-economic data for assessing vulnerability shall be obtained.	Data from 12,624 households across 16 villages shall be covered.

i) Details on Stake-holder consultation:

Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations).

Stakeholder approaches in general emphasize the importance of ensuring that the decisions to be analyzed, how they are analyzed, and the actions taken as a result of this analysis are driven by those who are affected by climate change and those who would be involved in the implementation of adaptations. The stakeholder approaches presented here represent a way of analyzing the institutional and organizational context of the adaptation strategy planning process more than they do specific tools to be applied to an assessment.

Consultation with	Date/Place	Participation	Objective	Outcome
Department of Agriculture	03.10.2016	<ul style="list-style-type: none"> <li>officials</li> </ul>	Purpose of Project, workable action plan and Identification of project area	<ul style="list-style-type: none"> <li>The activities and interventions implemented by the department in recent past, their successes, failures and challenges faced.</li> <li>For reduction of siltation of water and reservoirs and effects of floods and drought through control measures over soil erosion</li> <li>Drought proofing through in-situ moisture conservation, conservation of ground water</li> <li>To promote mixed / inter cropping among farmers to cope with climate change</li> <li>Convergence efforts need to be initiated to facilitate credit support &amp; / subsidy,</li> <li>Need of awareness among communities about disaster coping mechanisms such as Fodder banks, Seed banks, Post Harvest storage facilities and Farm equipment banks</li> <li>Multipurpose perennial &amp; semi perennial food and fruit trees, plant varieties which can be a regular source of fodder, firewood and herbs can be taken up for plantation in fallow / waste lands</li> <li>New technology and package of practices were provided by the department</li> <li>Social issues related to the development in the agriculture and cropping in the region such as Anna Pratha, etc</li> <li>Focus towards Water resources as the project areas identified are drought prone and highly affected by rainfall variability</li> </ul>

Consultation with	Date/Place	Participation	Objective	Outcome
Minor Irrigation Department	03.10.2016	officials	Role of department and possible Eco-development activities	<ul style="list-style-type: none"> <li>• New technology and package of practices were provided by the department</li> <li>• advised on the suitable best practices in the project area and additional agronomic technology to help the farmers in the villages to adapt to the effects of climate change</li> <li>• The activities and interventions implemented by the department in recent past, their successes, failures and challenges faced.</li> </ul>
Department of Environment	03-10-2016	Nodal Officer - Climate Change	Environmental concerns	<ul style="list-style-type: none"> <li>• Identification of state specific vulnerability and key priorities related to climate change adaptation in the Bundelkhand region</li> <li>• Ways to promote understanding of climate change and natural resource conservation</li> <li>• Discussions on SAPCC</li> </ul>
Indian Grassland and Fodder Research Institute, Jhansi.	04-10-2016	Principal Scientists, and Head-Grassland & Silviculture Management)	Obtain data and related studies carried out in the Bundelkhand region	<p>The knowledge about research work carried out by the scientists of the institute in the project areas with following :</p> <ul style="list-style-type: none"> <li>• Species of climate resilient grass which can be grown in the area</li> <li>• Ways to bridge the gap between demand and supply of fodder for solving the issues of regional specificity and seasonality</li> <li>• practical difficulties faced in expanding this area and also deteriorated condition of natural grazing areas both in terms of its extent and quality</li> <li>• Biodiversity in Forage Resources</li> <li>• losses due to pests and diseases in forage crops</li> <li>• concept of overlapping cropping systems</li> <li>• fertilizers management strategies in fodder crops aim at increasing the herbage production per unit area and time along with improvement in forage quality parameters and maintenance of soil health</li> <li>• Organic manure-induced improvement in soil physical, chemical and biological properties</li> <li>• Agroforestry technologies such as silvipasture, hortipasture etc. for bioremediation of degraded habitats &amp; forage production</li> <li>• improvement in fodder production on saline soils by increasing salt tolerance</li> <li>• identification of appropriate sites for undertaking forage seed production</li> <li>• social issues in adoption of forage production technologies, benefits and costs involved in different technologies in various conditions</li> <li>• Support for capacity building may be utilized</li> </ul>
Forest Division, Banda	04-10-2016	S.D.O. Banda	issues specific to climate change and to	<ul style="list-style-type: none"> <li>• Various issues discussed such as the challenges faced during the implementation of projects such as JICA and CAMPA in the Bundelkhand region</li> <li>• Social issues related to anna pratha and blue bulls</li> </ul>

Consultation with	Date/Place	Participation	Objective	Outcome
			locate potential areas and interventions	
	04-10-2016	Forest ranger officer, Banda, Forest range officer, Tindwani	The sites developed by the forest department were visited, The CAMPA sites developed by the forest department were visited	<ul style="list-style-type: none"> <li>• Due to decrease in average rainfall, green area in the forests has decreased.</li> <li>• Blue bulls (neel gai) cause large scale damages to the vegetation in the region, shattering the economic backbone of the local farmers.</li> <li>• Natural water resources in the region are bore well &amp; percolation tanks. Of the bore wells available in the region, most of them have dried. While, water related problems persist.</li> <li>• The rate of migration in the region is very high.</li> <li>• Anna Pratha: is the one major issue in the project districts. The cows abandoned by the villagers due to lack of fodder and other necessary resources lead to the destruction of the farmers 'crops in the region. Hence for success of any activity undertaken under the project needs to be planned keeping Anna Pratha in picture.</li> </ul>
Forestry Department Officers	04-10-2016	Forest range officer, Pailani	The CAMPA sites developed by the forest department were visited	<ul style="list-style-type: none"> <li>• The sites of CAMPA project and the forest sites developed by the department of forest in the project areas was visited to get an exposure of the issues and challenges faced by the project developers was discussed.</li> <li>• The participation of community in increasing the forest cover, and awareness about maintaining the forests is needed.</li> <li>• The plants and species which should be adopted for agro forestry, to bring business to the community people by selling the fruits and other products.</li> <li>• Villages training and capacity building of villagers to cater to the day-to-day needs of products. It strengthens the region's economy.</li> </ul>
Forestry Department Officers	04-10-2016	Forest range officer, Baberu	Identifying issues specific to climate change and to locate potential areas and interventions	<ul style="list-style-type: none"> <li>• Vegetation and species of the trees which can sustain in the high temperature and water scarcity conditions.</li> <li>• Visit to their sites to understand the challenges faced and issues which need to be resolved for the success of related activities in the project areas</li> <li>• Sustainable water conservation measures for agriculture productivity and environment sustainability .</li> <li>• The scope of solar water pumps and need of awareness among the local community people to enhance the green cover in the area.</li> </ul>
Forestry Department	04-10-2016	DFO Chitrakoot	Identifying issues specific	<ul style="list-style-type: none"> <li>• The issues related to maintaining the forest vegetation such as draught and water shortages, destruction by blue bulls, interference by village people for woods for their livelihood and fodder for their livestock.</li> </ul>

Consultation with	Date/Place	Participation	Objective	Outcome
Officers			to climate change and to locate potential areas and interventions	<ul style="list-style-type: none"> <li>• The vegetation suitable for the project areas which can sustain the high temperatures and draught like conditions</li> <li>• The participation of community in increasing the forest cover, and awareness about maintaining the forests</li> <li>• The plants and species which should be adopted for agro forestry, to bring business to the community people by selling the fruits and other products</li> <li>• Sources of irrigation in the village: Bore-well &amp; dug well were the main sources of irrigation.</li> <li>• Other livelihood activities: Poultry, goat rearing and dairy was taken up by around 5% to 10% of the population only.</li> <li>• Weather related information received by farmers: The mobile numbers of farmers who were literate and owned mobiles were registered by KVK, Commissionerate of Agriculture and others.</li> <li>• Scope for weather advisories was felt as weather related information is more reliable at block level</li> <li>• Lack of access to water was the major issue raised.</li> <li>• Increased incidence of pests and diseases. Rise in soil borne diseases.</li> </ul>
Forestry Department Officers	04-10-2016	RFO, Hamirpur forest range officer - Rath range, Hamirpur	Visit to the JICA sites to understand the issues and challenges faced in the project, Identifying issues specific to climate change and to locate potential areas and interventions	<ul style="list-style-type: none"> <li>• Natural water resources in the region are bore well &amp; percolation tanks. Of the bore wells available in the region, most of them have dried. While, water related problems persist.</li> <li>• The rate of migration in the region is very high.</li> <li>• Anna Pratha is the one major issue in the project districts.</li> </ul>
Yuwa Vikas Mandal (NGO)	05-10-2016	NGO active in Hamirpur, Banda and other districts	Identifying issues specific to climate change and to	<ul style="list-style-type: none"> <li>• Natural water resources in the region are bore well &amp; percolation tanks. Of the bore wells available in the region, most of them have dried. While, water related problems persist.</li> <li>• The rate of migration in the region is very high.</li> <li>• Anna Pratha is the one major issue in the project districts. The cows abandoned by the villagers due to lack of</li> </ul>

Consultation with	Date/Place	Participation	Objective	Outcome
			locate potential areas and interventions	fodder and other necessary resources lead to the destruction of the farmers 'crops in the region. <ul style="list-style-type: none"> <li>• Blue bulls (neel gai) cause large scale damages to standing crops in the poverty-stricken region every agriculture season, shattering the economic backbone of the local farmers.</li> </ul>
Village Gauhani Panwari (Hamirpur district)	04-10-2016	Chayya SHG, Villagers	Understanding the mode of operation and its replicability of various activities	The team visited the village and tried to understand the operational model of the project The villages are heavily affected by the climate variability with many farmers losing more than 80-100 percent of their crop during the last season. <ul style="list-style-type: none"> <li>• Lack of access to water was the major issue raised.</li> <li>• Increased incidence of pests and diseases. Rise in soil borne diseases.</li> <li>• Less than five percent of the farmers use mechanized agriculture techniques with little understanding of climate change adaptability.</li> <li>• Some crops like wheat have minimal mechanization for harvesting and weeding.</li> <li>• Potential areas for watershed interventions:</li> <li>• Canal deepening and desilting, well recharge structure, farm ponds</li> <li>• Villages training and capacity building of villagers to cater to the day-to-day needs of products. It strengthens the region's economy.</li> <li>• put an end to exploitation by private moneylenders and at the same time give a status for the illiterate farm women in the society</li> </ul>
Selected villages	04-10-2016 & 05-10-2016	Villagers/farmers of villages – Gauhani Panwari, Pailani, Tandwan,Rath	Identifying issues specific to climate change and to locate potential areas and interventions	Field visit to project area villages <ul style="list-style-type: none"> <li>• The villages are heavily affected by the climate variability with many farmers losing more than 80-100 percent of their crop during the last season.</li> <li>• Lack of access to water was the major issue raised.</li> <li>• Increased incidence of pests and diseases. Rise in soil borne diseases.</li> <li>• Less than five percent of the farmers use mechanized agriculture techniques with little understanding of climate change adaptability.</li> <li>• Some crops like wheat have minimal mechanization for harvesting and weeding.</li> <li>• Potential areas for watershed interventions:</li> <li>• Canal deepening and desilting, well recharge structure, farm ponds, lift irrigation from Khadakpoorna Dam (all the villages except village Pimpalgaon Bk)</li> <li>• Community tank, farm ponds, Earthen Bunding, lift irrigation</li> <li>• Weekly/fortnightly Weather advisories would be very useful for the farmers, Both in the form of sms and pamphlets</li> </ul>

Consultation with	Date/Place	Participation	Objective	Outcome
Forest Deptt	09-12-2016	APCCF, CCF (project), CCF, Jhansi, 3 DFOs, 1 SDO	<ol style="list-style-type: none"> <li>Objectives</li> <li>Components &amp; activities proposed</li> <li>Policy implications</li> <li>Unit costs</li> </ol>	<p>was advised by the farmers</p> <ul style="list-style-type: none"> <li>Focus on degraded forest areas &amp; community / grazing lands for ecosystem benefits</li> <li>Revision in interventions and scale possible in 4 year period. Integrated Nursery cum – Climate information centre</li> <li>No interventions for private lands since Agriculture &amp; WRD Deptts already present. No free distribution / subsidy. Some credit based interventions can be taken</li> <li>Unit costs for Plantations @ Rs. 70000/ha. Change in costs to be discussed. Second round of field visits to be taken to validate interventions and plan</li> </ul>
Distt. Hamirpur, Rath and Sarila Range Office	19 & 20-12-2016 Range office of Rath and Sarila, Banda Danda Village	Villagers from Gohani & Bihuni JFMC of Rath range, Villagers from Banda Danda, Devkhari of Sarila range	<ol style="list-style-type: none"> <li>Site verification of intervention area</li> <li>Discussion with department staff / respective JFMC / CBO / Villagers</li> <li>Cost Estimation and Quantity</li> </ol>	<ul style="list-style-type: none"> <li>Major of the land is ravine in the area.</li> <li>The kind of black soil is found in Rath range also called <b>mar</b>, is what is generally called black cotton soil also. It has high clay content and is prone to waterlogging. The soil has relatively high organic matter content, and hence can be cropped without use of fertilisers.</li> <li>The soil found at Sarila range is a yellowish, light-coloured variety of red <b>soil</b>, called parua, is sandy and has some clay content. It is well aerated and easily accepts water.</li> <li>Site of nursery is planned at forest land close to village community.</li> <li>Tubewell will generator facility is available in current nursery near proposed land.</li> <li>Neel Gai are of great concern. They destroy forest as well as farmer crop.</li> <li>The activity of gully plug, check dam, seep producer organization and nursery were well appraised.</li> <li>As per their opinion, there is long time shift in climatic condition. And the intervention was appreciated.</li> <li>No document proof was submitted for unit cost yet rough estimation was made/verified and modification was made accordingly in quantity and respective cost.</li> </ul>
Distt. Banda	19 & 20-12-2016 Range office, Banda	Villagers & Forest officials	<ol style="list-style-type: none"> <li>Site visits</li> <li>Discussions</li> </ol>	<ul style="list-style-type: none"> <li>Widening/deepening and maintenance of cattle proof trenches/stone walls for all project villages to preserve the forest areas as also to control the erosion and preserve moisture.</li> <li>Deepening of wells and ponds and installation of solar water pumps for supply of water for drinking and irrigation purposes, was suggested by JFMC members.</li> <li>Villagers/members of JFMCs asked to provide fruit plants to install in their own land also.</li> <li>DFO /RFO, Banda will set up Climate Resilient Technology Awareness Centre in their Nawab Tank, Banda nursery compound with all the relevant development model etc.</li> <li>Development of Storage and Seasoning facilities for forest/private produces like mahuwa, ber, chiraunji, karaunda etc. and awareness about related technologies in project villages. The suggestion was extended by both Sadha</li> </ul>

Consultation with	Date/Place	Participation	Objective	Outcome
				<p>and Dadhawa Manpur JFMC members.</p> <ul style="list-style-type: none"> <li>To generate employment opportunities at village level by imparting training to JFMC members/other youths of the villages to check the level of migration from the region. Creation of storage/seasoning facilities and imparting training for the related skills at village level will supplement the effort to check the migration from the region.</li> </ul>
Distt. Jalaun, DFO Office	21 & 22-12-2016 (DFO office and Aata, Teekar (range-Orai), Tandwa(range-Jalaun) proposed site)	Villagers from Aata and Teekar of Orai range, Tandwa of Jalaun range and respective forest officials.	<p>1.Site verification of intervention area</p> <p>2.Discussion with department staff / respective JFMC / CBO / Villagers</p> <p>3.Cost Estimation and Quantity</p>	<ul style="list-style-type: none"> <li>Land of Jalaun is less ravine than Hamirpur.</li> <li>The soil found in both range is known as <b>kabar</b>, resembles black cotton soils of central India. Its colour varies from dark black to grey black and brownish black. It has high clay content; hence it is highly adhesive, retains moisture, and quickly turns dry and into hard blocks.</li> <li>There is one existing nursery in Aata which can be improved. New nursery is proposed in Teekar and Tandwa. Site of nursery is planned at forest land close to village community and community pond used by local cattle.</li> <li>Neel Gai are of great concern in both village. However regional pig is also responsible for destroy of forest and private crop. And hence, fodder land development will be very successful.</li> <li>The activity of gully plug, check dam, seep producer organization and nursery were well appraised. However Gully plug may be more effective in Hamirpur than Jalaun due to land geography..</li> <li>As per their opinion, there is long time shift in climatic condition. And the intervention was appreciated.</li> <li>No document proof was submitted for unit cost yet rough estimation was made/verified and modification was made accordingly in quantity and respective cost.</li> </ul>
Range Forest Officer and JFMC/ SHG members of Patharaundi/ Jhari Villages, Chitreakoot	22.12.2016	RFO / JFMC/SHG Members	Discussion with village level functionaries and JFMC/SHG members	<ul style="list-style-type: none"> <li>Development of climate resilient plant nursery in the villages for supply of plants to members and inhabitants.</li> <li>Women SHG members bring drinking water from wells situated away from village as village wells' water is not worth for drinking purpose. Such wells need to be deepened and installed with solar water pumps. They also asked to generate few employment opportunities to generate some additional income for raising their level of living standard.</li> </ul>

j) Learning and knowledge management component to capture and disseminate lessons learned for the proposed project

The learning and knowledge management component of the project would aim at improving awareness regarding climate change and its impacts, and appreciating the the role of ecosystem services from forest lands, community lands and grasslands in reducing bio-physical vulnerabilities. For this purpose, various means would be used by arranging environment education classes/events in schools targeting direct beneficiary families and indirect beneficiaries and developing a dedicated website and printed materials. The component would also build networks and partnerships with relevant organisations for strengthening awareness and ownership of adaptation and climate risk reduction processes at local, state and national levels. At the district level, workshops, seminars, meetings, trainings, etc. would be organised with different stakeholders.

The project will take required steps for dissemination of the learnings/ outcomes from the project through films, dedicated website and other printed materials. Mass awareness generation among all the stakeholders including the school children through rallies, Graffiti, village fairs, farmers' convention, days celebration, awareness camps will be given priority. The documentation of best practices, and success stories will help to share the learnings at local, state and national level for wider adoption. Workshops at local, state and national levels will be organised with the participation of PRI members, Block/District/State level officials of different government departments, NGOs, and Scientists for large scale dissemination of the project outcomes. Technical and policy papers produced as part of the project as well as advocacy films shared in these workshops are expected to include similar approaches in the state and national plans so that the models evolved out of the project could be up scaled in the entire red and lateritic soil zone spread over different states of the country.

k) Sustainability of the project/programme outcomes has been taken into account when designing the project / programme

Climate change is one of the all-encompassing global environmental changes likely to have deleterious effects on natural and human systems, economies and infrastructure. Adaptation aims to alleviate the adverse impacts through a wide-range of system-specific interventions. Sustainability of the interventions primarily depends upon three important factors, i.e., Institutional (institutional arrangement), Financial (return to the farmers from the adaptive practices) and Environmental (minimized degradation of local environment and optimal use of natural resources in a scientific manner without over exploitation). For the sustenance of the proposed intervention, beyond the life of the project, current and proposed institutional arrangement will ensure its follow-up under different other schemes.

Project implementation will be mainly through Forest and Wildlife department. Hence, even after the project comes to an end, the climate volunteers, who would essentially be JFMC member / functionary can be continued since these bodies are sustainable.

The learning from the project will be documented and shared widely and the present / proposed institutional arrangement will take up such learning in other locations for higher benefit to farming community. Different schemes that are being implemented or will be implemented in future will also be designed strategically from climate resilient perspective. Microclimate improvement and co-benefits from ecosystem based adaptation is expected to enhance return to the farmers in the medium to long. Apart from that, environmental concerns that are existing will reduce further which will act as an input for the farmers and local people to continue such practices for a longer period. The lessons learnt from this pilot will also be an input for the policy makers to make it a part of future action in climate change adaptation.

l) Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

Check-list of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<b>Compliance with the Law</b>	The project complies with Environment (Protection) Act, 1986 and Forest Conservation Act, 1980	<b>None</b>
<b>Access and Equity</b>	The project provides fair and equitable access to the project beneficiaries and will not be impeding access to any of the other requirements like health clean water, sanitation, energy, education, housing, safe and decent working conditions and land rights	<b>None</b>
<b>Marginalized and Vulnerable Groups</b>	The project is basically aimed at providing livelihood and income to marginalised community living in the project area and as such will not have any adverse impact on other marginalised and vulnerable groups	<b>None</b>
<b>Human Rights</b>	The project does not foresee any violation of human rights	<b>None</b>
<b>Gender Equity and Women's Empowerment</b>	The project will ensure participation by women fully and equitably, receive comparable socio-economic benefits and ensure that they do not suffer adverse effect.	<b>None</b>
<b>Core Labour Rights</b>	Payments to labour under the project will be made as per Government approved norms duly following minimum wage rate and hence ensuring core labor rights.	<b>None</b>
<b>Indigenous Peoples</b>	The project will ensure to comply with the rights of the indigenous people set forth by the UN declaration adopted by the Government of India.	<b>None</b>
<b>Involuntary Resettlement</b>	The project does not displace any community and hence no issue of resettlement.	<b>NIL</b>
<b>Protection of</b>	The project does not affect any of the natural	<b>NIL</b>

<b>Check-list of environmental and social principles</b>	<b>No further assessment required for compliance</b>	<b>Potential impacts and risks – further assessment and management required for compliance</b>
<b>Natural Habitats</b>	habitats but will ensure the conservation and regeneration of biodiversity in the project area.	
<b>Conservation of Biological Diversity</b>	The project does not affect biodiversity in any adverse way.	<b>NIL</b>
<b>Climate Change</b>	The project is basically for enhancing the adaptive capacity and is not expected to contribute to GHG emissions	<b>NIL</b>
<b>Pollution Prevention and Resource Efficiency</b>	Many activities suggested in the project will prevent pollution and improve efficiency of resource use.	<b>NIL</b>
<b>Public Health</b>	No adverse impact on public health related issues is envisaged.	None
<b>Physical and Cultural Heritage</b>	No adverse impact on cultural heritage related issues is identified	None

## 2. Implementation Arrangements

### a) Describe the arrangements for project / programme implementation

- i. Who will implement the project and what are their comparative advantages and capacity compared to other potential implementing institutions?

The Department of Environment is the nodal agency for Climate Change in the state as per SAPCC. The overall guidance will be through the State Steering Committee (SSC) formed under the chairmanship of the Chief Secretary, as per SAPCC and issued vide Government Order No./467/55-Env-16-41 (Env) / 16 dated 14/03/2016. The project implementation will be through the Forest & Wildlife Department, UP.

#### Key Institutions and their responsibility for project implementation

Institution	Responsibilities
Department of Environment	Convening of SLSC meetings, Funds release & co-ordination with MoEFCC, GoI
Forest & Wildlife Department, UP	Project coordination, implementation, supervision and monitoring
Indian Grassland & Fodder Research Institute (IGFRI), Jhansi	Models of grassland development Support for orientation and training to farmers
Krishi Vigyan Kendras	Crop Advisory services based on Weather data Support for orientation and training to farmers
Voluntary organisations & JFMC functionaries	Community mobilisation
Local communities	Provide inputs for baseline study, vulnerability assessment and planning
SHGs, FPOs	Implementation of various activities

- ii. How will the project be coordinated with (and/or mainstreamed into) related development activities of the targeted sector?

At the National Level, the Ministry of Environment, Forests and Climate Change, Govt. of India and Department of Environment, Govt. of Uttar Pradesh will be in charge for the project management and organization. At Local Level, the Forest and Wildlife Department, Government of Uttar Pradesh will be responsible for the project management and organization.

The project is proposed to be steered by an **Advisory & Review Committee headed by PCCF & HoD, Forest & Wildlife Deptt, UP**, with members such as Director, IGFRI; National Bank for Agriculture and Rural Development (NABARD); Agriculture Deptt, GoUP (not below the rank of Deputy Director); APCCF (Projects, Forest & Wildlife Deptt), CCF (Jhansi, Forest & Wildlife Deptt) & CCF (Projects, Forest & Wildlife Deptt) who will also act as the Member Secretary).

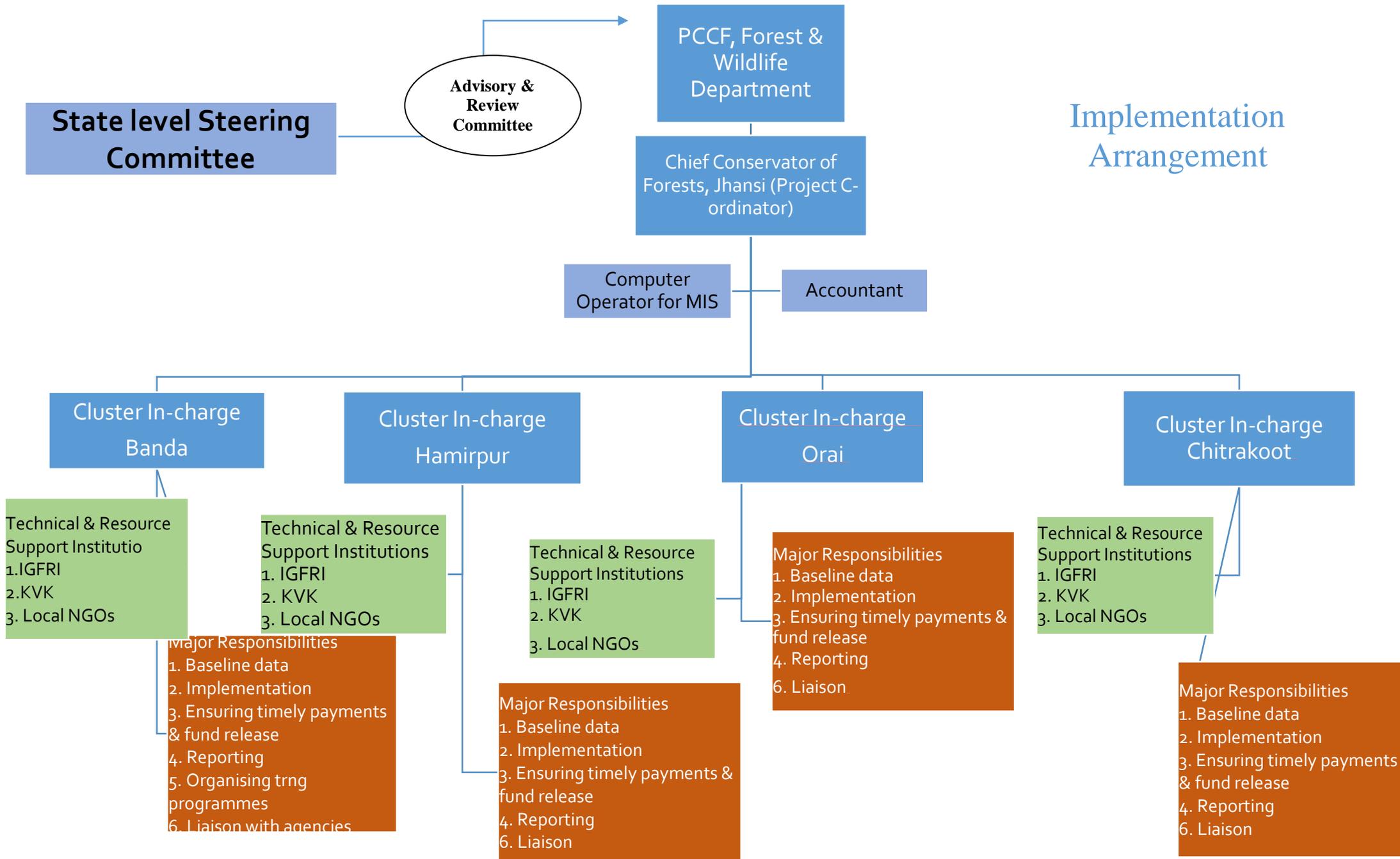
The State level Steering Committee (SLSC) on Climate Change, which was constituted while preparing Uttar Pradesh, SAPCC headed by Chief Secretary with members from key departments will provide an overarching support in endorsing, monitoring & evaluating the project.

The Project is to be implemented as per the Project Management Plan given in the next page. The Project Management Unit (PMU) proposed to be set up will have a Project Manager in the rank of Chief Conservator of Forests, Jhansi. There will also be 4 (four) Cluster In-Charges for Chitrakut, Hamirpur, Banda & Orai (Jalaun). The person/s responsible to be hired for these positions should have qualifications in Management / Social Sciences and sufficient experience at the field level preferably in the project area region. The Deputy Conservator of Forests (DCFs) for the 4 divisions will also be associated in project implementation. Financial approvals and fund releases could be through the DCFs of the 4 divisions.

The Project Co-ordinator will be supported by a Computer Operator responsible for maintaining database & MIS and an Accountant.

Persons to be recruited for these positions can be done through a third party / manpower consultancy firms / project consultants.

# Implementation Arrangement



*b) Describe the measures for financial and project / programme risk management (also include environmental and social risk, if any).*

<b>No.</b>	<b>Risk</b>	<b>Rating (High/Medium/Low)</b>	<b>Mitigation Measure</b>
1	Climatic changes	Medium	The districts that shall be covered are prone to high run off rates and loss of soil fertility. Additionally, population growth, increase in cultivable land, increased extraction of fuel wood, anthropogenic pressures and climatic changes have overall affected the quality of the forest in the region. Therefore, using past experience and knowledge of climatic conditions of the region will be used prior to planning project implementation
2	Restoration of forest ecosystems	Medium	The forests are in degraded condition and have poor quality. Hence, use of successfully demonstrated variety and involvement of JFMC in the region will be ensured.
3	Promote agro-forestry	Medium	Use of successfully demonstrated technology and past experience of JFMC.
4	Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands	Medium	Use of successfully demonstrated technology and past experience of IGFRI
5	Creating Structures	Low	Structures those have been useful in soil water conservation in similar terrain and climate shall be planned in consultation with soil and water conservation department.
6	Lack of buy-in from local community	Low	A consultation in the project area has already been conducted during the pilot project implementation
7	Success of Eco development activities	Medium	A need based assessment before implementation of activities will ensure community buy in as well as providing practical support where it is needed. Further, past experience will also help in avoiding activities which has not been successful in the past.

No.	Risk	Rating (High/Medium/Low)	Mitigation Measure
8	Community risk	Medium	<ul style="list-style-type: none"> <li>• Training and capacity building on safety measures to be adopted</li> <li>• Promote other means of income generation</li> </ul>

- c) *Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan. (Monitoring and evaluation cost need to be included in executing entity management cost).*

The activity wise budget will be worked out in consultation with NABARD as per MoEF&CC criteria.

**Monitoring and Evaluation:** The Forest & Wildlife Department shall act as a Monitoring and Evaluation body. Monitoring and Evaluation (M&E) framework is important to assess the implementation process with respect to the targets envisioned, financial resources used and strategies accomplished. Further, measurable, reportable, and verifiable (MRV) frameworks for monitoring adaptation and mitigation will be established at the beginning of this project. **Third Party Monitoring and Evaluation of the project is expected to be done by an external agency at mid term and at the end of the project. Accordingly, an external agency could be engaged for Third Party Monitoring and Evaluation.**

**Inception Report:** A Project Inception workshop will be held within the two months of the start of the project. The workshop will be attended by the members of the Steering Committee and the Advisory & Review Committee. The Inception Workshop will be held for:

- Assisting stakeholders to understand the objectives of the project and visualize their respective roles and responsibility in the implementation and results of the project
- Establishing reporting and communication protocols and familiarise with project decision making structure and processes
- Presentation of project activities and major milestones and the expected outcome of the project
- Presentation of the annual work plan to the stakeholders along with the indicators, means of verification, and monitoring and reporting frameworks and schedules. The Inception Report will be submitted within one month of holding the workshop.

**Performance Monitoring:** Performance monitoring will be done throughout the project period. The monitoring cycle will be quarterly and the report will be shared with the members of the Advisory & Review Committee. The Performance Monitoring Report will include the following components:

- Progress Tracking:** Conduct of activities against their time line will be tracked every quarter. The process entails conduct of review meeting and each activity will be tracked in terms of its progress and state of implementation. The review will be followed up with

finalizing the next quarter plan of activities that will incorporate spill over and inadvertent delays.

- (b) Risk Management:** Every quarter the risks will be monitored and the action taken for managing each risk will be reviewed. The exercise will also include identification of new risks and allocation of responsibility for managing it.
- (c) Output to Outcome:** Tracking Performance monitoring will undertake monitoring and review of output to outcome tracking.
- (d) Financial Monitoring:** Quarterly financial monitoring will be undertaken in order to review the progress of financial utilization and for ensuring that the expenditure for each head is according to the financial norms specified in the budget and agreed procurement processes. The accounts and audit will be maintained and evaluated as done by Forest Department for similar such projects.

**Project Completion Report:** At the end of the project a Project Completion Report will be prepared and submitted on an agreed format that will consolidate all the activities carried out during the project, its achievements, and results along with evidence of impact and benefit.

- (a) Audited Statement** A detailed Audited Statement of accounts will be prepared and submitted in funds received and spent under the project.

No.	Monitoring and Evaluation Plan Activity	Responsible Person	Yr.1	Yr. 2	Yr. 3	Yr. 4	Total	Timeframe
1	Project Inception report	Forest & Wildlife Department, UP	First Quarter					Three months
A	Performance monitoring	Forest & Wildlife Department, UP	4 times	4 times	4 times	4 times	32 days	Quarterly basis
B	Financial monitoring	Designated Finance and audit officer of, Forest & Wildlife Department, UP	12 times	12 times	12 times	12 times	48 days	Monthly basis
C	Overall periodic monitoring of the activity	State Steering Committee on climate change	2 times	2 times	2 times	2 times	8	Six monthly review

In addition, there will be monitoring and evaluation mechanisms by the Project Management Unit on a monthly basis to monitor the technical progress of the project activities.

d) Include a results framework for the project proposal, including milestones, targets and indicators

**Goal:** Ecosystem based adaptation through restoration of forests, community landscape, agro-forestry, conservation of soil & water for enhanced provision of services to the community for tackling the impacts of climate change.

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
<b>Objective 1: Baseline Survey, Assessment and Planning</b>					
<b>Outcome 1 - Communities adopt land use through better understanding of climate change related impacts</b>	<p>Number of households able to take informed decisions about climate adaptive interventions</p> <p>Percentage of planned interventions included as per the Plans</p>	<p>Farm families highly exposed to climate change related livelihood insecurity having no definite clue about the reasons or the solutions</p> <p>No scientific information and participatory processes are involved in planning land</p>	<p>12,624 households (are able to take informed decision about climate adaptive interventions.</p> <p>At least in 90% cases the interventions planned are included in the Plans</p>	<p>HH survey for assessing vulnerability</p> <p>Cluster level workshops for finalizing plans and execution strategies)based</p>	<p><b>Assumption:</b> All stakeholders will participate and contribute in the preparation of plans</p> <p><b>Risk:</b> A consensus may not emerge</p>
<b>Output 1.1 Village wise vulnerability levels assessed</b>	Updated land, agriculture, water resources and health related information	Updated Information not available	16 village wise PRA	Villagewise PRA for assessing Climate change Vulnerability Socio-economic	<p><b>Assumption:</b> PRAs are held</p> <p><b>Risk :</b> Low level of participation</p>
<b>Output 1.2 Socio-economic HH survey for assessing vulnerability</b>	Updated status report	Updated Information not available	Planning of interventions targeted to cover every	Socio-economic status report	<b>Assumption:</b> Survey is done properly

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
			household		<b>Risk</b> : Low level of participation
<b>Output 1.3</b> <i>Orientation on Climate Resilience, Adaptation &amp; Community mobilization</i>	Farmers are prepared to take appropriate actions in the event of risks due to climate change	Farmers are not aware about climate change related risks and impacts	Conducting 16 orientation programmes	Physical verification	<b>Assumption</b> : Community shows interest in making use of weather data to reduce climate risks to their livelihoods
<b>Output 1.4</b> <i>Data entry, Documentation &amp; Display boards</i>	Data records & documentation in place	No such data records are in place	Data entry of records for 23 locations	Physical verification Display materials Record of entry	<b>Assumption:</b> Regular meetings are held in the villages <b>Risk</b> : information sharing
<b>Objective2 : Improve forest ecosystem through community based restoration of degraded forest areas</b>					
<b>Outcome 2</b> <i>Restoration of forest ecosystems to promote conservation and sustainable management of forests</i>	Stocking in degraded forests through planting saplings, establishment of plantations, farmers have adopted land management techniques,  Conservation planning  Improving livelihood opportunities.	Vegetation cover is shrinking and encroachment in forest area resulting in cascading effect in changing micro climate leading to desertification.  No scientific information and participatory processes are involved in planning  Families are highly dependent on forestry.	Households in all the 16 villages are aware about existing status of forest ecosystem, threats posed, and are able to participate in conservation and management of forests.	Field monitoring reports & Household survey, Focused Group discussions Project reports, evaluation reports	<b>Assumption:</b> Community shows interest in making use of weather data to reduce climate risks to their livelihoods  Local Government agree to negotiate with the groups

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
<p><b>Output 2.1</b> Awareness for forest protection, watch &amp; ward,</p> <p>Institutionalizing systems / penalties/ rights etc.</p>	<p>People are sensitised to protection so as to prevent threats to forest ecosystem.</p> <p>Strengthened local self-governance institutions</p>	<p>The total of waste land and fallow land area available is 540 thousand hectares. Forests are in degraded condition and have poor quality since the open forest cover out of the forest area is 57.5%.</p> <p>Existing system is not well organized to handle the current system of forest degradation.</p>	<p>Adequately stocked forest areas are protected</p>	<p>Household level survey before and after the project</p> <p>Periodic monitoring report</p> <p>FGDs of officials from governing bodies &amp; PRAs of communities.</p>	<p><b>Assumption:</b> Community shows eagerness to attend training and replace conventional agriculture with sustainable agriculture</p> <p><b>Risks:</b> Farmers disinclination in adoption of recommended farming systems</p>
<p><b>Output 2.2</b> Department &amp; JFMC Plantation in degraded forest lands &amp; wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)</p>	<p>Improvement in degraded forest lands which are mainly open forest areas with less than 40% crown density/wastelands.</p> <p>Natural regeneration of locally found species.</p>	<p>Forests are in degraded condition and have poor quality since the open forest cover out of the forest area is 57.5%.</p>	<p>Coverage of 822 hectares of land for plantation 200 staggered contour trenches &amp; 288 pits (per hectare) dug at a spacing of 3m x 3m and 900 R.M. of furrows made at a spacing of 4m x 4m for seed sowing of NWFP shrubaceous/ herbaceous species, grasses (incl. planting of tufts) and legumes</p>	<p>Internal &amp; external Evaluation Reports, Project Progress Report</p>	<p><b>Assumption:</b> Community shows eagerness in taking up plantation</p>
<p><b>Output 2.3</b> In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) &amp; peripheral</p>	<p>Treated areas where planting may be taken up.</p> <p>Employment generation 50% of the employed</p>	<p>Forests are in degraded condition and plantation cannot be taken up</p>	<p>Coverage of 1,075 hectares of land</p>	<p>On site physical verification</p>	<p><b>Assumption:</b> Community shows eagerness to participate in soil and moisture conservation activities</p>

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
<i>areas</i>	being women				
<b>Output 2.4</b> <i>Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas</i>	Increased survival percentage of trees raised through plantations & protection from open grazing Employment generation 50% of the employed being women	Free grazing is widely observed and accepted by the local community.	Widening / deepening / renovation / maintenance of existing Cattle Proof Trenches / Stone Walls and Construction of new CPTs / Stone Walls of 94,450 rmt	On site physical verification	<b>Assumption:</b> Suitable sites are available for the various types of water storage and conservation structures  <b>Risk:</b> Overall plan is not developed in time
<b>Objective 3: Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agro-forestry</b>					
<b>Component 3.1 :</b> <i>Promote Agro-forestry</i>	Limiting degradation and increased productive capacity of forests and agriculture	Large population depends upon climate-sensitive sectors like agriculture and forestry for its livelihood in the region	Coverage of all the 16 villages to promote integrated forestry and agriculture.	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to participate in the activities
<b>Output 3.1.1</b> <i>Integrated central nursery cum climate resilient technology centre comprising conventional/clonal/Polyho use /Root trainer + Vermicompost model + SWP well for irrigation + Agroforestry dissemination centre (within 5 ha.)</i>	Increased resources and infrastructure of households in taking up agro-forestry in villages	Large population depend upon climate-sensitive sectors like agriculture and forestry for its livelihood in the region.	Coverage of all the 16 villages	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up integrated farming with forestry
<b>Output 3.1.2</b> <i>Horti-silviculture : horticulture+ trees in community / grazing lands</i>	Increased production and productivity from horticulture, increased resilience, increased survival of forest species, regular source of food and fodder and	Households are mainly dependent on agriculture and quarrying. Population has been clearing forests in case of failure of agriculture	Coverage of 185 hectares of land across 16 villages	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up integrated farming with forestry

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
	less dependency on chemical fertilizers	due to drought like conditions.			
<b>Output 3.1.3</b> <i>Live hedge fencing along community lands</i>	Increased rate of survival of species. Employment generation 50% of the employed being women	Free grazing is widely accepted and prevalent in the community.	Fencing of 50,000 rmt to reduce free grazing across 16 villages	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up integrated farming with forestry
<b>Output 3.1.4</b> <i>Water resource / Spring development / Well / Jalkund (Irrigation support)</i>	Increased plantation and sustenance of plantation. Increased production and productivity	Drought like condition in the region has reduced sustenance of plantations.	13 nos. of Water resource / Spring development / Well / Jalkund for supplementary irrigation support to the freshly planted seedlings	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up integrated farming with forestry
<b>Output 3.1.5:</b> <i>Support to JFMCs for raising nurseries for multipurpose trees for distribution</i>	Strengthened farmers' adaptive capacity to counter climate change impacts by building more resilient agricultural systems and diversifying income sources. Increased food security by multiple products and benefits from forestry such as food, fodder and shade for livestock, timber and renewable wood energy.	Large number of households are dependent on agriculture and forestry in the region.	Support for raising 8 nurseries by JFMCs	Physical verification, records of the projects	<b>Assumption:</b> Suitable sites are available for growing various species
<b>Output 3.1.6:</b> <i>Vermicompost</i>	Percentage of members of community grouped into SHGs to take up vermicompost making. vermicompost being used for raising plantation in degraded forest areas / community	Large number of households are dependent on agriculture and forestry in the region.	Formation of 107 SHGs for making vermicompost	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up integrated farming with forestry

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
	lands.				
<b>Component 3.2</b> <i>Building climate resilience for livestock through plantation of green fodder &amp; developing Fodder storage and providing technical support for feed management</i>	Increased availability of green fodder for livestock, improved farm productivity & increased resilience of farming community	Rise in temperature and abrupt monsoons influence existence of grasslands which affects availability of fodder and resilience of livestock.	Orientation of farmers in 16 villages to increase awareness about drought resistant livestock and techniques	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up climate resilient agriculture and resources available to them
<b>Output 3.2.1</b> <i>Plantation (IGFRI models) / grassland development for raising fodder &amp; forage trees in village commons / grazing lands</i>	Increased availability of green fodder for livestock	Rise in temperature and abrupt monsoons influence existence of grasslands which affects availability of fodder and resilience of livestock.	Grassland development in 49 hectares of land across 16 villages	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up climate resilient agriculture and resources available to them
<b>Output 3.2.2</b> <i>Development of Fodder Storage facility through District Admin.</i>	Increased availability of fodder for livestock around the year	Rise in temperature and abrupt monsoons influence existence of grasslands which affects availability of fodder and resilience of livestock.	Development of fodder storage facility in 3 centres across 16 villages to increase availability of fodder around the year.	Physical verification, records of the projects	<b>Assumption:</b> Community shows eagerness to take up climate resilient agriculture and resources available to them
<b>Output 3.2.3</b> <i>Technical orientation to farmers</i>	Trained group of farmers about drought resistant varieties and techniques.	Very few farmers are aware about drought resistant variety of techniques in the region.	Conducting 14 Orientation programmes for farmers across 16 villages to increase awareness about climate resilient livestock and techniques	Physical verification Focused Group discussions	<b>Assumption:</b> Community shows interest in taking up the training
<b>Component 3.3 : Building adaptive capacity of farmers through adoption of Medicinal, Aromatic &amp; Nutritional plants / crops (Alsi, Aloe vera, Arandi, Kulthi, Tulsi, Quinoa, Chia, Lemongrass) cultivation</b>					
<b>Output 3.3.1</b> <i>Medicinal/Aromatic/Nutritional plants are grown as</i>	Growing of Medicinal/Aromatic/Nutritional plants are grown in farm	Very few farmers grow medicinal and aromatic plants	At least 15 farmers in each of the 16 projects villages take up	Physical verification Focused Group	<b>Assumption:</b> Community shows eagerness to take up medicinal plants cultivation

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
<i>intercrops in farm lands</i>	lands		medicinal/aromatic/nutritional plants cultivation	discussions	for enhancement of livelihood income
<b>Objective4 : Creating structures to arrest run-off of rain water (check dams, bore-well recharge, small LIs &amp; micro-irrigation) in JFMC and other areas falling in the same watershed catchment</b>					
<b>Output 4.1</b> <i>CC Nala Bund / Check Dams in series (10 - 20m)</i>	Increased surface water storage and recharging of groundwater Employment generation 50% of the employed being women	No such structures in the identified sites	Creating 16 number of CC Nala Bund / Check Dams in series (10 - 20m)	On-site physical verification	<b>Assumption:</b> Suitable sites are available for construction of the structure
<b>Output 4.2</b> <i>CC Nala Bund / Check Dams in series (20 - 30m)</i>	Increased surface water storage and recharging of groundwater Employment generation 50% of the employed being women	No such structures in the identified sites	Creating 6 number of CC Nala Bund / Check Dams in series (20 - 30m)	On-site physical verification	<b>Assumption:</b> Suitable sites are available for construction of the structure
<b>Output 4.3</b> <i>Community Wells and Farm Ponds with Solar Water Pumps</i>	Increased availability of water Employment generation 50% of the employed being women	No such structures in the identified sites	17 nos of Community Wells and Farm Ponds with Solar Water Pumps	On-site physical verification	<b>Assumption:</b> Suitable sites are available for construction of the structure
<b>Output 4.4</b> <i>Well deepening and water lifting structures</i>	Availability of water for irrigation Employment generation 50% of the employed being women	No such structures in the identified sites	Deepening of 9 wells and water lifting structures in 5 villages	On-site physical verification	<b>Assumption:</b> Suitable sites are available for construction of the structure
<b>Objective5 : Knowledge Management for wider replication</b>					
<b>Outcome 5</b> <i>Various types of materials on processes and techniques are published and measures taken to upscale the interventions</i>	The community has developed potentially useful knowledge and can make use of it at a time and place that is appropriate for them.	Local level planning does not consider climate change related aspects.  Only few farmers	The project learning documents aligned to the SAPCC are advocated for adoption with relevant government departments at both state and national levels	Interaction with the community  External evaluation reports	<b>Assumption:</b> Local Governments, State/National Governments convinced of the approach demonstrated through the project

	Indicator	Baseline	Target	Means of Verification	Assumptions & Risks
to improve climate resilience in the project areas of the district		practice ecological farming and livelihood practices		Reports and meetings	<b>Risk:</b> Unwillingness of Governments (local/state/national) to accept change in their planning approach
<b>Output 5.1</b> Improved access to learnings from the project activities to be ensured through short films, dedicated website and other printed materials	<ul style="list-style-type: none"> <li>• Number of audio visual films, awareness materials published</li> <li>• Dedicated website created and updated regularly</li> <li>• Number of mass awareness generation measures</li> <li>• Increased participation of the community in such events/programmes</li> </ul>	<p>No appropriate awareness materials available, especially in vernacular</p> <p>No website at present</p> <p>Limited awareness generated through mainstream mass media e.g. television, radio.</p>	<p>At least 3 audio visual films, various types of awareness materials published for wider dissemination in the state</p> <p>A web space is created for regular dissemination of project learnings</p> <p>4 Melas and at least 2 mass events in and around the project villages</p> <p>Sharing of results and awareness creation in 4 other vulnerable districts in the State</p>	<p><b>Printed and Audio Visual content</b></p> <p><b>Photo documentation</b></p>	<b>Assumption:</b> Community shows interest in participating in such activities

S.No.	Component & Activities	Unit	Chitrakut									
			Ameenpur Chhiwlaha Hariharpur		Jhari		Duguwa		Pathraundi		Total	
			Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Total Qty	Total Cost
	<b>Component 1 : Baseline Survey, Assessment, Orientation &amp; Planning</b>											
	Villagewise PRA for assessing Climate change Vulnerability	Villages	1	10000	1	10000	1	10000	1	10000	4	40000
	Socio-economic HH survey for assessing vulnerability	HH	275	150	31	150	317	150	365	150	988	148200
	Orientation / Training / Workshops on Climate Resilience, Adaptation & Community mobilisation	Villages	1	20000	1	20000	1	20000	1	20000	4	80000
	Data entry, Documentation & Display boards	Nos.	1	15000	1	15000	1	15000	1	15000	4	60000
	<b>Subtotal</b>											<b>328200</b>
	<b>Component 2 : Improve forest ecosystem through community based restoration of degraded forest areas</b>											
	Awareness for forest protection, watch & ward, institutionalising systems / penalties/ rights etc.	Villages	1	100000	1	100000	1	100000	1	100000	4	400000
I	Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)	Area (ha)	25	70000	25	70000	15	70000	30	70000	95	6650000
I	In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas	Area (ha)	25	12000	25	12000	15	12000	30	12000	95	1140000
I	Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas	rmt	100 00	56.25	100 00	56.25	600 0	56.25	100 00	56.25	360 00	2025000
	<b>Subtotal</b>											<b>10215000</b>
	<b>Component 3 : Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry</b>											
	<b>Component 3.1 : Promote Agro-forestry</b>											

S.No.	Component & Activities	Unit	Chitrakut									
			Ameenpur Chhiwlaha Hariharpur			Jhari		Duguwa		Pathraundi		Total
I	Integrated central nursery cum climate information centre comprising conventional/clonal/Polyhouse /Root trainer nursery for Agroforestry & horticulture species+ Vermicompost model + SWP well for irrigation + Nursery for raising Medicinal plants & crops, seed production & distribution + Agroforestry dissemination centre (within 5 ha.)											5250000
I	Horti-silviculture : horticulture+ trees in community / grazing lands	Area (ha)	25	70000	25	70000	10	70000	10	70000	70	4900000
I	Water resource / Spring development / Well / Jalkund (Irrigation support)	Nos.	1	100000	1	100000	1	100000	1	100000	4	400000
I	Live hedge fencing along community lands	rmt	300	100	300	100	300	100	300	100	1200	120000
I	Support to JFMCs for raising nurseries for multipurpose trees for horticulture & silvipasture (80,000 plants/year capacity) for plantation & sale	Nos.	1	518000	1	518000	1	518000	1	518000	4	2072000
I	Vermicompost	Nos.	2	100000	2	100000	2	100000	2	100000	8	800000
	<b>Subtotal</b>											<b>13542000</b>
	<b>Component 3.2 : Building climate resilience for livestock through plantation of green fodder &amp; developing Fodder storage and providing technical support for feed management</b>											
I	Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands	Area (ha)	5	134000	10	134000	5	134000	5	134000	25	3350000
I	Development of Fodder Storage (100 MT)-cum-bank facility				1	500000	1	500000			2	1000000
	Knowledge and capacity building of farmers on IGFRI models and Fodder bank	Villages	1	50000	1	50000	1	50000	1	50000	4	200000
	<b>Subtotal</b>											<b>4550000</b>
	<b>Component 3.3 : Building Adaptive Capacity of farmers through adoption of Medicinal, Aromatic &amp; Nutritional plants /crops (Aisi, Aloe Vera, Arandi. Kulthi, Tulsi, Quinoa, Chia,</b>											

S.No.	Component & Activities	Unit	Chitrakut									
			Ameenpur Chhiwla Hariharpur		Jhari		Duguwa		Pathraundi		Total	
	<b>Lemongrass) cultivation</b>											
	Fencing support for areas for growing medicinal plants and crops as intercrops in farm lands (500 rmt for group of 4 farmers) - covering ~ 128 ha.	rmt	2000	300	2000	300	2000	300	2000	300	8000	2400000
	Transportation of seedlings/slips/cuttings/seeds of MAP/Cs & distribution	Villages	1	7000	1	7000	1	7000	1	7000	4	28000
	Training to Farmers on cultivation, processing, value addition, packaging and marketing of medicinal crop (4 trainings per village) from reputed institutions	Villages	1	120000	1	120000	1	120000	1	120000	4	480000
	Value addition, drying, ware-housing and augmenting marketing infrastructure etc. support to JFMCs / FPOs from NMPB (Rs. 15 Lakh) in each cluster	Convergence with National Medicinal Plants Board										
	Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres	Nos.	2	48000	2	48000	2	48000	2	48000	8	384000
	Support to FPO for Processing Plant facility at project level											
	<b>Subtotal</b>											<b>3292000</b>
	<b>Subtotal (component 3 combined)</b>											<b>21384000</b>
	<b>Component 4 : Creating structures to arrest run-off of rain water (check dams, borewell recharge, ponds) in JFMC and other areas falling in the same watershed catchment</b>											
I	CC Nala Bund / Check Dams in series (5 - 10m / 10 - 20m)	Nos.	2	1250000	2	1250000	2	1250000	2	1250000	8	10000000
I	CC Nala Bund / Check Dams in series (20 - 30m)	Nos.	1	2500000	1	2500000	1	2500000	1	2500000	4	10000000
I	Farm Ponds with Solar Water Pumps	Nos.	2	500000	2	500000	2	500000	2	500000	8	4000000
I	Well digging / deepening with small water lifting structures (incl. Solar Water Pumpset) for group irrigation	Nos.	1	350000	1	350000	1	350000	1	350000	4	1400000

S.No.	Component & Activities	Unit	Chitrakut							
			Ameenpur Chhiwlaha Hariharpur	Jhari	Duguwa	Pathraundi	Total			
	<b>Subtotal</b>									<b>25400000</b>
	<b>Component 5 : Knowledge Management and Template for Replication</b>									
	Awareness films	Nos.	3	50000					3	150000
	Printing materials, Newsletter, Journals, brochure, pamphlets	Nos.	1	50000					1	50000
	Website design & regular updation	Months	6	50000					6	300000
	Farmers Convention / Melas	Yearly	4	10000					4	40000
	Mass Awareness Events	Nos.	2	40000					2	80000
	Sharing & Awareness generation workshops at District, Div. and State level	Nos.	4	50000					4	200000
	Reporting and documentation	Half yearly	4	20000					4	80000
	<b>Subtotal</b>									<b>900000</b>
	<b>Project measure total</b>			<b>6244606</b>		<b>6474606</b>		<b>6474606</b>		<b>5974606</b>
<b>6</b>	<b>PROJECT MANAGEMENT</b>									
<b>A</b>	<b>Remuneration*</b>									
<b>1</b>	Cluster In-charge	Monthly							0	0
<b>2</b>	Cluster In-charge	Monthly							0	0
<b>3</b>	Cluster In-charge	Monthly							0	0
<b>4</b>	Cluster In-charge	Monthly	48	28000					48	1344000
<b>5</b>	MIS -cum Computer Operator	Monthly	48	18000					48	864000
<b>6</b>	Accountant	Monthly	48	18000					48	864000
	<b>Subtotal</b>									<b>3072000</b>
<b>B</b>	<b>Office Assets-cum-Stationery</b>									
<b>1</b>	Desktop computer	From Forest Deptt's own contribution								
<b>2</b>	Laptops with Loaded software									
<b>3</b>	Printer									
<b>4</b>	MFD Device									

S.N o.	Component & Activities	Unit	Chitrakut					Total
			Ameenpur Chhiwlaha Hariharpur	Jhari	Duguwa	Pathraundi		
5	Almirahs							
6	File Cabinets							
7	Files, Paper, pens, pads, folders, stationery etc.							
8	GPS / Tablets handheld devices							
9	Office Furniture - Tables							
10	Office Furniture - Chairs							
11	Broadband Data Card							
	<b>Subtotal</b>							
<b>C</b>	<b>Operational expenses</b>							
1	Office Rent	From Forest Deptt's own contribution						
2	Electricity charges							
3	Broadband Connection Services / Telephone Rent							
4	Tour Expense (8 mandays/month) / Cluster In-charge x 4	Monthly	384	1500			384	576000
5	Refreshments/Tea for Visitors							
6	Training & Capacity Building for staff of CC							
7	Local Travel, Training and Contingency Expenditure							
	<b>Subtotal</b>							576000
	<b>Total Administrative costs (A + B + C) - 3%</b>							3648000
8	<b>NIE COSTS (@ 3%)</b>							1856256
	<b>TOTAL COSTS</b>		6244606	6474606	6474606	5974606		63731456

e) Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use and an explanation and a breakdown of the execution costs.

S. No	Component & Activities	Unit	Hamirpur									
			Bihunikhurd		Gohanai-Panwadi		Benda-Danda		Devkhari		Total	
			Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Total Qty	Total Cost
	<b>Component 1 : Baseline Survey, Assessment, Orientation &amp; Planning</b>											
	Villagewise PRA for assessing Climate change Vulnerability	Villages	1	10000	1	10000	1	10000	1	10000	4	40000
	Socio-economic HH survey for assessing vulnerability	HH	1204	150	460	150	217	150	42	150	1923	288450
	Orientation / Training / Workshops on Climate Resilience, Adaptation & Community mobilisation	Villages	1	20000	1	20000	1	20000	1	20000	4	80000
	Data entry, Documentation & Display boards	Nos.	1	15000	1	15000	1	15000	1	15000	4	60000
	<b>Subtotal</b>											<b>468450</b>
	<b>Component 2 : Improve forest ecosystem through community based restoration of degraded forest areas</b>											
	Awareness for forest protection, watch & ward, insitutionalising systems / penalties/ rights etc.	Villages	1	100000	1	100000	1	100000	1	100000	4	400000
I	Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)	Area (ha)	20	70000	180	70000	100	70000	100	70000	400	28000000
I	In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas	Area (ha)	20	12000	180	12000	100	12000	100	12000	400	4800000
I	Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas	rmt	1000	56.25	9000	56.25	5000	56.25	5000	56.25	20000	1125000
	<b>Subtotal</b>											<b>34325000</b>
	<b>Component 3 : Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry</b>											

S. No	Component & Activities	Unit	Hamirpur								Total	
			Bihunikhurd		Gohanai-Panwadi		Benda-Danda		Devkhari			
	<b>Component 3.1 : Promote Agro-forestry</b>											
I	Integrated central nursery cum climate information centre comprising conventional/clonal/Polyhouse /Root trainer nursery for Agroforestry & horticulture species+ Vermicompost model + SWP well for irrigation + Nursery for raising Medicinal plants & crops, seed production & distribution + Agroforestry dissemination centre (within 5 ha.)											5250000
I	Horti-silviculture : horticulture+ trees in community / grazing lands	Area (ha)	5	70000	5	70000	5	70000	5	70000	20	1400000
I	Water resource / Spring development / Well / Jalkund (Irrigation support)	Nos.	1	100000	1	100000	1	100000	1	100000	4	400000
I	Live hedge fencing along community lands	rmt	1500	175	1500	175	1500	175	1500	175	6000	1050000
I	Support to JFMCs for raising nurseries for multipurpose trees for horticulture & silvipasture (80,000 plants/year capacity) for plantation & sale	Nos.	1	518000	1	518000	1	518000	1	518000	4	2072000
I	Vermicompost	Nos.	1	100000	1	100000	1	100000	1	100000	4	400000
	<b>Subtotal</b>											<b>10572000</b>
	<b>Component 3.2 : Building climate resilience for livestock through plantation of green fodder &amp; developing Fodder storage and providing technical support for feed management</b>											
I	Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands	Area (ha)	2	134000	2	134000	2	134000	2	134000	8	1072000
I	Development of Fodder Storage (100 MT)-cum-bank facility		1	500000							1	500000
	Knowledge and capacity building of farmers on IGFRI models and Fodder bank	Villages	1	50000	1	50000	1	50000	1	50000	4	200000
	<b>Subtotal</b>											<b>1772000</b>
	<b>Component 3.3 : Building Adaptive Capacity of farmers through adoption of Medicinal, Aromatic &amp; Nutritional plants /crops (Alsi, Aloe Vera, Arandi. Kulthi, Tulsi, Quinoa, Chia, Lemongrass) cultivation</b>											

S. No	Component & Activities	Unit	Hamirpur									
			Bihunikhurd		Gohanai-Panwadi		Benda-Danda		Devkhari		Total	
	Fencing support for areas for growing medicinal plants and crops as intercrops in farm lands (500 rmt for group of 4 farmers) - covering ~ 128 ha.	rmt	2000	300	2000	300	2000	300	2000	300	8000	2400000
	Transportation of seedlings/slips/cuttings/seeds of MAP/Cs & distribution	Villages	1	7000	1	7000	1	7000	1	7000	4	28000
	Training to Farmers on cultivation, processing, value addition, packaging and marketing of medicinal crop (4 trainings per village) from reputed institutions	Villages	1	120000	1	120000	1	120000	1	120000	4	480000
	Value addition, drying, ware-housing and augmenting marketing infrastructure etc. support to JFMCs / FPOs from NMPB (Rs. 15 Lakh) in each cluster	Convergence with National Medicinal Plants Board										
	Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres	Nos.	2	48000	2	48000	2	48000	2	48000	8	384000
	Support to FPO for Processing Plant facility at project level											
	<b>Subtotal</b>											<b>3292000</b>
	<b>Subtotal (component 3 combined)</b>											<b>15636000</b>
	<b>Component 4 : Creating structures to arrest run-off of rain water (check dams, borewell recharge,ponds) in JFMC and other areas falling in the same watershed catchment</b>											
I	CC Nala Bund / Check Dams in series (5 - 10m / 10 - 20m)	Nos.	1	1250000	1	1250000	1	1250000	1	1250000	4	5000000
I	CC Nala Bund / Check Dams in series (20 - 30m)	Nos.	0	0	0	0	0	0	0	0	0	0
I	Farm Ponds with Solar Water Pumps	Nos.	1	500000	1	500000	1	500000	1	500000	4	2000000
I	Well digging / deepening with small water lifting structures (incl. Solar Water Pumpset) for group irrigation	Nos.	0	0	0	0	0	0	0	0	0	0
	<b>Subtotal</b>											<b>7000000</b>
	<b>Component 5 : Knowledge Management and Template for Replication</b>											

S. No	Component & Activities	Unit	Hamirpur									
			Bihunikhurd		Gohanai-Panwadi		Benda-Danda		Devkhari		Total	
	Awareness films	Nos.	3	50000							3	150000
	Printing materials, Newsletter, Journals, brochure, pamphlets	Nos.	1	50000							1	50000
	Website design & regular updation	Months	6	50000							6	300000
	Farmers Convention / Melas	Yearly	4	10000							4	40000
	Mass Awareness Events	Nos.	2	40000							2	80000
	Sharing & Awareness generation workshops at District, Div. and State level	Nos.	4	50000							4	200000
	Reporting and documentation	Half yearly	4	20000							4	80000
	<b>Subtotal</b>											<b>900000</b>
	<b>Project measure total</b>			<b>3894681</b>		<b>312468</b>		<b>312468</b>		<b>312468</b>		<b>58329450</b>
				.3		1.3		1.3		1.3		
<b>6</b>	<b>PROJECT MANAGEMENT</b>											
<b>A</b>	<b>Remuneration*</b>											
<b>1</b>	Cluster In-charge	Monthly									0	0
<b>2</b>	Cluster In-charge	Monthly	48	28000							48	1344000
<b>3</b>	Cluster In-charge	Monthly									0	0
<b>4</b>	Cluster In-charge	Monthly									0	0
<b>5</b>	MIS -cum Computer Operator	Monthly									0	0
<b>6</b>	Accountant	Monthly									0	0
	<b>Subtotal</b>											<b>1344000</b>
<b>B</b>	<b>Office Assets-cum-Stationery</b>											
<b>1</b>	Desktop computer	From Forest Deptt's own contribution										
<b>2</b>	Laptops with Loaded software											
<b>3</b>	Printer											
<b>4</b>	MFD Device											
<b>5</b>	Almirahs											
<b>6</b>	File Cabinets											
<b>7</b>	Files, Paper, pens, pads, folders, stationery etc.											

S. No	Component & Activities	Unit	Hamirpur					Total	
			Bihunikhurd	Gohanai-Panwadi	Benda-Danda	Devkhari			
8	GPS / Tablets handheld devices								
9	Office Furniture - Tables								
10	Office Furniture - Chairs								
11	Broadband Data Card								
	<b>Subtotal</b>								
<b>C</b>	<b>Operational expenses</b>								
1	Office Rent	From Forest Deptt's own contribution							
2	Electricity charges								
3	Broadband Connection Services / Telephone Rent								
4	Tour Expense (8 mandays/month) / Cluster In-charge x 4	Monthly	384	1500				384	576000
5	Refreshments/Tea for Visitors								
6	Training & Capacity Building for staff of CC								
7	Local Travel, Training and Contingency Expenditure								
	<b>Subtotal</b>								<b>576000</b>
	<b>Total Administrative costs (A + B + C) - 3%</b>								<b>1920000</b>
8	<b>NIE COSTS (@ 3%)</b>								<b>1807484</b>
	<b>TOTAL COSTS</b>		<b>3894681</b>	<b>3124681</b>	<b>3124681</b>	<b>3124681</b>	<b>3124681</b>		<b>62056934</b>

S. No	Component & Activities	Unit	Orai (Jalaun)							
			Teekar		Aata		Tandwa		Total	
			Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Total Qty	Total Cost
	<b>Component 1 : Baseline Survey, Assessment, Orientation &amp; Planning</b>									
	Villagewise PRA for assessing Climate change Vulnerability	Villages	1	10000	1	10000	1	10000	3	30000
	Socio-economic HH survey for assessing vulnerability	HH	266	150	223	150	193	150	682	102300
	Orientation / Training / Workshops on Climate Resilience, Adaptation & Community mobilisation	Villages	1	20000	1	20000	1	20000	3	60000
	Data entry, Documentation & Display boards	Nos.	1	15000	1	15000	1	15000	3	45000
	<b>Subtotal</b>									<b>237300</b>
	<b>Component 2 : Improve forest ecosystem through community based restoration of degraded forest areas</b>									
	Awareness for forest protection, watch & ward, insitutionalising systems / penalties/ rights etc.	Villages	1	100000	1	100000	1	100000	3	300000
I	Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)	Area (ha)	37	70000	80	70000	60	70000	177	12390000
I	In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas	Area (ha)	126	12000	190	12000	180	12000	496	5952000
I	Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas	rmt	450	56.25	9500	56.25	9000	56.25	18950	1065938
	<b>Subtotal</b>									<b>19707938</b>
	<b>Component 3 : Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry</b>									
	<b>Component 3.1 : Promote Agro-forestry</b>									
I	Integrated central nursery cum climate information centre comprising conventional/clonal/Polyhouse /Root trainer nursery for Agroforestry & horticulture species+ Vermicompost model + SWP well for irrigation + Nursery for raising Medicinal plants & crops, seed production									5250000

S. No	Component & Activities	Unit	Orai (Jalaun)							Total
			Teekar	Aata	Tandwa					
	&distribution + Agroforestry dissemination centre (within 5 ha.)									
I	Horti-silviculture : horticulture+ trees in community / grazing lands	Area (ha)	25	70000	20	70000	0	0	45	3150000
I	Water resource / Spring development / Well / Jalkund (Irrigation support)	Nos.	1	100000	1	100000	1	100000	3	300000
I	Live hedge fencing along community lands	rmt	2500	100	2000	100	0	0	4500	450000
I	Support to JFMCs for raising nurseries for multipurpose trees for horticulture & silvipasture (80,000 plants/year capacity) for plantation & sale	Nos.	1	518000	1	518000	1	518000	3	1554000
I	Vermicompost	Nos.	2	100000	2	100000	2	100000	6	600000
	<b>Subtotal</b>									<b>11304000</b>
	<b>Component 3.2 : Building climate resilience for livestock through plantation of green fodder &amp; developing Fodder storage and providing technical support for feed management</b>									
I	Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands	Area (ha)	2	134000	2	134000	2	134000	6	804000
I	Development of Fodder Storage (100 MT)-cum-bank facility		1	500000	0	0	0	0	1	500000
	Knowledge and capacity building of farmers on IGFRI models and Fodder bank	Villages	1	50000	1	50000	1	50000	3	150000
	<b>Subtotal</b>									<b>1454000</b>
	<b>Component 3.3 : Building Adaptive Capacity of farmers through adoption of Medicinal, Aromatic &amp; Nutritional plants /crops (Alsi, Aloe Vera, Arandi. Kulthi, Tulsi, Quinoa, Chia, Lemongrass) cultivation</b>									
	Fencing support for areas for growing medicinal plants and crops as intercrops in farm lands (500 rmt for group of 4 farmers) - covering ~ 128 ha.	rmt	2000	300	2000	300	2000	300	6000	1800000
	Transportation of seedlings/slips/cuttings/seeds of MAP/Cs	Villages	1	7000	1	7000	1	7000	3	21000

S. No	Component & Activities	Unit	Orai (Jalaun)							Total
			Teekar	Aata	Tandwa					
	& distribution									
	Training to Farmers on cultivation, processing, value addition, packaging and marketing of medicinal crop (4 trainings per village) from reputed institutions	Villages	1	120000	1	120000	1	120000	3	360000
	Value addition, drying, ware-housing and augmenting marketing infrastructure etc. support to JFMCs / FPOs from NMPB (Rs. 15 Lakh) in each cluster	Convergence with National Medicinal Plants Board								
	Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres	Nos.	2	48000	2	48000	2	48000	6	288000
	Support to FPO for Processing Plant facility at project level									
	<b>Subtotal</b>									<b>2469000</b>
	<b>Subtotal (component 3 combined)</b>									<b>15227000</b>
	<b>Component 4 : Creating structures to arrest run-off of rain water (check dams, borewell recharge, ponds) in JFMC and other areas falling in the same watershed catchment</b>									
I	CC Nala Bund / Check Dams in series (5 - 10m / 10 - 20m)	Nos.	1	1250000	1	1250000	1	1250000	3	3750000
I	CC Nala Bund / Check Dams in series (20 - 30m)	Nos.	0	0	0	0	0	0	0	0
I	Farm Ponds with Solar Water Pumps	Nos.	1	500000	1	500000	1	500000	3	1500000
I	Well digging / deepening with small water lifting structures (incl. Solar Water Pumpset) for group irrigation	Nos.	0	0	0	0	0	0	0	0
	<b>Subtotal</b>									<b>5250000</b>
	<b>Component 5 : Knowledge Management and Template for Replication</b>									
	Awareness films	Nos.	3	50000					3	150000
	Printing materials, Newsletter, Journals, brochure, pamphlets	Nos.	1	50000					1	50000
	Website design & regular updation	Months	6	50000					6	300000
	Farmers Convention / Melas	Yearly	4	10000					4	40000
	Mass Awareness Events	Nos.	2	40000					2	80000

S. No	Component & Activities	Unit	Orai (Jalaun)						Total
			Teekar		Aata	Tandwa			
	Sharing & Awareness generation workshops at District, Div. and State level	Nos.	4	50000				4	200000
	Reporting and documentation	Half yearly	4	20000				4	80000
	<b>Subtotal</b>								<b>900000</b>
	<b>Project measure total</b>			<b>3894606.3</b>	<b>3124606.3</b>		<b>3054506</b>		<b>41322237.5</b>
<b>6</b>	<b>PROJECT MANAGEMENT</b>								
<b>A</b>	<b>Remuneration*</b>								
<b>1</b>	Cluster In-charge	Monthly						0	0
<b>2</b>	Cluster In-charge	Monthly						0	0
<b>3</b>	Cluster In-charge	Monthly	48	28000				48	1344000
<b>4</b>	Cluster In-charge	Monthly						0	0
<b>5</b>	MIS -cum Computer Operator	Monthly						0	0
<b>6</b>	Accountant	Monthly						0	0
	<b>Subtotal</b>								<b>1344000</b>
<b>B</b>	<b>Office Assets-cum-Stationery</b>								
<b>1</b>	Desktop computer	From Forest Deptt's own contribution							
<b>2</b>	Laptops with Loaded software								
<b>3</b>	Printer								
<b>4</b>	MFD Device								
<b>5</b>	Almirahs								
<b>6</b>	File Cabinets								
<b>7</b>	Files, Paper, pens, pads, folders, stationery etc.								
<b>8</b>	GPS / Tablets handheld devices								
<b>9</b>	Office Furniture - Tables								
<b>10</b>	Office Furniture - Chairs								
<b>11</b>	Broadband Data Card								
	<b>Subtotal</b>								
<b>C</b>	<b>Operational expenses</b>								
<b>1</b>	Office Rent	From Forest Deptt's own contribution							
<b>2</b>	Electricity charges								
<b>3</b>	Broadband Connection Services / Telephone Rent								

S. No	Component & Activities	Unit	Orai (Jalaun)						Total	
			Teekar	Aata	Tandwa					
4	Tour Expense (8 mandays/month) / Cluster In-charge x 4	Monthly	384	1500					384	576000
5	Refreshments/Tea for Visitors									
6	Training & Capacity Building for staff of CC									
7	Local Travel, Training and Contingency Expenditure									
	<b>Subtotal</b>									<b>576000</b>
	<b>Total Administrative costs (A + B + C) - 3%</b>									<b>1920000</b>
8	<b>NIE COSTS (@ 3%)</b>									<b>1297267</b>
	<b>TOTAL COSTS</b>			<b>3894606</b>	<b>3124606</b>		<b>3054506</b>			<b>44539505</b>

S.No.	Component & Activities	Unit	Banda										Total	
			Amara		Sadha		Kartal		Dadhawamanpur		Mancha		Total Qty	Total Cost
			Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost	Qty	Unit Cost		
	<b>Component 1 : Baseline Survey, Assessment, Orientation &amp; Planning</b>													
	Villagewise PRA for assessing Climate change Vulnerability	Villages	1	10000	1	10000	1	10000	1	10000	1	10000	5	50000
	Socio-economic HH survey for assessing vulnerability	HH	850	150	3250	150	1650	150	1927	150	306	150	7983	1197450
	Orientation / Training / Workshops on Climate Resilience, Adaptation & Community mobilisation	Villages	1	20000	1	20000	1	20000	1	20000	1	20000	5	100000
	Data entry, Documentation & Display boards	Nos.	1	15000	1	15000	1	15000	1	15000	1	15000	5	75000
	<b>Subtotal</b>													<b>1422450</b>
	<b>Component 2 : Improve forest ecosystem through community based restoration of degraded forest areas</b>													
	Awareness for forest protection, watch & ward, insitutionalising systems / penalties/ rights etc.	Villages	1	100000	1	100000	1	100000	1	100000	1	100000	5	500000
I	Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)	Area (ha)	10	70000	20	70000	10	70000	10	70000	10	70000	60	4200000
I	In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas	Area (ha)	10	12000	10	12000	10	12000	10	12000	10	12000	50	600000
I	Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas	rmt	1000	56.25	2000	56.25	3000	56.25	3000	56.25	4000	56.25	13000	731250
	<b>Subtotal</b>													<b>6031250</b>
	<b>Component 3 : Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry</b>													
	<b>Component 3.1 : Promote Agro-forestry</b>													

S.No.	Component & Activities	Unit	Banda										Total	
			Amara		Sadha		Kartal		Dadhawamanpur		Mancha			
I	Integrated central nursery cum climate information centre comprising conventional/clonal/Polyhouse /Root trainer nursery for Agroforestry & horticulture species+ Vermicompost model + SWP well for irrigation + Nursery for raising Medicinal plants & crops, seed production & distribution + Agroforestry dissemination centre (within 5 ha.)													5250000
I	Horti-silviculture : horticulture+ trees in community / grazing lands	Area (ha)	0	0	10	70000	5	70000		70000		70000	15	1050000
I	Water resource / Spring development / Well / Jalkund (Irrigation support)	Nos.	1	100000	1	100000	1	100000	1	100000	1	100000	5	500000
I	Live hedge fencing along community lands	rmt	0	0	2000	100	1500	100	0	0	0	0	3500	350000
I	Support to JFMCs for raising nurseries for multipurpose trees for horticulture & silvipasture (80,000 plants/year capacity) for plantation & sale	Nos.	1	518000	1	518000	1	518000	1	518000	1	518000	5	2590000
I	Vermicompost	Nos.	1	100000	1	100000	1	100000	1	100000	1	100000	5	500000
	<b>Subtotal</b>													<b>10240000</b>
	<b>Component 3.2 : Building climate resilience for livestock through plantation of green fodder &amp; developing Fodder storage and providing technical support for feed management</b>													
I	Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands	Area (ha)	2	134000	2	134000	2	134000	2	134000	2	134000	10	1340000
I	Development of Fodder Storage (100 MT)-cum-bank facility		0	0	1	500000							1	500000
	Knowledge and capacity building of farmers on IGFRI models and Fodder bank	Villages	1	50000	1	50000	1	50000	1	50000	1	50000	5	250000
	<b>Subtotal</b>													<b>2090000</b>
	<b>Component 3.3 : Building Adaptive Capacity of</b>													

S.No.	Component & Activities	Unit	Banda											Total
			Amara	Sadha	Kartal	Dadhawamanpur	Mancha							
	farmers through adoption of Medicinal, Aromatic & Nutritional plants /crops (Alsi, Aloe Vera, Arandi. Kulthi, Tulsi, Quinoa, Chia, Lemongrass) cultivation													
	Fencing support for areas for growing medicinal plants and crops as intercrops in farm lands (500 rmt for group of 4 farmers) - covering ~ 128 ha.	rmt	2000	300	2000	300	2000	300	2000	300	2000	300	10000	3000000
	Transportation of seedlings/slips/cuttings/seeds of MAP/Cs & distribution	Villages	1	7000	1	7000	1	7000	1	7000	1	7000	5	35000
	Training to Farmers on cultivation, processing, value addition, packaging and marketing of medicinal crop (4 trainings per village) from reputed institutions	Villages	1	120000	1	120000	1	120000	1	120000	1	120000	5	600000
	Value addition, drying, ware-housing and augmenting marketing infrastructure etc. support to JFMCs / FPOs from NMPB (Rs. 15 Lakh) in each cluster	Convergence with National Medicinal Plants Board												
	Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres	Nos.	2	48000	2	48000	2	48000	2	48000	2	48000	10	480000
	Support to FPO for Processing Plant facility at project level												0	0
	<b>Subtotal</b>													<b>4115000</b>
	<b>Subtotal (component 3 combined)</b>													<b>16445000</b>
	<b>Component 4 : Creating structures to arrest run-off of rain water (check dams, borewell recharge,ponds) in JFMC and other areas falling in the same watershed catchment</b>													
I	CC Nala Bund / Check Dams in series (5 - 10m / 10 - 20m)	Nos.	1	1250000	1	1250000	0	1250000	0	1250000	0	1250000	2	2500000
I	CC Nala Bund / Check Dams in series (20 - 30m)	Nos.											0	0

S.No.	Component & Activities	Unit	Banda										Total	
			Amara		Sadha		Kartal		Dadhawamanpur		Mancha			
I	Farm Ponds with Solar Water Pumps	Nos.	0	500000	2	500000	1	500000	0	500000	0	500000	3	1500000
I	Well digging / deepening with small water lifting structures (incl. Solar Water Pumpset) for group irrigation	Nos.	0	350000	0	350000	0	350000	0	350000	0	350000	0	0
	<b>Subtotal</b>													<b>4000000</b>
	<b>Component 5 : Knowledge Management and Template for Replication</b>													
	Awareness films	Nos.	3	50000									3	150000
	Printing materials, Newsletter, Journals, brochure, pamphlets	Nos.	1	50000									1	50000
	Website design & regular updation	Months	6	50000									6	300000
	Farmers Convention / Melas	Yearly	4	10000									4	40000
	Mass Awareness Events	Nos.	2	40000									2	80000
	Sharing & Awareness generation workshops at District, Div. and State level	Nos.	4	50000									4	200000
	Reporting and documentation	Half yearly	4	20000									4	80000
	<b>Subtotal</b>													<b>900000</b>
	<b>Project measure total</b>			<b>3674506.3</b>		<b>3974606.3</b>		<b>3474606.3</b>		<b>3474506.3</b>		<b>3474506.3</b>		<b>28798700</b>
<b>6</b>	<b>PROJECT MANAGEMENT</b>													
<b>A</b>	<b>Remuneration*</b>													
1	Cluster In-charge	Monthly	48	28000									48	1344000
2	Cluster In-charge	Monthly											0	0
3	Cluster In-charge	Monthly											0	0
4	Cluster In-charge	Monthly											0	0
5	MIS -cum Computer Operator	Monthly											0	0
6	Accountant	Monthly											0	0
	<b>Subtotal</b>													<b>1344000</b>
<b>B</b>	<b>Office Assets-cum-Stationery</b>													
1	Desktop computer	From Forest Deptt's own contribution												
2	Laptops with Loaded software													
3	Printer													

S.No.	Component & Activities	Unit	Banda					Total
			Amara	Sadha	Kartal	Dadhawamanpur	Mancha	
4	MFD Device							
5	Almirahs							
6	File Cabinets							
7	Files, Paper, pens, pads, folders, stationery etc.							
8	GPS / Tablets handheld devices							
9	Office Furniture - Tables							
10	Office Furniture - Chairs							
11	Broadband Data Card							
	<b>Subtotal</b>							
<b>C</b>	<b>Operational expenses</b>							
1	Office Rent	From Forest Deptt's own contribution						
2	Electricity charges							
3	Broadband Connection Services / Telephone Rent							
4	Tour Expense (8 mandays/month) / Cluster In-charge x 4	Monthly	384	1500				384
5	Refreshments/Tea for Visitors							
6	Training & Capacity Building for staff of CC							
7	Local Travel, Training and Contingency Expenditure							
	<b>Subtotal</b>							576000
	<b>Total Administrative costs (A + B + C) - 3%</b>							1920000
8	<b>NIE COSTS (@ 3%)</b>							921561
	<b>TOTAL COSTS</b>		3674506	3974606	3474606	3474506	3474506	31640261

S.No.	Component & Activities	Unit	Total Quantity	Total Cost
	<b>Component 1 : Baseline Survey, Assessment, Orientation &amp; Planning</b>			
	Villagewise PRA for assessing Climate change Vulnerability	Villages	16	160000
	Socio-economic HH survey for assessing vulnerability	HH	11576	1736400
	Orientation / Training / Workshops on Climate Resilience, Adaptation & Community mobilisation	Villages	16	320000
	Data entry, Documentation & Display boards	Nos.	16	240000
	<b>Subtotal</b>			<b>2456400</b>
	<b>Component 2 : Improve forest ecosystem through community based restoration of degraded forest areas</b>			
	Awareness for forest protection, watch & ward, insitutionalising systems / penalties/ rights etc.	Villages	16	1600000
I	Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)	Area (ha)	732	51240000
I	In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas	Area (ha)	1041	12492000
I	Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas	rmt	87950	4947188
	<b>Subtotal</b>			<b>70279188</b>
	<b>Component 3 : Improve ecosystem in community / grazing lands, grasslands and adjoining lands through agroforestry</b>			
	<b>Component 3.1 : Promote Agro-forestry</b>			
I	Integrated central nursery cum climate information centre comprising conventional/clonal/Polyhouse /Root trainer nursery for Agroforestry & horticulture species+ Vermicompost model + SWP well for irrigation + Nursery for raising Medicinal plants & crops, seed production & distribution + Agroforestry dissemination centre (within 5 ha.)			21000000
I	Horti-silviculture : horticulture+ trees in community / grazing lands	Area (ha)	150	10500000
I	Water resource / Spring development / Well / Jalkund (Irrigation support)	Nos.	16	1600000
I	Live hedge fencing along community lands	rmt	15200	1970000

S.No.	Component & Activities	Unit	Total Quantity	Total Cost
I	Support to JFMCs for raising nurseries for multipurpose trees for horticulture & silvipasture (80,000 plants/year capacity) for plantation & sale	Nos.	16	8288000
I	Vermicompost	Nos.	23	2300000
	<b>Subtotal</b>			<b>45658000</b>
	<b>Component 3.2 : Building climate resilience for livestock through plantation of green fodder &amp; developing Fodder storage and providing technical support for feed management</b>			
I	Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands	Area (ha)	49	6566000
I	Development of Fodder Storage (100 MT)-cum-bank facility		5	2500000
	Knowledge and capacity building of farmers on IGFRI models and Fodder bank	Villages	16	800000
	<b>Subtotal</b>			<b>9866000</b>
	<b>Component 3.3 : Building Adaptive Capacity of farmers through adoption of Medicinal, Aromatic &amp; Nutritional plants /crops (Alsi, Aloe Vera, Arandi. Kulthi, Tulsi, Quinoa, Chia, Lemongrass) cultivation</b>			
	Fencing support for areas for growing medicinal plants and crops as intercrops in farm lands (500 rmt for group of 4 farmers) - covering ~ 128 ha.	rmt	32000	9600000
	Transportation of seedlings/slips/cuttings/seeds of MAP/Cs & distribution	Villages	16	112000
	Training to Farmers on cultivation, processing, value addition, packaging and marketing of medicinal crop (4 trainings per village) from reputed institutions	Villages	16	1920000
	Value addition, drying, ware-housing and augmenting marketing infrastructure etc. support to JFMCs / FPOs from NMPB (Rs. 15 Lakh) in each cluster	Convergence with National Medicinal Plants Board		
	Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres	Nos.	32	1536000
	Support to FPO for Processing Plant facility at project level			3600000
	<b>Subtotal</b>			<b>16768000</b>
	<b>Subtotal (component 3 combined)</b>			<b>72292000</b>
	<b>Component 4 : Creating structures to arrest run-off of rain water (check dams, borewell recharge,ponds) in JFMC and other areas falling in the same watershed catchment</b>			
I	CC Nala Bund / Check Dams in series (5 - 10m / 10 - 20m)	Nos.	17	21250000

S.No.	Component & Activities	Unit	Total Quantity	Total Cost
I	CC Nala Bund / Check Dams in series (20 - 30m)	Nos.	4	1000000
I	Farm Ponds with Solar Water Pumps	Nos.	18	900000
I	Well digging / deepening with small water lifting structures (incl. Solar Water Pumpset) for group irrigation	Nos.	4	1400000
	<b>Subtotal</b>			<b>41650000</b>
	<b>Component 5 : Awareness, Knowledge Management and Template for Replication</b>			
	Awareness films	Nos.	12	600000
	Printing materials, Newsletter, Journals, brochure, pamphlets	Nos.	4	200000
	Website design & regular updation	Months	24	1200000
	Farmers Convention / Melas	Yearly	16	160000
	Mass Awareness Events	Nos.	8	320000
	Sharing & Awareness generation workshops at District, Div. and State level	Nos.	16	800000
	Reporting, documentation and template for replication	Half yearly	16	320000
	<b>Subtotal</b>			<b>3600000</b>
	<b>Project measure total</b>			<b>190277588</b>
<b>6</b>	<b>PROJECT MANAGEMENT</b>			
<b>A</b>	<b>Remuneration*</b>			
1	Cluster In-charge	Monthly	48	1344000
2	Cluster In-charge	Monthly	48	1344000
3	Cluster In-charge	Monthly	48	1344000
4	Cluster In-charge	Monthly	48	1344000
5	MIS -cum Computer Operator	Monthly	48	864000
6	Accountant	Monthly	48	864000
	<b>Subtotal</b>			<b>7104000</b>
<b>B</b>	<b>Office Assets-cum-Stationery</b>			
1	Desktop computer			
2	Laptops with Loaded software			
3	Printer			
4	MFD Device			
5	Almirahs			
6	File Cabinets			
7	Files, Paper, pens, pads, folders, stationery etc.			

S.No.	Component & Activities	Unit	Total Quantity	Total Cost
8	GPS / Tablets handheld devices			
9	Office Furniture - Tables			
10	Office Furniture - Chairs			
11	Broadband Data Card			
	<b>Subtotal</b>			
<b>C</b>	<b>Operational expenses</b>			
1	Office Rent			
2	Electricity charges			
3	Broadband Connection Services / Telephone Rent			
4	Tour Expense (8 mandays/month) / Cluster In-charge x 4	Monthly	480	2304000
5	Refreshments/Tea for Visitors			
6	Training & Capacity Building for staff of CC			
7	Local Travel, Training and Contingency Expenditure			
	<b>Subtotal</b>			<b>2304000</b>
	<b>Total Administrative costs (A + B + C) - 3%</b>			<b>9408000</b>
				0
				0
8	<b>NIE COSTS (@ 3%)</b>			<b>5990568</b>
				0
	<b>TOTAL COSTS</b>			<b>205676155</b>

f) Include a disbursement schedule with time-bound milestones at the component level

Instalment	Percentage	Amount*	Year	Milestones
First	30%	6,16,92,093	October, 2017	Project Initiation, inception workshop, Baseline Survey, orientation etc.
Second	40%	8,22,56,124	June, 2018	Progress implementation, monitoring&review by steering committee
Third	20%	4,11,28,062	June, 2019	Project implementation, monitoring & review by steering committee
Fourth	10%	2,05,64,031	June, 2020	Project implementation, monitoring &review

\*Assumptions:

1. First year advance work for plantation has been taken as 10% of the total cost for the activity, in the 2<sup>nd</sup> year it has been taken as 50% of the total cost for the activity and in the third and fourth year it has been taken as 20% each.
2. Cost to be incurred for creating structures has been taken proportionate for four years i.e. 25% of the total cost for the activity for each year up till fourth year.
3. Cost to be incurred for Baseline survey, assessment, orientation and planning has been taken in the first year.
4. Cost to be incurred for all the other components has been considered proportionately for the project duration.

Major Activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4												
1.1 Villagewise PRA for assessing Climate change Vulnerability																
1.2 Socio-economic HH survey for assessing vulnerability																
1.3 Orientation on Climate Resilience, Adaptation & Community mobilisation																
1.4 Data entry, Documentation & Display boards																
2.1 Awareness for forest protection, watch & ward, insitutionalising systems / penalties/ rights etc.																
2.2 Department & JFMC Plantation in degraded forest lands & wastelands (500 plants/ha + 200 (3 plants by seed sowing) trenches/ha)																

Major Activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4												
2.3 In-situ soil and moisture conservation in forest lands (gully plugs, earthen structures etc.) & peripheral areas																
2.4 Widening / Deepening / Renovation / Maintenance of existing Cattle Proof Trenches / Stone Walls to increase effectiveness for plantations in selected JFMC areas																
3.1.1 Integrated central nursery cum climate resilient technology centre comprising conventional/clonal/Polyhouse /Root trainer + Vermicompost model + SWP well for irrigation + Agroforestry dissemination centre (within 5 ha.)																
3.1.2 Horti-silviculture : horticulture+ trees in community / grazing lands																
3.1.3 Live hedge fencing along community lands																
3.1.4 Water resource / Spring development / Well / Jalkund (Irrigation support)																
3.1.5 Support to JFMCs for raising nurseries for multipurpose trees for distribution																
3.1.6 Vermicompost making																
3.2.1 Plantation (IGFRI models) / grassland development for raising fodder & forage trees in village commons / grazing lands																
3.2.2 Development of Fodder Storage-cum-bank facility																
3.2.3 Knowledge and Capacity building of farmers on IGFRI models																
3.3.1 Fencing, planting material and extension support for growing of medicinal/aromatic/nutritional plants																
3.3.2. Transportation of seedlings/slips/cuttings/seeds of MAP/Cs & distribution																
3.3.3 Training to Farmers on cultivation, processing, value addition, packaging and marketing of medicinal crop (4 trainings per village) from reputed institution																
3.3.4 Identification, training and equipping Youth (Volunteers for promotion of MAPs, dissemination of climate information (CI) and agro-advisory received from KVKs and for operationalisation of Value addition centres																
3.3.5 Support to FPO for Processing Plant facility at project level																

Major Activities	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4												
4.1 CC Nala Bund / Check Dams (10 - 20m)																
4.2 CC Nala Bund / Check Dams (20 - 30m)																
4.3 Community Wells and Farm Ponds with Solar Water Pumps																
4.4 Well deepening and water lifting structures for group irrigation																
5. Learning & Knowledge Management																

## Annexure

### *Annexure1 – Sample data collection tool for Vulnerability Assessment*

#### Building a vulnerability context – What is happening to the environment and why?

Note 1: Given below are indicative questions for collecting data

1. Please note the same question can be used for eliciting data for both past and present situations. While collecting data for this section always find out reasons as to why/what has triggered the change from the past, which will help identify the drivers and pressures.
2. There are other sectors that are climate sensitive, hence users are suggested to add sectors as appropriate to their project area or domain of operation.

#### Identifying the Drivers–D & Pressures–P

##### I. Agriculture

- a) What is the area under agricultural land resources mentioned below?
  - Culturable waste land
  - Fallow lands other than current fallows
  - Current fallows
  - Net area sown
  - Total cropped area
  - Net irrigated area
  - Gross irrigated area
- b) What are the different sources of irrigation in the village (e.g. Farm wells, common wells, bore wells, farm ponds, irrigation tanks)?
- c) Describe the farming system: diversified/specialized/mixed/rain-fed/etc.
- d) What are the different crops sown during kharif, rabi and summer season.
- e) Describe the inputs like variety of seeds, fertilisers used for each crop.
- f) What is the yield per crop?
- g) What are the common crop diseases prevalent in the village?
- h) What are the total input costs and income per hectare?
- i) What are the different agriculture support systems in the village (e.g. subsidies, crop insurance, other government schemes)?
- j) Information about agriculture infrastructure and other facilities like storage structures, cold storages, collection points, markets, seed and grain banks, etc.
- k) Collect information about the social capital related to agriculture, like farmer groups, producer companies, Self Help Groups, etc.
- l) List the reasons for losses in agriculture production due to climate variability and other stressors, collect maximum possible description and try quantify all types of losses using the resilience scale to the extent possible

## II. Livestock

- a) What are the different animal species present in the village? (cattle-indigenous, crossbred, exotic, buffaloes, sheep, goats, poultry-native, improved, commercial, others pigs, camels, horses, mules, yak, rabbit.)
- b) Describe the various grazing resources (cultivable waste land, fallow lands, current fallows, post-harvest land, forest, common property resources, etc.) and non-grazing resources (crop residues) in the village.
- c) What are the various sources of water for livestock?
- d) What are the major livestock products for sale?
- e) Describe the common livestock diseases.
- f) What are the total input costs and income per livestock category?
- g) Describe the livestock support systems like subsidies, schemes for dairy development, feed and fodder development, livestock insurance, etc.
- h) Information about livestock-based infrastructure like milk chilling centers, good collection centres, markets, veterinary clinics, diagnostic labs, etc.
- i) Collect information about the social capital like milk federations, sheep and goat breeders association, self help groups, pastoralists and grazers association.
- j) List the reasons for losses in livestock production species-wise and breedwise due to climate variability and other stressors; collect maximum possible descriptions and try to quantify all types of losses using the resilience scale to the extent possible.

## III. Forests

- a) What are the various water sources in the forest (seasonal rivers, perennial rivers, natural water bodies, etc.)?
- b) List the major forest resources like tree and shrub species, fauna, etc.
- c) What are the different forest products per tree species and give details of the quantity and costs related to each product.

## IV. Fisheries

- a) What are the sources of fisheries (inland, marine, aquaculture, estuaries etc.)?
- b) Describe the fish habitat (mangroves, inland, coral reefs, rivers, wetlands, fresh water, etc. as appropriate in your area).
- c) Name the fish species found in the village and give details of the fish catch per species.
- d) What are the total input costs and income per fish species?
- e) What are the various support systems for fisheries like formal/informal credit systems, insurance, and subsidies?
- f) Give details about the infrastructure like boat-building and propulsion, markets, onshore and on-board processing units, and preserving systems.
- g) Information about the village-level social capital like fishermen groups, trader groups, self help groups, etc.

## **V. Non-farm livelihoods that support the above sectors**

a) Collect information about the various non-farm livelihoods that are related to the above sectors more specifically, like carpenters who make farm implements, electricians, welders, mechanics, traditional healers, masons, etc. present in the village.

## **VI. Other climate-sensitive sectors and crosscutting themes**

### **1. Health sector**

- a) What are the major diseases among men, women and children prevalent in the village?
- b) Collect detailed information about natural deaths and weather-related occurrence of diseases in men, women and children.
- c) Describe the various natural resources like medicinal plants, availability of clean drinking water, food and nutrition sources in the village required for healthy environment.
- d) What are the expenses on diseases and the daily wage loss due to illness?
- e) Information about various government and private health improvement schemes and programmes.
- f) What are the health care facilities present in and around the village and infrastructure to access the facilities?
- g) Describe the condition of housing infrastructure.
- h) What are the different government, private and community-based organisations and groups working for the improvement of health of the villagers?
- i) Describe the equity issues in the village with respect to castes and religions, etc.
- j) Collect information about practices for village sanitation and hygiene.
- k) What is the level of awareness among the villagers with respect to health-related issues like cleanliness, hygiene, family planning, etc?
- l) What is the migration pattern in the village, as a migrating population can be the carriers of diseases?
- m) What are the various addictions like smoking, alcohol consumption, etc. among the villagers?
- n) Describe the traditional healing systems.

### **2. Cross-cutting themes**

#### **2.1 Gender**

- a) What is the participation of women in the local farmer organisations?
- b) What is the existing division of labour in the household farming system?
- c) What are the male and female roles in seed selection, land preparation, planting, weeding, harvest, storage, processing, and marketing?
- d) What are the male and female roles in collection and fodder preparation, feeding, watering, cleaning, herding, shearing, other harvest activities, and care of sick animals?
- e) Are agricultural decisions made by men and women jointly?
- f) Who decides on planting, harvesting, post-harvesting, marketing, and consumption of crops and water usage for agricultural and domestic consumption?
- g) What are the roles of women and men for saving local seed varieties?

- h) Do men as well as women participate in farmer field schools, extension groups, or other dissemination activities to the same extent they carry out the activity themselves?
- i) Do women have access to credit?
- j) What is the relative availability of training and expertise for the crops women farm, animals women raise, and agricultural tasks women perform compared to those of men?
- k) Do men and women receive different wages and benefits?
- l) Do women hold leadership positions in village level organisations?
- m) Do women-only organisations exist? How effective are these organisations?
- n) What is the control over resources or income by men and women?
- o) What is the attendance of girls at primary and secondary schools?

### **2.2 Local traditions and systems**

- a) What are the different common areas in the village used for ceremonies or other festivals?
- b) What is the status of common resource-sharing in the village?
- c) Describe the effect of migration on family integration and traditions?
- d) Does the availability of resources affect the local traditions in the village?

### **2.3 Governance and informal governance**

- a) What is the role of local institutions in the resolution of conflict on resource-sharing?
- b) What are the modifications required in the functioning of the local institutions?
- c) What is the participation of villagers in various committees and local level institutions?
- d) Are there any key players or influential leaders in the village?
- e) What is the status of participation of different sections of the society in the local institutions and what are the different levels they participate in?

### **State & Trends of Climate in the Region**

- a) What was the climate before year 2000? How were the seasons? What were the rainfall and temperature patterns; describe the seasons and climate risks faced in the past in detail.
- b) What are the main climate risks you feel now? Describe each climate risk.
- c) Note the trends of all climate risks being felt since year 2000 till date.
- d) What are the current impacts being faced for each climate risk.
- e) What are the responses taken by communities and external agencies in the context of the climate risks identified?

Note 1: Dry spells, irregular rainfall, frost, high levels of temperature/humidity, sudden high intensity rainfall, unseasonal rains etc can all be considered as climate risks in the region. It is important to understand the frequency of these risks as each risk will have a different impact and hence a different response by the communities. Each response taken will determine the vulnerability depending on the impact it has on the ecosystem the communities live in and themselves.

### **Step 2: Responses – what is being done and how effective is it?**

This section analyses the responses being taken by the communities or by external agencies due to the climate risks that emerge from discussions/data collection in the study area. The

questions below will help the user analyse the responses, gaining a better understanding on what is causing vulnerability in a climatic change context.

1. How effective and sustainable are the responses taken by the community and/or external agency identified in Table B in context to the climate risks being faced?
2. What are the impacts (both positive and negative) of the responses on the ecosystem? Do you notice a series of responses that are causing a negative impact (maladaptation)?
3. What is the effect of responses taken on the vulnerability of the communities? Does a particular response increase or reduce the vulnerability of the community?
4. What are the resources essential for the community to cope or respond to the climate risks identified?
5. Are external agency responses helping build response capacity of communities or resilience of the ecosystem?

**Note:** In case innovative adaptation responses are spotted either by communities or any external agencies, it would be important to identify ways and means to support and amplify these responses.

## Annexure 2 Unit Cost of Raising 1 ha. forestry plantation

Sr. No	Work Description	Units	Quantity	rate	Amt. (Rs)
<b>First Year</b>					
1	Survey	Ha	1	44	44
2	Soil testing	Ha	1	220.57	220.57
3	Removal of Lantana and other bushes (including uprooting) to bush density less than 25 %	Ha	1	1391	1391
<b>Demarcation</b>					
4	Sowing Trenches	Nos.	200	1.47	294
5	Pits	Nos.	500	0.37	185
<b>Digging</b>					
6	Digging of sowing trenches		200	62	12400
7	Pit digging		500	8	4000
8	Digging of Cattle Proof Trench by JCB machine / Stone wall construction*		150	75	11250
9	Construction of Plantation gate	Per/cm	20	101	2020
<b>Grid Construction</b>					
10	New Construction (3 m Wide)	Km	0.1	7552	755.2
11	Inspection path (1 m wide)	km	0.1	1960	196
12	Other expenses	Ha	1	50	50
					32805.8
	<b>First Year cost</b>				<b>32800</b>
<b>Second Year</b>					
<b>Filling of trenches and pits</b>					
1	A- Pit (45 x 45 x 45)	per Pit	500	1.08	540
2	Dressing of sowing trenches	per	200	2.8	560
3	Dressing of cattle proof trenches	per meter	150	1.62	243
<b>Transportation of seedlings (loading and unloading)</b>					
4	Polybag seedlings (25 km distance)-3% by Tractor Load	per seedling	515	2.32	1194.8
5	Transportation of polybag seedlings by head load	per seedling	500	1.51	755
<b>Price of Seed</b>					
6	Cost of seeds for sowing in trenches	per trench	200	6	1200
7	Cost of seeds for sowing in Cattle Proof trench	per rmt	150	3	450
<b>Planting and Sowing</b>					
8	plantation in pit	per tree	500	3.89	1945
9	Seed sowing in trenches	per trench	200	1.51	302
10	Line sowing in cattle proof trenches	per rmt	150	1.4	210
11	Making of Saucer (Thaula) 1.2 m Diameter	Per	500	4.32	2160
<b>Weeding and Hoeing (First / Second/</b>					
					0

Sr. No	Work Description	Units	Quantity	rate	Amt. (Rs)
	<b><u>Winter)</u></b>				
12	A- Plantation area	per seedling / no. of times	(500 x 3)	0.86	1290
	B- Sowing area ( line sowing trees)	per drain / no. of times	(200 x 3)	3.03	1818
	Weeding and hoeing of cattle proof trenches (one time)	per rmt	150	1.4	210
13	Plantation Display Board ( 4.00 ft x 3.00 ft)	nos.	1	390	390
	<b><u>Facilities for labour</u></b>				
14	Water and first aid	per Ha	1	152	152
15	Tools reparation	per Ha	1	428	428
16	o1 labour for various plantation tasks		23.4	174	4071.6
	Other expenses		L.S.		100
		<b>Total</b>			<b>17930.4</b>
	<b>Second year cost</b>				<b>17930</b>
	<b>Third Year</b>				
1	For redigging of failed pits	per pit	50	3	150
2	For repurchase of plants	per seedling	52	7	360.5
3	Transportation of polybag seedlings (15 x 23) cm - 3% additional	per seedling	52	2.32	119.48
	Transportation of polybag seedlings	per seedling	50	1.51	75.5
	<b><u>Plantation and sowing</u></b>				0
5	Seed sowing in trenches by digging upto 20 cm	per drain	20	2.76	55.2
6	Small bags plantation	per seedling	50	3.89	194.5
	<b><u>Compost and micro-nutrients during plantation</u></b>				
7	a) Dung compost 1 kg		50	2.18	109
	b) Micronutrients + chemical fertilizers		50	1.2	60
	c) Insecticides / Termite proof		50	0.65	32.5
8	Saucer (Thala bandi) for failed seedlings		50	4.32	216
9	Repair (Thaula bandi) of old seedlings		450	2.05	922.5
10	Repairing protection trenches / Stone Wall		130	25	3250
	<b><u>Weeding and Hoeing (First / Second/ Winter)</u></b>				0
11	Weeding and hoeing of plants planted in pit (2 times)		500 *2	1.35	1350
12	Weeding and hoeing -Line sowing		200	4.17	1668
13	o1 labour for various plantation tasks		31.2	174	5428.8

Sr. No	Work Description	Units	Quantity	rate	Amt. (Rs)
14	Other expenses		L.S.		30
			Total		<b>14022</b>
	<b>Third year cost</b>				<b>14020</b>
	<b>Fourth Year</b>				
1	For redigging of failed pits	per pit	50	3	150
2	For repurchase of plants	per seedling	52	7	360.5
3	Transportation of seedlings (15 x 23) cm - 3% additional	per seedling	51.5	2.32	119.48
4	Transportation of polybag seedlings	per seedling	50	1.51	75.5
	<b>Plantation and sowing</b>				0
5	Seed sowing in failed trenches by digging upto 20 cm	per drain	20	2.76	55.2
6	Small bags plantation	per seedling	50	3.89	194.5
	<b>Using dung compost and micro-nutrients during plantation</b>				0
7	A Dung compost 1 kg		50	2.18	109
	B Micronutrients + chemical fertilizers		50	1.2	60
	C Insecticides / Termite proof		50	0.65	32.5
8	Saucer (Thaula bandi) for failed seedlings		50	4.32	216
9	Repair (Thaula bandi) of old seedlings		450	2.05	922.5
	<b>Weeding and Hoeing (First / Second/ Winter)</b>				
10	Winter weeding and hoeing of plants planted in pit		500	1.35	675
11	Winter weeding and hoeing -Line sowing		200	4.17	834
12	01 labour for various plantation tasks		7.8	174	1357.2
13	Other expenses		L.S		120
			Total		<b>5281.38</b>
	<b>Fourth Year Cost</b>				<b>5280</b>
	<b>Total Cost</b>				<b>70030</b>

\*Adequate flexibility has been built in so that stone wall construction can be taken up at sites wherein it would be suitable and stones are locally available within the overall cost/ha.

### *Annexure 3A Integrated Nursery cum Climate Information centre*

Particulars	Fixed cost	Recurring cost year 1	Recurring cost year 2	Recurring cost year 3	Total cost
Forest Nursery	325720	217297	217297	217297	977611
Horticulture nursery	892800	240600	307000	396100	1836500
Medicinal Plants Nursery	350000	50000	50000	50000	500000
Workers shed	525000	10000	10000	10000	555000
Administrative building	375000	50000	50000	50000	525000

2 AV classrooms	480000	50000	50000	50000	630000
Fencing	90000		10000		100000
Vermicompost Demonstration	70000	10000	10000	10000	100000
Misc		10000	10000	10000	30000
<b>Total</b>	<b>2548520</b>	<b>587897</b>	<b>674297</b>	<b>743397</b>	<b>5254111</b>

### *Annexure 3B Forest Nursery for Integrated Climate Centre*

S.No.	Particulars of works	Unit	Cost. (Rs.)
	<b>Fixed Cost</b>		
1	Site Preparation	8 MD	400
2	Fencing with barbed wire for 150 RMT	Rs.30/RMT	
3	Preparation of compost pit, nursery path	10 MD	500
4	Maintenance of irrigation source	LS	2000
5	5 HP Solar Water Pump	LS	200000
6	Borewell		75000
7	Cost of pipeline for irrigation (100 mts.)	Rs.15/RMT	1500
8	Cost of implements for nursery operations	LS	2500
9	Cost of Water Tank	LS	5000
10	Preparation of Polybeds (120)	100 MD	5000
11	Cost of Net for providing shade and installation	LS	30000
12	Contingency 5%		3820
13	<b>SubTotal</b>		<b>325720</b>
	<b>Recurring Cost</b>		
1	Rent for land 0.25 ha.	Rs.2500/yr	2500
2	Preparation of Seed beds (10)	10MD	500
3	Cost of seeds	LS	5000
4	Cost of Polybags (400 Polybags/kg)	Rs.40/kg	12000
5	Cost of Pot mixture including loading, unloading @ 2 kg/bag	Rs.120/MT	30000
6	Cost of fertilizer @ 10 gm/polybag	Rs.10/kg	12000
7	Cost of chemicals for plant protection	LS	2500
8	Cost of diesel and lubricants for pumpsets @ 1.5 hrs for 100 days	1 ltr. /hr @ Rs.22/ltr.	3300
9	Cost of thatching material	LS	1000
10	Cost of sowing on seed beds	10 MD	500
11	Cost of weeding and hoeing	50 MD	2500
12	Cost of picking up from germi beds	50 MD	2500
13	Filling up of polybags @ 200 Polybags /MD	625 MD	31250
14	Shifting of polybags	50 MD	2500

S.No.	Particulars of works	Unit	Cost. (Rs.)
15	Cost of labour for irrigation	100 MD	5000
16	Cost of fertilizer application	25 MD	1250
17	Cost of application of insecticides	25 MD	1250
18	Maintenance of paths	10 MD	500
19	Maintenance of pumpset	LS	2500
20	Watch and ward	Rs.1000/month	12000
21	Cost of supervision 5%		6527
22	SubTotal		137077
23	Grand Total		462797

### Annexure 3 C Horticulture nursery

Particulars	Unit	Unit/Rate	Year 1	Year 2	Year 3	Year 4	Total
Cost of planting material for mother plants @ Rs. 75/ plant	1500	75	112500				112500
Maintenance @ Rs. 60/plant	1500	40	60000	60000	60000	60000	240000
Cost of Seed for rootstock raising @ Rs. 300/1000		300		9000	16875	28125	54000
Cost of pot mixture (manure, red earth leaf mold) for rootstock in polybags/pots		5		100000	100000	100000	300000
Plant protection (mother plants, rootstock/grafted plants)			4000	5000	6000	7000	22000
Infrastructure							0
Poly house 200 sq m		930	136000				136000
Mist chamber		550	11000				11000
Shade house (shadenets) 500 sq m		710	255000				255000
Irrigation infrastructure							0
Drip irrigation for mother plant garden (1500 plants)		40000	40000				40000
Water storage tank 10000 L capacity			75000				75000
Store room 50 sq @ Rs.1000/sq m	50	1000	50000				50000
fencing (8000 sq m area / 450 m approximately)		75	33750				33750
<b>Total Material cost</b>			<b>777250</b>	<b>174000</b>	<b>182875</b>	<b>195125</b>	<b>1329250</b>
Labour Mandays	<b>100</b>						0
Land Preparation	100	15	1500				1500
Pit digging for mother plants	100	60	6000				6000
Planting of mother plants	100	50	5000				5000
<i>Nursery for rootstocks</i>							0

Particulars	Unit	Unit/Rate	Year 1	Year 2	Year 3	Year 4	Total
Labour for preparation of 50 beds 1.25mX1 m each bed	100	5		500	500	500	1500
Sowing	100	15			1500	1500	3000
filling of poly bags/pots				1200	2200	3500	6900
Uprooting of rootstocks and planting in polybags		200		6000	11000	19000	36000
Grafting (100 grafts / layers per manday		100		12000	23000	38000	73000
curing and maintenance				1000	1500	2000	4500
Miscellaneous (plant protection / weeding /shifting)			1000	1500	2000	2500	7000
<b>Total Labour requirement</b>			<b>13500</b>	<b>22200</b>	<b>41700</b>	<b>67000</b>	<b>144400</b>
Labour Cost		200	27000	44400	82400	134000	287800
Provision for raising of vegetable / annual flower crops nurseries*		LS	75000	0	0	0	75000
Total Cost (Material and labour& provision for annual crops nurseries)			892750	240600	306975	396125	1836450
Rounded			892800	240600	307000	396100	<b>1836500</b>

#### Fodder storage –cum-bank

Investment particulars	Unit cost
Fodder Storage Godown - 100 MT	300000
Primary processing machinery	50000
Working capital	100000
Furniture, table, computer etc.	50000
<b>Total</b>	<b>500000</b>

#### JFMC Nursery on Common Lands

Items	Unit	Qty	Rate	Total Cost
Survey and Levelling by labour	Ha.	0.3	2702	810.6
Digging to a depth of 0.3m by rented tractor	Ha.	0.3	3504.38	1051.314
10 x 10 m plot formation with boundary drainage	Plot	20	4431	88620
10 x 01 m bed formation	Beds	140	54	7560
Procurement of small bags (3% additional) (15 x 23 cm)	bags	82400	0.38	31312
10 x 01 m germination bed formation				
Raised bed	Beds	373	75.65	28217.45
Level / Sunken bed	beds	100	37.82	3782
Polybag filling (Manure, Sand and Soil – 1:2:4) material				
Soil (0.968 cum)	Bags	80000	298 / ha.	23840
Sand (0.44 cum)	Bags	80000	189/ha.	15120

Manure (0.242 cum)	Bags	80000	151.30/ha	12104
Mixing of Manure, Sand and Soil with pesticide and Bag filling and placing in beds	Bags	80000	168/ha.	13440
Pricks in germination beds for sowing, irrigation etc.	Bags	80000	151/ha.	12080
Sprinkler irrigation till establishment	Bags	80000	227/ha.	18160
Sprinkler irrigation till establishment	Bags	80000	227/ha.	18160
Pricking in Beds	Bags	80000	357/ha.	28560
Shifting of polybags, grading, casualty replacement - 4 times ie. in September, December, March and May	Bags	80000	168/ha.	13440
Weeding and hoeing (2 times)	Bags	80000 x 2	146/ha.	23360
Irrigation (fuel, Water cost included) April to June		80000 x 9	54/ha.	38880
Irrigation (fuel, Water cost included) July to September		80000 x 3	54/ha.	12960
Irrigation (fuel, Water cost included) October to March		80000 x 12	59/ha.	56640
Nursery Display Board	Board	1	3900	3900
Cottage making		1	9068	9068
Watch & Ward and Security – Day & Night	No. of days	312	174	54288
Other works				2000
<b>Total</b>				<b>5,17,353</b>
<b>say,</b>				<b>5,18,000</b>

### Fodder Development (1 ha.)

Items	Unit	Qty	Rate	Total Cost
Survey	Per ha.	1	44	44
Jungle clearance work	Per ha.	1	294	294
Deep ploughing through hired tractor	Per ha.	1	3504.38	3504.38
Land levelling work	Per ha.	1	2702	2702
Pit marking / Staking	manday	0.37	150	55.50
Pit digging works (0.3x0.3x0.3 m)	manday	3	150	450
Protection (Cattle Proof) Trench digging by JCB machine	Per hour	200	75	15000
Live hedge	Per mtr	200	100	20000
Phosphorus fertiliser application	Per kg	20	22	440
Nitrogen fertiliser application	Per kg	20	10	200
Stylo grass seed cost	Per kg	8	200	1600
Clytoris grass seed cost	Per kg	8	700	5600
Sowing of grass	LS			500
Forage plants cost	Per plant	156	7	1092
seedling transportation – 10 kms	Per plant	156	1.62	252.72
Seedling – loading & unloading	Per plant	150	1.51	226.50
Planting works	Per plant	150	3.89	583.50
Weeding & Hoeing – 3 times	Per plant/ once	450	0.86	387

Watch & Ward for every 2 ha.	Per day	117	174	20358
Other expenses				1700
	<b>Total</b>			<b>74989</b>
	<b>Say</b>			<b>75000</b>

### Grassland / Fodder development with maintenance for Model Demonstration plots

Items	Total Cost
First Year works for Fodder / Grassland Development	75000
Second Year works for Fodder / Grassland Maintenance	294,00
Third Year works for Fodder / Grassland Maintenance	294,00
<b>Total</b>	<b>1,33,800</b>
<b>Say</b>	<b>1,34,000</b>

### Well deepening and water lifting structure for group irrigation (with Solar Water Pump)

Items	Total Cost
Approved Rate by UPNEDA 180 Watt + 2Hp	2,00,000
Deepening of well with construction / renewal of super structure	1,50,000
<b>Total</b>	<b>3,50,000</b>

**Model Estimate – CC Check Dam( 10 mtr width)**

Item No.	Particular	Unit	Quantity	Rate	Amount (Rs.)
252	Foundation excavation on murrum soil	Cum	248	60	19840.00
255	Local sand and dressing for foundation	Cum	28.12	550	15466
281	Concrete work at Foundation (1:4:6)	Cum.	73.34	3800	278692
201	At Foundation (1:4) – Stone, Cement and Sand till plinth	Cum.	119.64	3200	382848
201	Above foundation 1 : 4 Mixture	Cum.	97.92	3200	313344
279 A	CC Works at the ratio 1:2:4	Cum.	41.52	479.6	215904
577	1:2 work with Sand, Concrete 20 mm Plaster Works	Sqm	189	90	17010
577	1:2 Pointing work	Sqm	37.20	90	3348
252	Earth filling work for the check Dam and wings on both sides	Cum	140	80	11200
	<b>Total</b>				<b>1257652</b>
	Jungle clearance at Site	LS			15000
	Dag well works etc.	LS			5000
	Repair of kuccha road (For material lift) and site development	LS			15000
	Painting & Writing	LS			5000
	Photography work (4 times)	LS			5000
	Other works (water from tanker)	LS			20000
	For security of material – Watch & ward		65	174	11310
	<b>Total</b>				<b>76310</b>
	<b>Grand Total</b>				<b>1333962</b>
	Less 10% Contractor's benefit				125765
	<b>Total</b>				<b>1208196.80</b>
	Overhead / Entry Point				<b>20000</b>
	Facilities for labour and drinking water				22000
	<b>Total cost of Rs.</b>				<b>1250196.80</b>
	<b>Round Up in Lakh</b>				<b>12.50</b>