

GOVERNMENT OF JAMMU & KASHMIR  
DETAIL PROJECT REPORT  
NATIONAL ADAPTATION FUND FOR CLIMATE CHANGE (NAFCC)

BUDGAM AND JAMMU DISTRICT  
JAMMU AND KASHMIR

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## Project Concept Note:

Title of the Project / Programme	Climate Resilient Sustainable Agriculture in Rain-Fed Farming Areas of Jammu and Kashmir
Project / Programme Objective/s	To reduce agricultural vulnerability of farmers in water stressed rain shadow zones through promotion of appropriate Cropping System, rain water harvesting and recycling, appropriate irrigation and water saving facilities, Integrated Farming System building soil resilience combined with Integrated Nutrition Management with Special Focus on Micro-Nutrients and institutional interventions
Project / Programme Sector	Agriculture
Name of Executing Entity/ies/Department:	Agriculture Production Department, Government of Jammu and Kashmir
Beneficiaries	Farmers in General and Small and Marginal Farmers in Particular
Project Duration (In Years)	4 Years
Start Date	April 2016
End Date	April 2020
Amount of Financing Required (Rs.)	25 Crore (25, 00, 00, 000.00)
Project Location State:	Jammu and Kashmir
District	Jammu District of Jammu Division and Budgam District of Kashmir Division
Block :	Bhalwal Block of Jammu District of Jammu Division <sup>1</sup> Budgam Block of Budgam District of Kashmir Division
Contact Details of Executing Entity/ies	Commissioner/Secretary to Government, Agriculture Production Department

<sup>1</sup> The blocks of the Jammu and Kashmir division has been primarily identified and proposed by the Directorate of Agriculture Jammu and Directorate of Agriculture Kashmir based on the envisaged level of vulnerability and coping capacity of the farmers to weather variability in lieu of the existing climate stress. However the activity jurisdiction of the proposed pilot implementation might be changed based on the initial vulnerability assessment, baseline study and SWOT analysis proposed to be carried out across the district.

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## 1. PROJECT BACKGROUND:

### 1.1 Project / Programme Background and Context:

Global climate change and high variability in monsoon impacts agriculture adversely. As per the fifth assessment report of Intergovernmental panel on climate change (IPCC) droughts, floods, tropical cyclones, heavy precipitation events, hot extremes, and heat waves are known to negatively impact agricultural production, and farmers' livelihood in the south Asian region.

The state of Jammu & Kashmir is strategically located in the north-west corner of India. The state consists of twenty two districts, eighty two tehsils, one hundred forty two blocks, four thousand one hundred twenty eight panchayats and seven urban agglomerations. It consists of three distinct regions – Kashmir valley, Jammu, and Ladakh.

**Physiography:** The state is blessed with diverse ecosystem. In the south lies the Jammu region the lower portion of which is essentially hot in summer and cold in winters, bearing broad leaved forests at lower altitudes in plains and Siwaliks. The middle part of Jammu region support mostly Chirpine forests where as higher reaches are temperate and support luxuriant coniferous forests, the northwest region between Pir Panjal and Zojila is the Kashmir Valley. To the north east lies the great landscape of Ladakh bound by snow peaks. The state of Jammu & Kashmir is having varieties of landscape, the glaciers, rushing torrent, sparkling springs. The state of Jammu & Kashmir is drained by the mighty Indus and its tributaries like Kishan-Ganga, Jhelum, Chenab and Ravi and their tributaries. Out of these, the Indus and the river Chenab have their origins to the north of the greater Himalayas and they pierce through the main ranges of Himalayas.

The State of Jammu and Kashmir has a long history of natural disasters. The State has witnessed many natural disasters especially in the 19th and early 20th centuries. Owing to its peculiar topography, rugged terrain, extreme weather conditions and underdeveloped economy, the State has suffered a lot on account of natural disasters. Hazards like earthquakes, floods, fires, droughts, avalanches and landslides often convert into disasters leading to loss of human lives as well as public and private property. Enhanced vulnerabilities of the built environment make the State highly prone to natural disasters.

**Agro-Climatic Zone:** The regions of state Jammu, Kashmir and Ladakh have distinct agro climatic characteristics and cultural identity. Jammu region has two different climatic zones depending primarily on altitude. Lower hills & plains bear subtropical climate with hot dry summer lasting from April to July. The summer monsoons coming around middle of July and fading away in early September. This is followed by dry spell from September to November. Winter is mild and temperature seldom touches freezing point. In the high reaches of Chenab valley, the climate is moist temperate, winter are severe and varied quantity of snow is received. The Kashmir valley with Pir Panjal Mountains on its south and Karakoram on its north receives

precipitation in the form of snow due to western disturbances. The winter is severely cold and temperature often goes below 0°C. Summers are warm and dry and autumn is again cool and sometimes wet. Ladakh is situated in eastern mountain range of Kashmir. This is one of the highest ranges in the world. It is a cold desert receiving very little precipitation. The temperature remains below the freezing point during winter due to its high altitude.

ARP Zone	Zonal Research Station	Districts	Suitable Crops
JK-1 Low altitude Sub-Tropical Zone	R.S. Pora	Kathur, footlands of Jaserata, Samba and Jammu. Plain land on either sides of Chinab near Akhnur, lower soils of Billavar, Jaserata, Samba and Reasl, the lower elevation of longitudinal dune of Dansal and Udampur, the lower hills of Akhnur, Naushera, Bhimb	Rice , Wheat, Maize, Other Crops & millets, oilseeds, Pulses.
JK-2 Mid to high altitude Intermediate Zone	Rajouri	Including major part of the districts of Poonch, Rajouri and Doda.	Rice, Wheat, Maize, Other Crops & millets, Pulses.
JK-3 Mid to high altitude Temperate Zone	Mansbal	Anantnag, Pulwama, Srinagar, Badgam, Baramulla and Kupwara.	Rice, Maize, Pulses, Lentil, Green gram, Potato, Saffron, Hops, Mustard, Oats.
JK-4 Cold-Arid Zone	Leh	Kadakh.	Millets, Wheat, Pulses, oilseeds, Fruits, Barley & Fodder.

The key vulnerability has been noticed in rice-maize system in Kharif in Kandi areas of Jammu and Badgam due to high variability of rainfall and temperature variability for potato in rabi season.

#### (a.) Problem context:

The two staple crops in the state are rice and maize. Out of which rice has high concentration in the Kashmir Valley and wheat in the Jammu Plain. Wheat is mainly grown in the district of Kathua and Jammu.

The state agricultural university and research centres in J&K has estimated certain vulnerability and adaptation measures for the cropping system in the kandi areas of the valley and certain plain areas in Jammu region. The undulating tracts in valley and critical ground water in Jammu are main obstacles in crop intensification (maximum it is double cropped). Managing crop-water in this area is the adaptation challenge. Enhancing agricultural productivity, therefore, is critical for ensuring food and nutritional security for all, particularly the resource poor small and marginal farmers who would be affected most. In the absence of mitigation and adaption strategies, the

consequences of long-term climate change could be even more severe on the livelihood security of the poor in J&K.

The model prepared by the State Agriculture University predicted that the crop water demand under subtropical condition of Jammu increases by 7 percent if temperature alone rises by 3<sup>0</sup>C. Rise in temperature during Rabi season affect the wheat crop adversely because it shortens the duration of all development stages. It was estimated that the wheat yield reduces to the extent of 0.5 q/ha per rise of temperature by 1<sup>0</sup>C. The testing and validation of CERES-maize model under subtropical condition predicted the significant reduction in maize yield by 34 percent under increase in temperature by 3<sup>0</sup>C. Studies have shown that production and quality of fruit and vegetable crops are affected by high temperature and exposure to elevated levels of carbon dioxide and even ozone concentration.

This project aims to reduce agricultural vulnerability of farmers in water stressed rain shadow zones of Jammu plain and Badgam district of Kashmir valley. Although the proposed study is planned to be carried out for the entire districts the implementation intervention is planned at Bhalwal Block of Jammu District and Budgam Block of Budgam District<sup>2</sup>. This is planned through promotion of appropriate cropping system (through introduction of improved early duration drought, heat and flood tolerant varieties, introduction of improved agronomic practices including improved crop/fallow rotation, use of legumes in crop rotation, use of cover crops, promoting cultivation of pulses/vegetables as suggested by the technical steering committee for achieving optimum yields and ensuring socio-economic security of small and marginal farmers despite climatic stresses. The technical steering committee<sup>3</sup> will derive its conclusion based on the outcome of the study<sup>4</sup> to be carried out across the districts initially including assessing vulnerability, developing baseline data, historical time series' data on temperature and precipitation (30 years), soil health monitoring, accessing traditional knowledge and practice, projecting climate variation using appropriate model and other as decided by the technical steering committee.), rainwater harvesting and recycling, appropriate irrigation and water management technologies (creation of poly house, protected cultivation, contour farming, terracing, tillage and residue management ,reduced/minimum/zero tillage and other resource conservation practice towards reduction of soil erosion), building soil resilience (soil testing and issuing of soil health card<sup>5</sup>, soil health monitoring<sup>6</sup>) integrated farming system (promoting

<sup>2</sup> The blocks of the Jammu and Kashmir division has been primarily identified and proposed by the Directorate of Agriculture Jammu and Directorate of Agriculture Kashmir based on the envisaged level of vulnerability and coping capacity of the farmer to weather variability in lieu of the existing climate stress. However the activity jurisdiction of the proposed pilot implementation might be changed based on the initial vulnerability assessment, baseline study and SWOT analysis proposed to be carried out across the district

<sup>3</sup> The technical steering committee to be created at each directorate/ centrally at Agriculture Production Department will include the members from the respective Agriculture Directorate, academic institution (like SUKAST) , individual advisors, resource pool and other agency/individual deemed to be appropriate by the Directorate/Agriculture Production Department

<sup>4</sup> The study is proposed to be carried out by ICAR/NICRA/CREDA/ SUKAST/other institute as may be deemed to be appropriate by the Technical Steering Committee

<sup>5</sup> The directorate in consultation with the Technical Steering committee will assess the requirement of the setting up of mobile soil testing laboratories and if required may route fund from other activities currently proposed under the NAFCCC

<sup>6</sup> Soil testing will ensure balanced use of chemical fertilizers matching with crop requirement to reduce nitrous oxide emission



fodder production and improved fodder/feed storage methods) combined with integrated nutrition management with special focus on Micro-Nutrients and promotion of organic farming(vermin composting , organic manuring and green manuring). This aforesaid intervention is to couple with institutional inventions. The focus of this adaptation intervention is crop-water use for food security of small and marginal farmers.

### (b.) Linkage with NAPCC and SAPCC

The project is directly linked to objectives of national mission on sustainable agriculture

- To make agriculture more productive, sustainable, remunerative and climate resilient by promoting location specific Integrated/Composite Farming Systems(objective 2.1);
- Appropriate soil and moisture conservation measures with a focus on water use efficiency-partly linked to national water mission);
- To adopt comprehensive soil health management practices based on soil fertility maps, soil test based application of macro & micro nutrients, judicious use of fertilizers etc. (objective 2.3)

The project is directly linked to the following key priorities identified under the Sustainable Agriculture Mission:

- Planning of cropping system and crop varieties through Crop diversification, drought tolerant crops and water saving crops:
- Capacity building of farmers and extension workers and dissemination of new and appropriate technology:
- Integrated nutrient management (INM)

### (c.) Climate and Vulnerability Analysis:

#### **Observed Climatic Hazards and Vulnerability**

The state is a multi-hazard prone region with natural disasters like earthquakes, floods, landslides, avalanches, high velocity winds, snow storms, besides manmade disasters including road accidents and fires etc. Human activities disturbing the ecological balance in most of the case directly results in disastrous event or exacerbate the natural disaster. Observation exhibited that construction of road under Pradhan Mantri Gram Sadak Yojana (PMGSY) schemes or railway track has altered stream course, discharge areas and closed aquifers due to lack of geo-hydrological assessments while sanctioning or developing the projects. Moreover the unauthorized and unplanned construction on the river banks has disturbed the river ecosystem. Sand and gravel dredging or top soil denudation for brick industry to support growing real estate

industry have significantly enhanced the human induced disaster risk in the eco sensitive zones of the State. With projected increase in the frequency and intensity of extreme events including cyclones, droughts, and floods, disaster management needs greater attention. The projected increase in the occurrence of extreme events is likely to include (1) increase in areas affected by drought, (2) increase in areas affected by heavy precipitation and floods and (3) areas affected by earthquakes, landslides, soil creeps and avalanche falls. Apart from the projected hydro-meteorological hazards viz. floods, droughts and cloud-bursts there are likely scenarios of natural hazards such as caused due to earthquakes, landslides and snow avalanches.

<b>Hazards</b>	<b>Areas Covered / Affected</b>
Floods	Low-lying areas of the Kashmir Valley, especially Sonawari, Awantipora, Srinagar, along with parts of Jammu are prone to floods. Upper catchments of all the tributaries of the Jhelum, Indus, Chenab and Tawi rivers are prone to flash floods.
Drought	Most parts of Jammu division including Doda, Udhampur, Kathua, Jammu etc. are drought prone.
Cloudbursts	All hilly areas of the State are prone to cloudbursts.
Wind storm	Occasional wind storms destroying crops, horticulture and roof-tops of houses. Ladakh has been identified as prone to high speed winds but there are hardly any damages due to wind storm, perhaps due to the sparse population and traditional house construction practices.

To study the climate change of any region, the first and foremost step is to assess historical time series' data on temperature and precipitation. But unfortunate part in case of Jammu and Kashmir State is that historical meteorological data are scarce because state overall had few weather stations. Though the temperature and precipitation data from observational measurements in Jammu and Kashmir are not sufficient to draw any conclusion with regards to climatic change scenario of the region but trends derived at different levels by various scientists can be an eye-opener for people of the state about the climate change. The analysis of data indicates that there is a moderate warming trend. The temperature across the Jammu region of J & K State, shows increasing trend and it increases at rate of 0.3 to 0.6<sup>0</sup>C per decade. Similar trend was reported by Jaswal and Rao in 2010 for Kashmir region where temperature increases 0.4 to 0.5<sup>0</sup>C per decade. Other Climate Scientists in 2007, based upon three stations (Srinagar, Leh and Shimla), reported significant rise in air temperature by 1.6<sup>0</sup>C during the last century in the northwest Himalayan region with winter increase at faster rate. They also deduced that the maximum temperature increased more rapidly than minimum temperature<sup>7</sup>.

The annual rainfall and rainy days are decreasing in the region. It is reported that (Khushu, 2011) downward trend in rainfall at the rate of 2.0 to 8.4 mm per year in rabi season across the Jammu region however, in kharif season no definite trend was seen. However, in Kashmir region the

<sup>7</sup> Khushu M. K, An inconvenient Truth-Climate Change in Jammu and Kashmir, SKUAST, Jammu

situation is even worst. As a matter of fact that, during winter, the reduction of snowfall has been clearly noticed over the last few decades in Kashmir. During our childhood, in late sixties, we used to see harsh winters in Kashmir valley due to frequent and heavy snowfalls. Dimri and his co-worker in 2011 reported a distinct shift in precipitation from snow to rain. The high Himalayan Mountains in the north of India are important sources for generating and maintaining the climate over Jammu and Kashmir. They influence extreme weather events, such as the Western Disturbances (WD) over the region during winter. The shifting of precipitation patterns and deficit of snowfall are probably due to unusual changes in frequency and a characteristic of WD's which usually originates over the Mediterranean Sea, Black Sea and Atlantic Ocean. Moreover, glaciers are considered among the most sensitive indicators of climate change. The warming of the region has severely impacted glacier formation.

It is pertinent to mention here that there are certain extreme weather events which are noteworthy and alarming indicating real changes in weather pattern. For example during 2007 the winter was warmest for entire Northern Hemisphere including Jammu and Kashmir state where temperature had gone up by 4- 6<sup>0</sup> C above normal during the month of January, while in the month March heavy snowfall on 13-03-2007, due to western disturbances, resulted significant drop in the over the region and thousands of people get affected by this natural disaster.

Though, evidence for global climate change has been well established by scientific communities around the world, the effects of these changes on regional climates still need to be investigated further. Regional-scale forcing induced by the regional topographical features, along with land-use characteristics, modifies the effect of climate change. The above studies suggest that temperature in the region. Similarly, during year 2008 winter, the entire northern region including this state was grip of cold wave the valley recorded the minimum temperature – 10<sup>0</sup> C. Further, Leh being described as a high altitude cold desert, where sparse rainfall and a heavy downpour is a rare phenomenon.

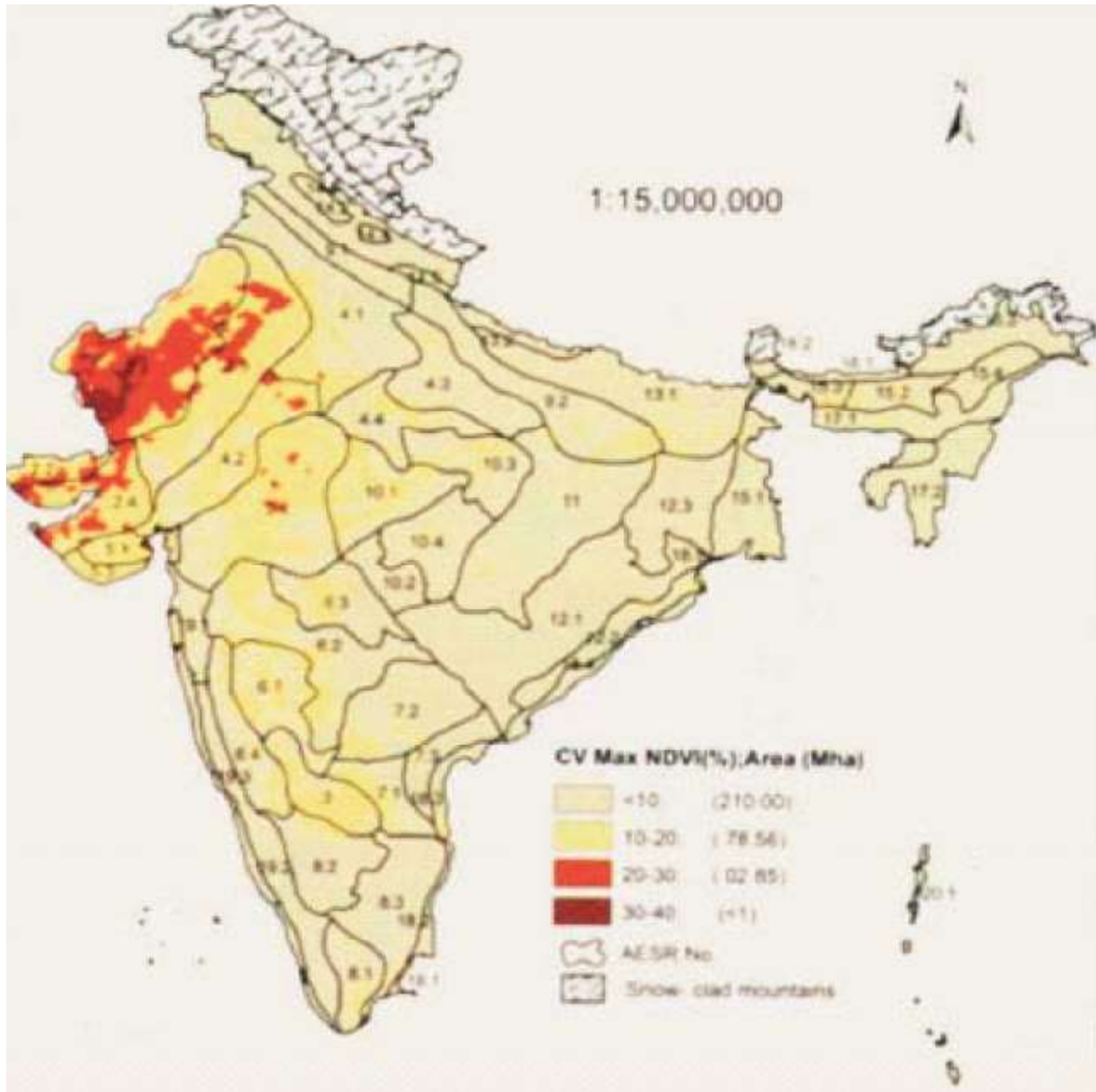
### **Future Climate Vulnerability**

The PRECIS run for 2030's indicate that annual rainfall in the Himalayan region is likely to increase in 2030's with respect to 1970's range from 5% to 13% with some areas of Jammu and Kashmir showing an increase of up to 50%. All seasons in the Himalayan regions indicate an increase in rainfall, with monsoon months of June, July, August and September showing the maximum increase in the rainfall. The winter rain in the month of January and February are also projected to increase whereas minimum increase is indicated in October, November and December<sup>8</sup>.

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<sup>8</sup> State Action Plan on Climate Change, Jammu and Kashmir

Based on the past trend the future vulnerability of the agriculture sector due to climate change has been given in the map below. However, several areas marked in the map (areas under Pakistan occupation no ground level data is available).



### Details of Vulnerability in Agriculture Sector:

Agriculture plays a prominent role in the development of economy of J&K. Around 70% of the population in the State gets livelihood directly or indirectly from the Agriculture and allied Sectors. The three regions of the state, namely Jammu, Kashmir and Ladakh having distinct geographical outlook and agro climatic zones. Each zone having its own characteristics that largely determine the cropping pattern and productivity of crops. Paddy is the main crop of Kashmir, followed by maize, oilseeds, pulses, vegetables, fodder and wheat. In Jammu region, wheat is the prominent crop followed by maize, paddy, pulses, oilseeds, fodder, vegetables and other crops. While in Ladakh, barley is the major cereal crop followed by wheat. The production of three major crops paddy, maize and wheat in J&K state is more than 90% of the total food grain production of all crops and rest is shared by other cereals and pulses.

Around 73% of the population of the State resides in the rural areas and is directly or indirectly dependent upon this sector for their livelihood and employability. Despite its importance for ensuring inclusive growth and providing Food security, the contribution of Agriculture towards Gross State Domestic Product (GSDP), is gradually decreasing<sup>9</sup>. The decline in growth rate is attributed to low productivity, lack of adequate agricultural research extension, low seed replacement rate, yield stagnation, lack of adequate irrigation facility (58% of the net area sown is rain fed) and small size of holdings. Roughly 94% of the holdings fall in the size class of less than 2 hectares and around 81.5%, in less than 1 hectare. Average size of operational holding at state level stood at 0.67 hectares (2005-06) which reflects no change in the holding size in comparison to the holding size in 2000-01.

Agriculture in the state is having a number of limitations like Small and fragmented land holdings, Fragile Soil in hilly areas susceptible to soil erosion, Extreme limits to irrigation of cultivated land, Single Cropping season in temperate / high altitude areas, etc. In order to address these limitations and capitalising upon the potentials, the suggested strategies<sup>10</sup> that can be taken up are like Timely sowing of treated seeds of rice, maize etc., Timely arrangements and easy access of inputs (seeds, fertilizers, technology, etc.), Ensuring supplies of Quality Inputs & Services, Stress on Soil & Water Management, Gearing up Extension Network & Capacity building of farmers in quality seed production, Diversification in cropping system to reduce pressure on water resources, Provide alternatives for marketable crop products and higher income, Generate more employment opportunities through crops having scope in value addition etc.

While the state agriculture policy looks at achieving 4 percent annual growth in agricultural production, the policy framework looks at achieving the followings with strategies that are feasible by agro-climatic regions.

<sup>9</sup> Economic Survey of Jammu and Kashmir, 2013-14

<sup>10</sup> Economic Survey of Jammu and Kashmir, 2013-14

1. Promote sustainable use of natural resources and adoption of practices that conserve soil, water and biodiversity. This will also involve transition of hilly regions to “Organic Farming”.
2. Promote diversification of crops and such other agricultural activities that are commercially more viable for increasing farmers’ income as per local agro-climatic and market conditions.
3. Adopt and implement plans for growth in productivity and income based on specific geographical, agro-climatic and traditional practices within different agro-climatic zones.
4. Promote dry land technologies and adopt specific water conservation initiatives like watershed development etc., to raise farm production and income in rain fed ecosystems of the State.
5. Promote growth that is technologically sound, economically profitable and environmentally sustainable, so that the agriculture in the state develops in a socially acceptable way.
6. Increase in cropping intensity from the present level of 123% to 150% in Kashmir, 176% to 190% in Jammu and 105% to 120% in Ladakh region.
7. Implementing integrated package of measures to increase farm productivity and profitability without any ecological harm; harnessing available technological opportunities both for irrigated and dry land areas. Greater congruence between productivity and sustainability will be ensured through integrated soil-water-nutrient management to bridge the existing yield gaps.
8. Human Resource Development for knowledge, skill and technology upgradation and adoption. Specific human resource and skill development programmes will be pursued to help farmers make better/informed decisions/choices. Transfer of technology (ToT) programmes will be carried out.
9. For moisture stress areas, water conservation/harvesting infrastructure and for low lying areas, drainages shall be created to increase the area under double cropping. Food self-sufficiency will be achieved by double cropping under Rice-Wheat rotation. Seed production of short duration wheat variety, i.e., Shalimar Wheat-1 will be promoted.
10. Special attention will be paid to rain-fed farming (dry land agriculture) in terms of augmentation of available water resource, rain water harvesting and recharge of aquifers. Judicious use of irrigation water is necessary and management will be ensured through improved irrigation practices, micro-irrigation systems (sprinkler and drip irrigation),

water harvesting structures, cultivation of high value low water requiring crops, water saving methods of cultivation to improve Water Use Efficiency (WUE) e.g. System of Rice Intensification (SRI) and choice of cropping pattern.

11. In the hilly regions of the State, particularly Kashmir valley and intermediate hilly zone of Jammu region “Organic Farming” will be promoted through conjunctive use of plant residues, farmyard manure, bio-fertilizers, vermi-compost, bio-pesticides, biocontrol agents, associated cropping of legumes with cereals etc. This will improve Total Factor Productivity (TFP) and sustainability of farming systems.
12. In the areas of the state, where organic farming may not be feasible, Integrated Nutrient Management will be encouraged using available organic resources with inorganic fertilizers. However, nutrient application to soils will be based on soil test results and therefore, soil health cards will be made available to all the farmers. Mobile soil testing laboratories will be made available in all the districts for this purpose.
13. Insulation of our production systems to face the consequences of climate change will be given priority. Mitigation options for sustainable agriculture will be developed through appropriate interventions. For agro-meteorological interventions, weather stations will be established in all the districts of the State through ISRO.

The State Action Plan on Climate Change (SAPCC) highlights possible impact of climate change in agriculture and allied sector as follows.

1. Increase in ambient CO<sub>2</sub> concentration is beneficial since it leads to increased photosynthesis in several crops, especially those with C<sub>3</sub> mechanism of photosynthesis such as wheat and rice, and decreased evaporative losses. Despite this, yields of major cereals crops, especially wheat are likely to be reduced due to decrease in grain filling duration, increased respiration, and / or reduction in rainfall/irrigation supplies.
2. The primary effects of increased concentration of CO<sub>2</sub> include higher photosynthetic rate, increased light-use efficiency, reduction in transpiration and stomatal conductance and improved water-use efficiency.
3. Most of the studies on impact of elevated CO<sub>2</sub> on crop species, reported earlier, have been based on controlled environment or enclosures like green houses, controlled environmental chambers, open top chambers, and other enclosures to confine CO<sub>2</sub> gas around the experimental plants. However, concerns have been expressed that the results obtained from such enclosure-based CO<sub>2</sub> enrichment systems might not be the true representatives of the open field conditions.

4. Increase in extreme weather events such as floods, droughts, cyclones and heat waves will adversely affect agricultural productivity. (the project tries to address mostly drought in this case)
5. Reduction in yields in the rain-fed areas due to changes in rainfall pattern during monsoon season and increased crop water demand. (the project tries to address)
6. Incidence of cold waves and frost events may decrease in future due to global warming and it would lead to a decreased probability of yield loss associated with frost damage in northern India in crops such as mustard and vegetables. (e.g. Potato crop loss in both the districts proposed may be taken up)
7. Quality of fruits, vegetables, tea, coffee, aromatic, and medicinal plants may be affected.
8. Incidence of pest and diseases of crops to be altered because of more enhanced pathogen and vector development, rapid pathogen transmission and increased host susceptibility.
9. As temperature increases, the insect-pests will become more abundant through a number of inter-related processes, including range extensions and phenological changes, as well as increased rates of population development, growth, migration and over-wintering.
10. Agricultural biodiversity is also threatened due to the decrease in rainfall and increase in temperature, and increased frequency and severity of droughts, cyclones and floods.
11. Demand for irrigation water would increase with rise in temperature and evapotranspiration rate. It may result in lowering of groundwater table at some places.
12. Organic matter content, which is already quite low in soils, would become still lower. Quality of soil organic matter may be affected.
13. There may be a change in rainfall volume and frequency, and wind may alter the severity, frequency and extent of soil erosion.

#### (d.) Socio-Economic and demographic context

The Gross State Domestic Product (GSDP) of J&K state during 2012-13 (at current prices) has increased to Rs. 75574.31 crores (quick estimates) from Rs. 65758.52 crores (quick estimates) of 2011-12 registering a growth of 14.93% during 2012-13. The growth as per advance estimates for the state during 2013-14 at current prices is projected at 15.54%. Similarly the State economy is expected to grow at 5.88% (advanced estimates at constant 2004-05 prices) during 2013-14 as compared to achievement of 5.51% in 2012-13 (quick estimates).



Year	2004-05	2009-10	2010-11	2011-12	2012-13	2013-14
GSDP of J&K (Rs. In Lakh)	2730462	4838451	5807257	6575852 (QE)	7557431 (QE)	8731872 (AE)
Contribution of J&K to India (%)	0.92	0.79	0.80	0.78	0.80	-
Per capita GSDP of J&K (Rs.)	25478	42052	49809	55699	63232	72188
Growth rate J&K (%)	-	14.34	20.02	13.24	14.93	15.54

Source: Economic Survey of J&K, 2013-14; Note: QE: Quick Estimate, AE: Advance Estimate

Level of poverty in the state is comparatively less than the national average. As compared with 28.3 percent people officially estimated to survive below the poverty line in India in the year 2004-05, the comparable ratio for the state of Jammu and Kashmir in the same year was pegged by the Planning Commission a meagre 4.5 percent.

The State is basically agrarian and agriculture occupies an important place in the economy of the state. The share of agriculture and allied sectors in the Gross state Domestic Product (at 1999-2000 prices) for the year 2010-11 as per preliminary estimates stands at 20.59%. On the other nearly 70% of the population in the state derives its livelihood directly or indirectly from agricultural sector. The state is predominantly a mono cropped and rain fed with about 40% of the area in Jammu division and 60% in Kashmir Division having assured means of irrigation. Irrigation is crucial input for development of agriculture in the state. The major area in the state falls under the command of canal irrigation. Rice, Maize and Wheat are the major crops in the state, while in Kashmir region Wheat, Oil Seeds and Fodder is being introduced as the secondary crop. In Jammu farmers are raising paddy as an additional crop. Over the year land use statistics has not undergone any significant change. The total reporting area is 2,416 thousand hectares for the year 2011-12. The crop yield for the year 2011-12 regarding principal agriculture crops was estimated to be 1.6 metric tonnes per annum for maize, 2.078 metric tonnes per annum for rice and 1.68 metric tonnes per annum for wheat, which are the major crops of the state.

The total population of the state is about 1.25 crore (1, 25, 48,926) with a population density of 124 persons per sq.km. The sex ratio of the state is 883 female per 1000 male. A decrease in the decadal population growth rate of the region has been observed during 1991-2001 (29.4 percent) and 2001-2011 (23.7 percent). The area and population of the three regions are presented in the Table.

Region	Area (in Sq. Mile)	Population (Census 2011 P)
Kashmir Valley	8,639	5,35,0811
Jammu Region	12,378	69,07,623
Ladakh Region	33,554	2,90,492
<b>Total</b>	<b>54,571</b>	<b>1,25,48,926</b>

Description	Particulars (Census 2011)
Population	1, 25, 41, 302
Population size (Males)	66, 40, 662
Population size (Females)	59, 00, 640
Population size (Rural)	91, 08, 060
Population size (Urban)	34, 33, 242
Population size (Rural Males)	47, 74, 477
Population size (Rural Females)	43, 33, 583
Population size (Urban Males)	18, 66, 185
Population size (Urban Females)	15, 67, 057
Population density	124
Sex ratio (Females per 1000 males)	889
Sex ratio (Rural)	908
Sex ratio (Urban)	840
Percentage of Literacy	68.74
GDP at constant (2004-05) prices	17.10% (2012-13)

Source: NIDM, Jammu and Kashmir, National Disaster Risk Reduction Portal

#### (d.) Project Location Details:

The proposed project will be implemented in two regions of the state, i.e., Jammu Region and Kashmir valley. Two semi-arid and rain-fed districts have been selected for the implementation of the project which frequently experience water stress situation in cropping seasons.

For the piloting, Bhalwal Block of Jammu District of Jammu Division is selected and Budgam Block of Budgam District is selected from Kashmir Division. The project is proposed to be implemented in aforementioned community development block in each district. However the technical steering committee might change the jurisdiction based on the outcome of the studies proposed to be carried out across the district which will be assessed prior to implementation. Kandi areas that cover both these districts have some climatic stress related mostly to monsoon variability. The major land and water management problems being faced in the Siwalik hills and Kandi belt include excessive runoff, soil erosion, land degradation and erratic rainwater

distribution in space and time, thereby hampering agricultural production. The groundwater table in the region is deep. Streams of the area carry huge amount of debris material during rainy season due to fragile geological conditions. In deficient monsoon both areas face drought affecting staples (e.g. rice in valley resulting in 20-25% yield loss to maize about 30% yield loss in Jammu). Potato too gets affected in both there region when there is excess run off. There is significant nutrient loss in both the districts in varying degree (Jammu plain has higher adverse impact).

Climate stimuli	Climatic stress (similarity and difference)	
	Budgam (valley)	Jammu
Rainfall variability (excess moisture)	Highly undulating, excess run off, nutrient leaching and reduction in soil health	Low lying areas affected due to debris deposit and poor soil respiration due to siltation, especially from upstream deposits
Rainfall variability (deficit moisture)	Reduced yield due to lack of water in critical grain filling stage (mid-season drought and late season drought)	Lack of water in critical stages (early season drought and mid-season drought)
Temperature rise	Moderate ET loss (impact on legumes)	High ET loss (impact on both cereals and legumes)

Particulars	Location Profile for the planned implementation intervention	
	Bhalwal	Budgam
Name of the Block	Jammu	Budgam
Name of the District	Jammu	Budgam
No of Village (As per census) <sup>11</sup>	42	84
Total population (rural)	74,790	90,378
Total Population (SC-rural)	23,371	-
Total Population (ST-rural)	10,409	302
Total Number of Cultivators (rural)	4,823	3,965
Total Number of Agricultural laborers (rural)	1,201	1669
Total area (ha)	6921 ha (of which irrigated are is 238 ha and un-irrigated area is 6683 ha)	Data unavailable at block level

<sup>11</sup> As per District Census handbook , Census of India 2011, however as per the Directorate of Agriculture Jammu the number of village are 64

District Irrigation Profile<sup>12</sup> – Jammu

Sl. No.	Size Class(HA)	Total Holdings		Wholly Irrigated Holdings		Wholly Un-irrigated Holdings		Partly Irrigated Holdings			Holdings Receiving Irrigation	
		Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Total Area (ha)	Irrigated Area (ha)	Number	Net Irrigated Area (ha)
1	Below 0.5	79562	19460	51599	12276	26903	6232	307	102	46	51906	12322
2	0.5 - 1.0	30742	22387	18244	13054	11993	7586	420	299	122	18664	13176
<b>MARGINAL</b>		<b>110304</b>	<b>41847</b>	<b>69843</b>	<b>25330</b>	<b>38896</b>	<b>13817</b>	<b>727</b>	<b>401</b>	<b>168</b>	<b>70570</b>	<b>25498</b>
3	1.0 - 2.0	20890	30744	11920	17377	8546	10448	389	540	238	12309	17615
<b>SMALL</b>		<b>20890</b>	<b>30744</b>	<b>11920</b>	<b>17377</b>	<b>8546</b>	<b>10448</b>	<b>389</b>	<b>540</b>	<b>238</b>	<b>12309</b>	<b>17615</b>
4	2.0 - 3.0	5814	13840	3070	7019	2601	5085	134	290	88	3204	7107
5	3.0 - 4.0	2085	7046	1065	3475	1003	2633	17	52	17	1082	3492
<b>SEMMEDIUM</b>		<b>7899</b>	<b>20885</b>	<b>4135</b>	<b>10494</b>	<b>3604</b>	<b>7718</b>	<b>151</b>	<b>342</b>	<b>105</b>	<b>4286</b>	<b>10599</b>
6	4.0 - 5.0	667	2933	294	1253	356	1152	17	65	21	311	1273
7	5.0 - 7.5	376	2211	199	1112	141	580	32	166	31	231	1143
8	7.5 - 10.0	54	434	29	209	22	124	3	24	5	32	214
<b>MEDIUM</b>		<b>1097</b>	<b>5578</b>	<b>522</b>	<b>2574</b>	<b>519</b>	<b>1855</b>	<b>52</b>	<b>255</b>	<b>56</b>	<b>574</b>	<b>2630</b>
9	10.0 - 20.0	35	478	17	189	18	140	0	0	0	17	189
10	20.0 & ABOVE	21	2215	21	2177	0	0	0	0	0	21	2177
<b>LARGE</b>		<b>56</b>	<b>2693</b>	<b>38</b>	<b>2365</b>	<b>18</b>	<b>140</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>38</b>	<b>2365</b>
11	<b>ALL CLASSES</b>	<b>140246</b>	<b>101748</b>	<b>86458</b>	<b>58140</b>	<b>51583</b>	<b>33979</b>	<b>1319</b>	<b>1538</b>	<b>567</b>	<b>87777</b>	<b>58707</b>

## District Irrigation Profile –Budgam

Areas in ha

Sl. No.	Size Class(HA)	Total Holdings		Canals		Tanks		Wells		Tubewells		Other Sources		Exclusive Number of Holdings Receiving Irrigation	Total Net Irrigated Area
		Number	Area	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated		
1	Below 0.5	82548	19016	66873	14795	0	0	0	0	0	0	1028	218	67827	15013
2	0.5 - 1.0	21727	14910	17751	10418	0	0	0	0	0	0	416	165	17972	10582
<b>MARGINAL</b>		<b>104275</b>	<b>33926</b>	<b>84624</b>	<b>25212</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1444</b>	<b>383</b>	<b>85799</b>	<b>25595</b>
3	1.0 - 2.0	7772	9966	6353	6646	0	0	0	0	0	0	115	76	6410	6723
	<b>SMALL</b>	<b>7772</b>	<b>9966</b>	<b>6353</b>	<b>6646</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>115</b>	<b>76</b>	<b>6410</b>	<b>6723</b>
4	2.0 - 3.0	1109	2548	792	1474	0	0	0	0	0	0	5	11	797	1484

<sup>12</sup> <http://agcensus.dacnet.nic.in/dttabledisplay4.aspx>

Sl. No.	Size Class (HA)	Total Holdings		Canals		Tanks		Wells		Tubewells		Other Sources		Exclusive Number of Holdings Receiving Irrigation	Total Net Irrigated Area
		Number	Area	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated	No. of Holdings	Area Irrigated		
5	3.0 - 4.0	333	1117	199	485	0	0	0	0	0	0	0	0	199	485
SEMIMEDIUM		1442	3665	991	1958	0	0	0	0	0	0	5	11	996	1969
6	4.0 - 5.0	112	522	35	152	0	0	0	0	0	0	0	0	35	152
7	5.0 - 7.5	74	428	68	306	0	0	0	0	0	0	0	0	68	306
8	7.5 - 10.0	29	244	29	240	0	0	0	0	0	0	0	0	29	240
MEDIUM		215	1194	132	698	0	0	0	0	0	0	0	0	132	698
9	10.0 - 20.0	13	140	13	98	0	0	0	0	0	0	0	0	13	98
10	20.0 & ABOVE	11	254	11	254	0	0	0	0	0	0	0	0	11	254
LARGE		24	394	24	352	0	0	0	0	0	0	0	0	24	352
11	ALL CLASSES	113728	49144	92124	34867	0	0	0	0	0	0	1564	470	93361	35336

## 1.2 Project / Programme Objectives:

### Overall Goal:

The overall goal of the project is to “Improve the Adaptive Capacity of Farmers, basically Small and Marginal Farmers, through Climate Resilient Agricultural Practices. The goal of the project is in line with the current land holding status of the farming families, i.e., 0.67 ha (small holders in undulating areas in valley and both small and marginal farmers in Jammu) and also as per the action plans suggested in NAPCC and SAPCC.

### Project Objectives:

The broad objective of the project is to reduce agricultural vulnerability of farmers in water stressed rain shadow zones through promotion of appropriate Cropping System, rain water harvesting and recycling, appropriate irrigation and water saving facilities Integrated Farming System building soil resilience combined with Integrated Nutrition Management with Special Focus on Micro-Nutrients and institutional interventions

Specific objectives of the project are;

- Objective 1:** To minimize the current level of crop loss through adaption of appropriate and scientific cropping system<sup>13</sup>.
- Objective 2:** Promoting improved return from agriculture with the adoption of Integrated Farming System<sup>14</sup>.
- Objective 3:** Bringing improvement in production and productivity of crops through Integrated Nutrition and Pest Management<sup>15</sup>.
- Objective 4:** Promoting Irrigation Management through Micro Irrigation System in water stressed areas based on crop suitability<sup>16</sup>.
- Objective 5:** Building capacity of farmers and other stakeholders on climate resilient sustainable agricultural practices<sup>17</sup>.

<sup>13</sup> Action Sl. No. 1 under Sustainable Agriculture Mission, High Priority, State Action Plan on Climate Change

<sup>14</sup> Action Sl. No. 7 (high priority), 30 (medium priority) under Sustainable Agriculture Mission, High Priority, State Action Plan on Climate Change

<sup>15</sup> Action Sl. No. 3 (high priority), 12 (high priority), 25 (medium priority) under Sustainable Agriculture Mission, State Action Plan on Climate Change

<sup>16</sup> Action Sl. No. 6 under Sustainable Agriculture Mission, High Priority, State Action Plan on Climate Change

<sup>17</sup> Action Sl. No. 2 under Sustainable Agriculture Mission, High Priority, State Action Plan on Climate Change

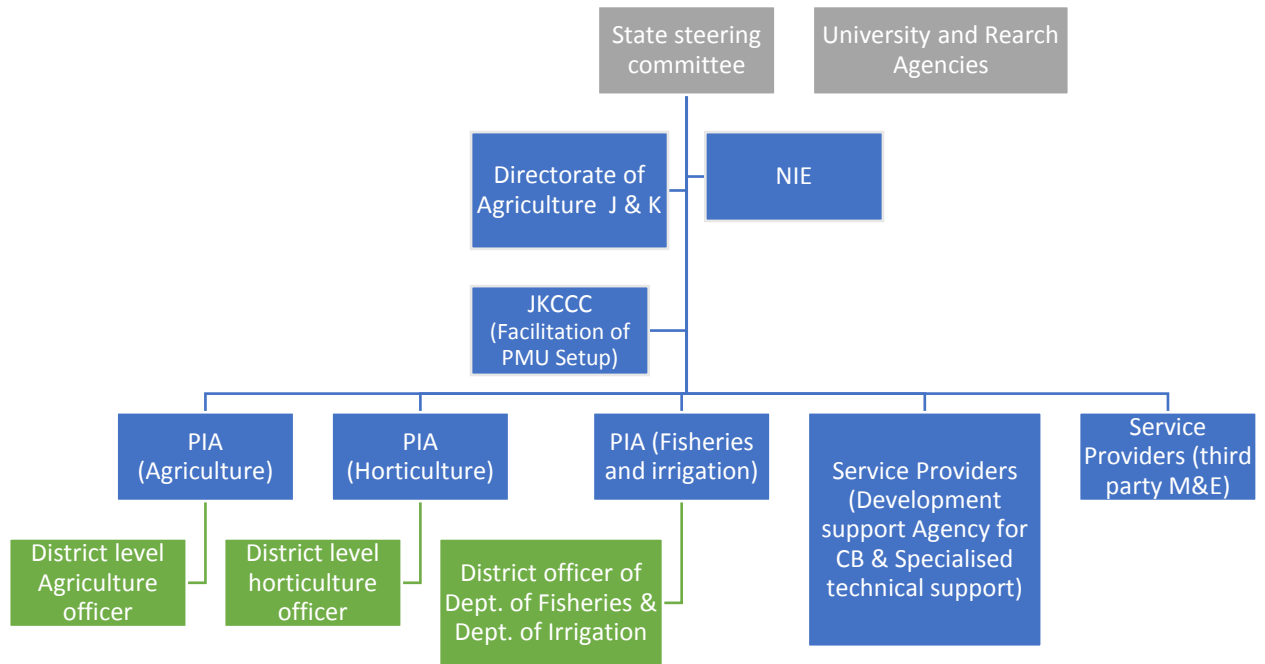
### 1.3 Details of Project / Programme Executing Agency:

(a) Name and Other Details:

Commissioner-cum secretary Commissioner/Secretary to Government, Agriculture Production Department , Government of J&K
Climate Change Cell, Government of J&K Department of Forest, Ecology and Environment, Civil Secretariat, Srinagar/ Jammu
rakeshkumarguptaias@gmail.com mutaharradeva@gmail.com

(b) Technical Person Power:

Please refer the annexed organogram for detail



### (c) Three Largest Climate Change Adaptation Projects Handled:

The State Government is yet to implement large scale climate change adaptation projects

### (d) Three Largest Community Based NRM Projects Handled:

Integrated watershed management programme of Government of India  
Rashtriya Krishi Vikas Yojana of Government of India

### (e) Three Largest Climate Change Adaptation/NRM Projects of State/Central Govt.:

### (f) Availability of Suitable Infrastructure for Implementation

The State Government of Jammu and Kashmir is having adequate infrastructure to implement project of this nature. Apart from own infrastructure, the existence of agriculture university in both the regions (Jammu and Kashmir) is an added advantage for research and development on climate change.

### (g) Blacklisting of Executing Entity:

The project is proposed to be implemented by State Government of Jammu and Kashmir in its Department of Agriculture.

## 1.4 Project / Programme Components and Financing:

Project / Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (Rs.)
<b>Component 1:</b> Assessment of vulnerability of cropping system and recommended guidance	<ol style="list-style-type: none"> <li>1. Baseline data of the block (land use system, cropping pattern, yield, soil health, historical time series' data on temperature and precipitation (30 years)) and vulnerability</li> <li>2. Cropping system assessment based on the agro-climatic condition based on their vulnerability</li> <li>3. Suitable variety of crops based on climate variability in Cereals (paddy / rice), Pulses, Maize and other horticultural crops.</li> </ol>	Climate adaptive cropping system minimizes crop loss and improve production & productivity	4,01,50,000
<b>Component 2:</b> Adoption of Integrated Farming System	<ol style="list-style-type: none"> <li>1. Adoption of mixed farming of Livestock and Agriculture;</li> <li>2. Change in Farming Techniques for</li> </ol>	Enhanced food security through diversified	5,50,40,000



	<p>maximum production;</p> <ol style="list-style-type: none"> <li>3. Promoting ideally suited agronomic practices (improved crop/fallow rotation, use of legumes, cover crops)</li> <li>4. Promotion of promoting fodder production and improved fodder/feed storage methods</li> <li>5. Recycling of farm waste for livestock production;</li> <li>6. Shift from mono-culture to integrated farming system.</li> <li>7. Promoting cultivation of pulses, vegetables</li> </ol>	<p>livelihoods to cope with climate variability Livestock security</p>	
<b>Component 3:</b> Integrated Nutrition and Pest Management	<ol style="list-style-type: none"> <li>1. Improved soil health;</li> <li>2. Distribution of soil health card</li> <li>3. Efficient application of nutrients (integrated nutrient management) as per requirement;</li> <li>4. Promotion of organic manuring, green manuring vermi-compost in suitable locations (as applicable);</li> <li>5. Nutrient recycling;</li> <li>6. Efficient use of pesticides as per crop requirement.</li> </ol>	<p>Improved Soil health and its crop specific profile contributing improved production and minimized occurrence of crop specific diseases through Pest Management Practices</p>	2,75,00,000
<b>Component 4:</b> Enhancement of Water security by bringing in water use efficiency in rain-fed farming conditions.	<ol style="list-style-type: none"> <li>1. Introduction of polyhouse, promoting protected cultivation</li> <li>2. Promotion of drip / sprinkler irrigation;</li> <li>3. Support to farmers with scientific crop-water management system with on field improvement</li> <li>4. Orientation of farmers on tillage and residue management , water management</li> <li>5. Creation of water harvesting structures</li> </ol>	<p>Water scarcity situation managed bringing water use efficiency in rain-fed farming conditions.</p>	8,80,00,000
<b>Component 5:</b> Building capacity of farmers and other stakeholders on climate resilient sustainable agricultural practices	<ol style="list-style-type: none"> <li>1. Capacity building of farmers on INM, IPM and Integrated Farming System;</li> <li>2. Capacity Building of Extension Service Officials to promote INM, IPM, Integrated Farming etc.</li> </ol>	<p>Improved capacity of the farmers on climate resilient agricultural practices and its adoption in</p>	83,20,000

	farming.	
Project / Programme Execution Cost		2,34,90,000
Total Project / Programme Cost		24,25,00,000
Project / Programme Cycle Management Fee Charged by Implementing Entity		75,00,000
Amount of Financing Required		25,00,000,00

**Note:** Component 5 Includes Baseline and Tracking of Climate Parameters along with Mapping

### 1.5 Project Calendar:

Milestones	Expected Dates
Start of Project/Programme Implementation	April 2016
Mid-term Review (if planned)	January 2018
Project/Programme Closing	April 2020
Terminal Evaluation	August 2020

## 2.0 PROJECT / PROGRAMME JUSTIFICATION:

### (a) Component wise Details and Justification of Project Components:

#### (i.) What is the business-as-usual development for the targeted sector:

Agriculture sector has been one of the prominent sectors of the State and about 70 per cent of the populations directly or indirectly depend on agriculture and its allied sectors. The net sown area of 7.35 lakh ha (2009-10) is 35 per cent of the reported area as against the national average of 46 per cent. About 70 per cent of the net sown area is under the food crops. The average size of holding is very small (0.545 ha/holding) as compared to 1.66 ha at the national level with more than 93% of owners of these farm holdings subsisting on agriculture and allied activities.

The State Government has been implementing a number of projects having thrust on vegetable production, production of Basmati rice, saffron production, mushroom development, Apiculture, Sericulture Development etc. The saffron mission is established for augmenting saffron production whereas RKVY has been one of the major support for overall development of agriculture sector.

However, specific focus on climate resilient farming system is lacking whereas focus in the sector has been more on augmenting production and productivity. The kandi areas where the project has been proposed are rain shadow areas. The small and marginal framers in these areas are highly vulnerable. Adoption of scientific technologies in the crop production is low because of low literacy, lack of awareness regarding the mode of adoption of modern technologies resulting in low and unstable income since agriculture is mostly in rain fed conditions, the use of inputs is very crucial for making the farming economically viable in these areas. 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. Integrated farming system and recycling of farm waste is rarely practiced though it is one of the important adaptation mechanism to climate variability situations.

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 arise out of this under climate change action plan. This project proposed for pilot execution is part of the overall initiative of the State Government to deal with adaptation to the climate variability situations.

The project aims to do a proper status review of various prevalent cropping systems and the vulnerability due to climate change. It is important to note that several research studies from university and NICRA have not been mainstreamed yet in the departmental planning process. For e.g. In maize, 72.08 percent and in wheat, 67.5 percent of the respondents used seeds of local varieties.

After the adaptation gaps are estimated, the focus would shift to scientific management of cropping system; management of soil health, management of crop-water with focus on water use efficiency and finally livelihood diversification. This does not form a sequence and would be assessed based on the adoption levels of the farmers. The project aims to focus 1<sup>st</sup> on climate vulnerability of the existing cropping system and tries to address all issues with a clear focus on adaptation.

To give an example a study conducted by SKUSAT shows that seed usage is about 15-25% less than recommended dose in the state.

Name of Crop	Number	Average Seed rate used(kg/ha)		
		Marginal	Small	Semi medium
Maize	240	25.80	29.40	31.60
Wheat	240	105.60	117.8	123.60
Bajra	240	14.20	11.04	12.85
Mustard	23	6.34	6.45	7.34
Toria	19	6.37	6.48	7.23
Mash	21	17.42	19.60	20.80
Til	17	6.14	6.21	6.87
Cowpea (Mix crop with Maize)	23	12.42	11.80	13.60
Moong	32	17.35	18.32	23.45
Lentil	15	34.75	35.75	37.85

Similarly there is hardly any attempt at soil health management in response to climatic stress. It is understood that the programmes exist at the national level and corresponding programmes do exist in the region too, but stressed crop based targeting as a demonstration measure will help policy makers to mainstream these adaptation actions in the planning process.

### (ii.) Specific Adaptation Activities to be implemented:

Specific adaptation activities to be implemented to reduce the climate variability / change vulnerability which are beyond the scope of business-as-usual are as follows. However, the overall scope of the project will be in line with the sector development focused along with adapting to the changing climatic situations.

1. Vulnerability analysis of the existing cropping system and document deviations from recommended practices
2. Identifying priority crops for interventions
3. Introduction of climate adaptive cropping system as per the assessment findings;
4. Assessment of feasibility of inter-cropping / mixed cropping and its promotion;
5. Soil testing and soil-moisture management system based on soil health card;
6. Nutrition Management Plan (Micro-nutrient) for each crop in project locations;
7. Pest Management Plan for each crop in project locations;
8. On-Farm water management in rain-fed & water stress areas through drip/sprinkler systems;
9. Farm ponds / water harvesting structures in the water stress / rain-fed areas;
10. Training / Orientation of target farmers on climate resilient agriculture / horticulture;
11. Demonstration of different package of practices that are adaptive to climate variability;
12. Credit linkage and convergence of other existing schemes at farmer and area level;
13. Promotion of Integrated Farming System, taking in to account livestock and agriculture;
14. Extension services and hand holding support to target farmers from time to time;
15. Monitoring and documentation climate benefit of adaptive practices and overall adaptation benefits and sharing the learnings;
16. Project monitoring, Supervision and Reporting by constituting of Project Steering Committee (PSC) and Technical Advisory Committee (TAC);

### (iii) Justification on the concrete adaptation activities of the project:

All the activities stated above may not be concrete adaptation, specific concrete adaptation activities are explained below:

#### *Assessment of cropping system vulnerability*

Our crop planning system is usually ex-post and top down. The project wants to assess the vulnerability of the cropping system so that a change can be justified to policy makers. This will

be based on exposure (to stimuli, area coverage), sensitivity (productivity trends), adaptive capacity (ability of the farmers).

*Testing of the recommended cropping system from an adaptation point of view*

To give an example, in maize + cowpea intercropping, due to synergy existing between two intercrops, an yield enhancement of 75.3% in maize and 2.3% in cowpea was observed over the traditional system with a net return of Rs. 24200/ha in maize and Rs. 32400/ha in cowpea. Net return in case of cowpea was more because, no additional input other than seed was applied to the cowpea crop.

*Change in framing techniques and diversification of livelihood in an integrated farming system*

In this the sub-activities will be three types (from concrete adaptation point of view)

- Varietal diversification
- Change in farming techniques
- Livelihood opportunity assessment
- Livelihood diversification

Some of varietal recommendations and farming techniques illustrate this (this has been recommended by NICRA and SKUSAT in some areas)

*Demonstration of improved varieties/ hybrids of Khariff and Rabi crops*

*Crops/Treatments in Khariff*

Varieties/hybrids of maize (single crop):

1. Tip Top
2. KH-517
3. Double DeKalb
4. PB-2475

In double crop with water balance

1. Maize (Double DeKalb) – Wheat (PBW-175)
2. Maize (Double DeKalb) – Mustard (Pusa Bold)
3. Green gram (PDM-14) –Wheat (PBW-175)
4. Green gram (PDM-14) –Wheat (PBW-175)
5. Black gram (Uttara) – Chickpea (Pusa-372)
6. Fodder (mixed fodder ) – fodder (Oat)
7. Sesame (Pb. Til no 1) – Mustard (Pusa Bold)

### *Integrated nutrient management*

This will be based on soil health card and would move gradually from major fertiliser application to micro-nutrient. The adoption gap of fertilisers in the state from a study is given below to show there exists scope for improvement. The balancing will be done on climate induced soil characteristic deterioration like leaching, or deterioration of soli organic carbon.

Fertilizer dose kg/ha	Maize	Wheat	Bajra
<b>Urea</b>			
Used	79.53	83.27	41.87
Recommended	100	100	35
Gap	-20.47	-16.73	+6.87
<b>DAP</b>			
Used	42.20	43.67	0.0
Recommended	90	66	33
Gap	-47.80	-22.33	-33
<b>MOP</b>			
Used	23.70	24.10	0.0
Recommended	33	35	25
Gap	-9.30	-10.90	-25

Sub-activities like organic cultivation, nutrient recycling and farm manure integration would be under this category.

### *Integrated pest management*

This will have two major components one is a pest surveillance of which the project will focus on vector induced pests control while the other component will be converged from the components under RKVY so that there is no duplication.

Second component shall be introducing package up practices and varieties resistant to vectors.

### *Diversification of livelihoods*

Livelihood action plans will be based on the livelihood shock during the climatic stress and actions proposed thereof and will be different from normal top down livelihood programmes and would be designed through a micro-planning process.

e.g. introduction of small ruminants, introduction of green fodder will be under this category

### *Crop water balance and water use efficiency*

The focus in this case will be based on the water requirement crops and the overall efficiency. This is in line with PMKSY. The micro-irrigation equipment will come from that source.

However, the crop rotation, intercrop that will have best water use will be the mode of integration. In any case cereals and staples do not use drip. These systems will be given in areas where the vegetable cultivation or floriculture is feasible.

#### *Monitoring and learning adaptation benefits*

The project is a learning projects hence every lesson learnt here need to be documented shared. Policy briefs will help mainstreaming climate stress induced planning and adaptation in the agriculture planning and research system. A credible agency with considerable experience in the state and nationally shall act as a knowledge partner to assist the project management unit in this process. The agency will also work with NIE in generating periodic reports.

#### (b) Economic, Social and Environmental Benefits of Project/Programme:

Components/Activities	Key Benefits (Direct)		
	Social	Economic	Environmental
<b>C1. Assessment of vulnerability of cropping system</b> Location Specific Climate Vulnerability Analysis	Vulnerability specific to holding size and cropping will be mapped for project support. This will be the targeting criteria.	Mapping will identify of economic vulnerability arise due to crop loss (30-40% loss in staples), less production (20% yield loss), high input cost etc.	Finalization of intervention strategy based on agro-climatic situation and crop suitability.
<b>Component 2:</b> Adaption of appropriate and integrated farming system	Focus will be on small and marginal farmers and will ensure social equity. The state largely had inequity manifested through large orchard owners and cultivators	Improved production / productivity, minimized crop loss will give more economic return. Livelihood diversification will reduce risk	Adaptive cropping system put less stress on the local environment (along with other suggested measures)
<b>Component 3:</b> Integrated Nutrition and Pest Management	Small holders will not suffer by ensuring their soil health and organic methods will help them in the long term	Minimized input cost and there by reduced unit cost of production	Uses of bio-pesticides minimize negative impact on local environment. Micro nutrients contribute to maintaining soil health.
<b>Component 4:</b> Irrigation Management through Micro Irrigation System in water stressed areas	Improved water management practices may lead to equitable access	Improved production and yield with appropriate water management measures there by economic gain reduced crop failure (appropriate irrigation	Storage and use of available water with less water wastage at farm level.



		at critical stage ensures yield protection and with input management at least 15-20% increase in yield)	
<b>Component 5:</b> Building capacity of farmers and other stakeholders on climate resilient sustainable agricultural practices	Farmers will be well equipped with the climate resilient agricultural practices	Better return on investment through application of improved knowledge base	Regulated / minimization of current farming practices that are less environment friendly. More adaptive capacity.

### (c) Sustainability of the Intervention:

Sustainability of the intervention 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. 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 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 inputs 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 Project / Programme:

## (i) Alternative Options

<b>Activity</b>	<b>Proposed Alternatives</b>	<b>Benefits (of Proposed Activity)</b>
Vulnerability analysis, specific to agriculture and allied sectors, including irrigation sector;	General top down assessment	Generating Scientific data on climate change and adaptation for better targeting and future cropping system planning in agriculture / horticulture sector
Identifying priority areas of intervention within the sector along with target mass, crop specificity etc.;	Standard schemes across the regions	More localized action in-adherence to adaptation requirements as per the agro-climatic and crop requirement. The climate stress better captured and yield protection and increase in the range of 10-25% envisaged
Introduction of climate adaptive cropping system as per the assessment findings;	General cropping system promotion	More adaptive to climate variability through appropriate crop planning.
Soil testing and soil-moisture management system; Micro-nutrient application	Business as usual, no use of micro-nutrient	Creation of top soil and restoration of organic matter in soli is highly expensive. Soil testing and micro nutrient application by crop type will bring nutrient balance and enhance soil health
Nutrition Management Plan for each crop in project locations;	General / common plan or no plan; business as usual	Better and efficient way of input management along with nutrient management calendar by crop
Pest Management Plan for each crop in project locations;	General / common plan or no plan; business as usual	Better and efficient way of pest management along with organic pest treatment methods.
Assessment of feasibility of inter-cropping / mixed cropping and its promotion;	Mono-cropping without any inter-mixed cropping	Pest resistance and increased output per unit area; better adaptation to climate variability.
On Farm water management in rain-fed & water stress areas focused on water use efficiency through drip/sprinkler systems;	Common / flood irrigation system and no run off management	Irrigation management, efficient water use, better yield from marginal land, minimize conveyance loss. Cost of water saved is significant (drip irrigation saves more than 20-25% water esp. in vegetables, not required for staples)
Training / demonstration of	General training without any	Better adaptive capacity,

<b>Activity</b>	<b>Proposed Alternatives</b>	<b>Benefits (of Proposed Activity)</b>
target farmers on climate resilient agriculture / horticulture;	reference to climate	availability of alternatives to cope,
Credit linkage and convergence of other existing schemes at farmer and area level;	Unilateral / common implementation strategy	Bringing strength of other schemes to the current intervention, quality output
Promotion of Integrated Farming System, taking in to account livestock and agriculture;	Farming as usual, mono cropping	Risk sharing during climate stress situation through supportive livelihood.
Introduction of farm residual recycling and management system within the farm;	No specific use, piling of waste	Recycling minimizing environmental threat, optimization of resource use.
Farm ponds / water harvesting structures in the water stress / rain-fed areas;	Using common irrigation system or rain-fed farming	Better water availability, soil moisture retention, minimizing dry spell impact.
Documentation of project learning & dissemination;	Business as usual	Improved learning and sharing adaption outcomes for mainstreaming adaptive practices.
Institutional Arrangement: Constitution of Project Steering Committee (PSC) and Technical Advisory Committee (TAC);	General implementation frame like most of the current schemes	Better technical advice, measurement & tracking of climatic factors, translating adaptation mechanisms in to learning

## (ii) Weighting of the Project Activities:

Type of Activity	List of Activities	Funding Requirement	
Investment Activity	Vulnerability Analysis and Baseline Study	30,000,000	192,120,000 (77%)
	Farmer Field Demonstration (Demo. Inputs)	6,250,000	
	Seed Support to Farmers (Climate Resilient Varieties)	2,500,000	
	Support to farmers for Integrated Farming (Livestock etc.)	37,500,000	
	Soil Testing	4,000,000	
	Nutrition Management Plan-Each crop by Location	4,000,000	
	Support to farmers on adopting integrated nutrient management, organic cultivation	6,000,000	
	Pest Management Plan-Each Crop by Location	6,000,000	
	Support to farmers for Pest Management Instruments	6,250,000	
	support to farmers in developing Poly house, Drip / Sprinkler/ drip irrigation/ protected cultivation and others	25,000,000	
	Feasibility Study for Farm Pond / WHS and water management practices	250,000	
	Farm Ponds / restoration of old rainwater harvesting structures/ percolation ponds/open wells/bore wells /injection wells or other as deemed to be necessary for a particular location	50,000,000	
	Orientation of farmers on tillage and residue management , water management (contour farming, terracing, water harvesting and other irrigation concepts), protected cultivation	12,500,000	
Developing GIS Based Project Tracking System	1,870,000		
Capacity Building Activity	Community Mobilization & Sensitization	100,000	29,260,000 (12%)
	Cropping System Planning (Village based)	50,000	
	Orientation on Climate Smart Ag.	1,250,000	
	Support to farmers for Inter/Mixed Cropping	7,500,000	
	Interface with banks for Credit Support	20,000	
	Scheme Level Convergence Meeting-Other		

Type of Activity	List of Activities	Funding Requirement	
	Dept.	20,000	
	Farmer Orientation on Farm Residual Recycling, Agronomic practices	1,250,000	
	Establishing Residual Recycling & Management Units	8,750,000	
	Soil Moisture Management Orientation to Farmers	1,250,000	
	Introduction of 5% & 10% Models	250,000	
	Farmers Orientation - Crop Specific Practices , organic farming, pulses and fodder production	150,000	
	Orientation for Strengthening Extension Services	45,000	
	Exposure of Farmers to similar initiatives	7,500,000	
	Farmer Led Extension Service Dev. (Trg. & Mobility)	625,000	
	Inception Workshop (State Level)	100,000	
	Inception Workshop (District Level)	100,000	
	Dissemination Workshops on Project Learning	300,000	
	Project Management Activity	Quarterly Monitoring by Implementing Agency	
Meeting of Project Steering Committee		80,000	
Meeting of Technical Advisory Committee		160,000	
Documentation of Project Benefits / Learning		300,000	
Concurrent Project Evaluation (External)		500,000	
Final Project Evaluation (External)		1,000,000	
Stationary / Office Management		480,000	
Contingency & Unforeseen		480,000	
HR Support (Technical)		12,000,000	
HR Support (Non-Technical)		4,800,000	
Project Formulation Cost		1,000,000	
Project Monitoring		1,000,000	
Technical Support to the Project (Quarterly)		1,040,000	
Project Review		400,000	
Other Expenses Including HR Cost (Tech. Expert)	5,060,000		
<b>Total</b>			250,000,000

### (e) Alignment with National & State Action Plans & Other Policies/Programmes:

The proposed project is in line with the National Action Plan on Climate Change (NAPC) and State Action Plan on Climate Change (SAPCC). The proposed project is one of the high priority actions that are envisaged in the SAPCC. Under Sustainable Agriculture Mission, the State has high priority actions that are as follows;

1. Capacity building of Planners farmers and extension workers and dissemination of new and appropriate technology;
2. Integrated nutrient management (INM);
3. Introducing Trash mulching in agriculture 5000 ha are to be covered under mulching practice for Kashmir Division;
4. Combating climate related risk through Micro Irrigation programme;
5. Management of climate change risk for sustainable productivity;
6. Resource mapping (Agriculture) by using GIS and RS technology and Strengthening of agro advisory services by using Android Technology;
7. Screening of crops for moisture/heat/disease/pest tolerance and nutrient use efficiency;

The National Action Plan on Climate Change (NAPCC) foresees to promote dryland agriculture with particular relevance to adaptation, promotion of drought resistant varieties and improving methods of soil and water conservation.

The proposed project looks at achieving both national and state objectives and also a step towards fulfilling the mandate of 12<sup>th</sup> plan propositions on climate change adaptation.

### (f) Component wise Technical Standards

The technical standards with regard to agriculture promotion, as set by State Government / Agricultural University will be adhered to. Other standards will also be as per the State norms like wage rate.

Activity	Applicable Standard	Application to project
Water harvesting structures	As per the applicable structural guideline for hill region and scheduled rate. The structures will be created by Department of Minor Irrigation, Himachal Pradesh as per the regular technical standard being adopted by the department for constructional activity .	Higher water availability in the project location to be used for local livelihood promotion.
Sprinklers and drips	Technical standard (BIS) used by Department of horticulture will be used for micro irrigation system. Pre-qualified vendors empanelled with the concern department will provide the equipment as per the specification. IS 12232 (for sprinklers); 4985-1999 fro pipes etc.	Optimal uses of water for horticultural activity without wastage of available water in water harvesting structures.

### (g) Duplication Check:

The suggested components under climate resilient agriculture are not having any duplication with any other funding sources. However, certain agriculture promotion schemes are discussed here that area having potential for convergence with the proposed project.

Project	Objectives	Complementarity	Geographical Coverage / Agency
RKVY	Agricultural Promotion	Specific crop based planning due to climate stress component is covered under this project, rest can be converged	Coverage: All over the State Agency: Dept. of Agriculture
RIDF	Infrastructure Development	Existing irrigation system will be converged but water use efficiency component and crop-water management is part of this plan	Coverage: All over the State Agency: Dept. of Agriculture
Saffron Mission	Promotion of Saffron Cultivation	Not envisaged in this project	Coverage: Pulwama, Kishtwar, Doda and Udhampur Agency: Dept. of Agriculture
National Mission on Protein Supplement (Part of RKVY)	Livestock Development	Only heat stress related matters and forage promotion for small ruminants to be addressed by this projects	Coverage: All over the State Agency: Animal Husbandry Dept.
Development of Vegetable Clusters (part of RKVY)	Vegetable production promotion & Market linkage	Linkages to market as per the existing will be converged (under FPOs)	Coverage: All over the State Agency: Dept. of Agriculture
Agriculture Technology Management Agency (ATMA)	Research and Extension	Extension material prepared by the project for specific climate adaptation practices will be shared with ATMA for mainstreaming.	Coverage: All over the State Agency: Dept. of Agriculture

## (h) Details on Stakeholder Consultation:

Consultation	Date / Place	Participation	Objective	Outcome
State Climate Change Centre	11.08.2015	Officials of the Centre	Explore intervention areas around forest	Idea Note generated around forest based adaptation
State Climate Change Cell	12.08.2015	Officials of the Centre	Project Feasibility discussion around different sectors	Mapping sector perspectives around different sectors as per SAPCC
Dept. of Forest	12.08.2015	Secretary, Dept. of Forest and Other Officials	Explore intervention areas around forest	Idea Note generated around forest based adaptation
Dept. of Agriculture	12.08.2015 13.08.2015	Secretary, Agriculture, Director of Agriculture of Kashmir, Deputy Director, Agriculture of Jammu, Agriculture Scientists and Others	Explore intervention areas around agriculture, finalization of adaptation actions	Finalization of intervention areas, Geographical area for intervention and development of PCN
Department of Lake Development	12.08.2015 13.08.2015	Lake Authority Officials, DFO and Other Officials	Discussion on adaptation around lake areas	Idea Note Generation around Lake and its tributaries.
Dept. of Irrigation & Flood Control	13.08.2015	Executive Engineer and other officials of the Irrigation and Flood Control	Exploring Adaptation projects and handling flood situation	Idea Note Generation on adaptive mechanism and flood control system
Representative of Agriculture University	14.08.2015	Professor from University	Exploring scope of adaptation and initiatives of University	Authenticating findings
NABARD	14.08.2015	DGM, NABARD	Regarding PCN and finalized sector	Appraisal on PCN
Agriculture	05.02.2016	CS APD, Director	Regarding DPR	Finalization of



Consultation	Date / Place	Participation	Objective	Outcome
Production Department		Agriculture Jammu , Director Agriculture Kashmir , Nodal officer CC cell, NABARD and other		the DPR
Directorate of Agriculture Kashmir	05.02.2016	Director Agriculture Kashmir	Regarding DPR	Finalization of the DPR
Directorate of Agriculture Jammu	05.02.2016	Director Agriculture Jammu, Jt Director Agriculture Jammu	Regarding DPR	Finalization of the DPR

#### (i) Learning and Knowledge Management Component:

From the inception of the project, process aspects of the project intervention will be captured for each component / sub-component / activity. The baseline and its comparative progress will be captured and learning will be recorded in the shape of scientific data and field findings. Implementation process and its success / failure will be recorded from time to time for learning and sharing. Each component of the project will have monitorable indicators that will be mapped during the intervention and key achievements will be disseminated. Different workshops will be organized at the State / regional level from time to time to disseminate learning. Different publications / leaflets on research and findings will be disseminated and feasible feedbacks will be incorporated in the intervention strategy.

#### (j) Sustainability of Project / Programme Outcomes:

Attempt is made in the proposed project to ensure sustainability of the outcomes after the life of the project. Certain outcomes will sustain through own initiatives of the target mass and certain outcomes through institutional arrangement and follow-up measures. The proposed project focus more on self-sustainability of the outcome at the target mass end which will be possible by means of economic and environmental benefits they harvest during the life of the project. Certain outcomes and its sustainability mechanisms are discussed below.

Project / Programme Components	Expected Outcomes	Expected Concrete Outputs	Responsible Parties
<b>Component 1:</b> Assessment of vulnerability of cropping system	Climate adaptive cropping system minimizes crop loss and improve production & productivity	<ol style="list-style-type: none"> <li>1. Baseline data of the block (land use system, cropping pattern, yield, soil health, historical time series' data on temperature and precipitation (30 years)) and vulnerability</li> <li>2. Cropping system assessment based on the agro-climatic condition based on their vulnerability</li> <li>3. Suitable variety of crops based on climate variability in Cereals (paddy / rice), Pulses, Maize and other horticultural crops</li> </ol>	Dept. of Agriculture and its subsidiaries. PEC/PMU/TAC
<b>Component 2:</b> Enhanced food security through diversified livelihoods to cope with climate variability	Supportive and diversified livelihoods system with mixed farming and advanced farming technique to cope with climate variability and increased output per unit of land	<ol style="list-style-type: none"> <li>1. Adoption of mixed farming of Livestock and Agriculture;</li> <li>2. Change in Farming Techniques for maximum production;</li> <li>3. Promoting ideally suited agronomic practices (improved crop/fallow rotation, use of legumes, cover crops)</li> <li>4. Promotion of promoting fodder production and improved fodder/feed storage methods</li> <li>5. Recycling of farm waste for livestock production;</li> <li>6. Shift from mono-culture to integrated farming system.</li> <li>7. Promoting cultivation of pulses, vegetables</li> </ol>	Dept. of Agriculture and Target mass in general
<b>Component 3:</b>	Improved soil health and	1. Improved soil health;	Dept. of Agriculture

<b>Project / Programme Components</b>	<b>Expected Outcomes</b>	<b>Expected Concrete Outputs</b>	<b>Responsible Parties</b>
Integrated Nutrition and Pest Management	minimized occurrence of crop specific diseases through Nutrition & Pest Management Practices	<ol style="list-style-type: none"> <li>2. Distribution of soil health card</li> <li>3. Efficient application of nutrients (integrated nutrient management) as per requirement;</li> <li>4. Promotion of organic manuring, green manuring vermi-compost in suitable locations (as applicable);</li> <li>5. Nutrient recycling;</li> <li>6. Efficient use of pesticides as per crop requirement..</li> </ol>	and Target mass in general, SKUSAT research
<b>Component 4:</b> Irrigation Management through Micro Irrigation System in water stressed areas	Water scarcity situation managed bringing water use efficiency in rain-fed farming conditions.	<ol style="list-style-type: none"> <li>1. Introduction of polyhouse, promoting protected cultivation</li> <li>2. Promotion of drip / sprinkler irrigation;</li> <li>3. Support to farmers with scientific crop-water management system with on field improvement</li> <li>4. Orientation of farmers on tillage and residue management , water management</li> <li>5. Creation of water harvesting structures</li> </ol>	Dept. of Agriculture and Target mass in general, Department of water resources
<b>Component 5:</b> Building capacity of farmers and other stakeholders on climate resilient sustainable agricultural practices	Improved capacity of the farmers on climate resilient agricultural practices and its adoption in farming.	<ol style="list-style-type: none"> <li>1. Capacity building of farmers on INM, IPM and Integrated Farming System;</li> <li>2. Capacity Building of Extension Service Officials to promote INM, IPM, Integrated Farming etc.</li> </ol>	Dept. of Agriculture

### (k) Overview of the Environmental & Social Impacts & Risks:

The proposed project, at this stage, does not seem to have any potential risks or negative environmental and social impact. Rather it will be helpful to bring better adaptive capacity to farming community and expected to exert a positive impact on the local environment.

<b>Checklist 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>
Compliance with the Law	Mostly	Not required
Access and Equity	Ensured	Ex post monitoring
Marginalized and Vulnerable Groups	Ensured	Ex-ante required
Human Rights	NA	Indeterminate at this stage
Gender Equity and Women's Empowerment	Ensured	
Core Labour Rights	Will be ensured	Ex-post, concurrent
Indigenous Peoples	protected	Ex-post, concurrent
Involuntary Resettlement	Not envisaged	No envisaged
Protection of Natural Habitats	Will be done	Will be assessed
Conservation of Biological Diversity	After site identification	Will be assessed
Climate Change	Addressed	Will be assessed
Pollution Prevention and Resource Efficiency	Will be assessed	Will be done
Public Health	Will be done	Will be done
Physical and Cultural Heritage	Ensured	As per site if any
Lands and Soil Conservation	Ensured	Ex post monitoring

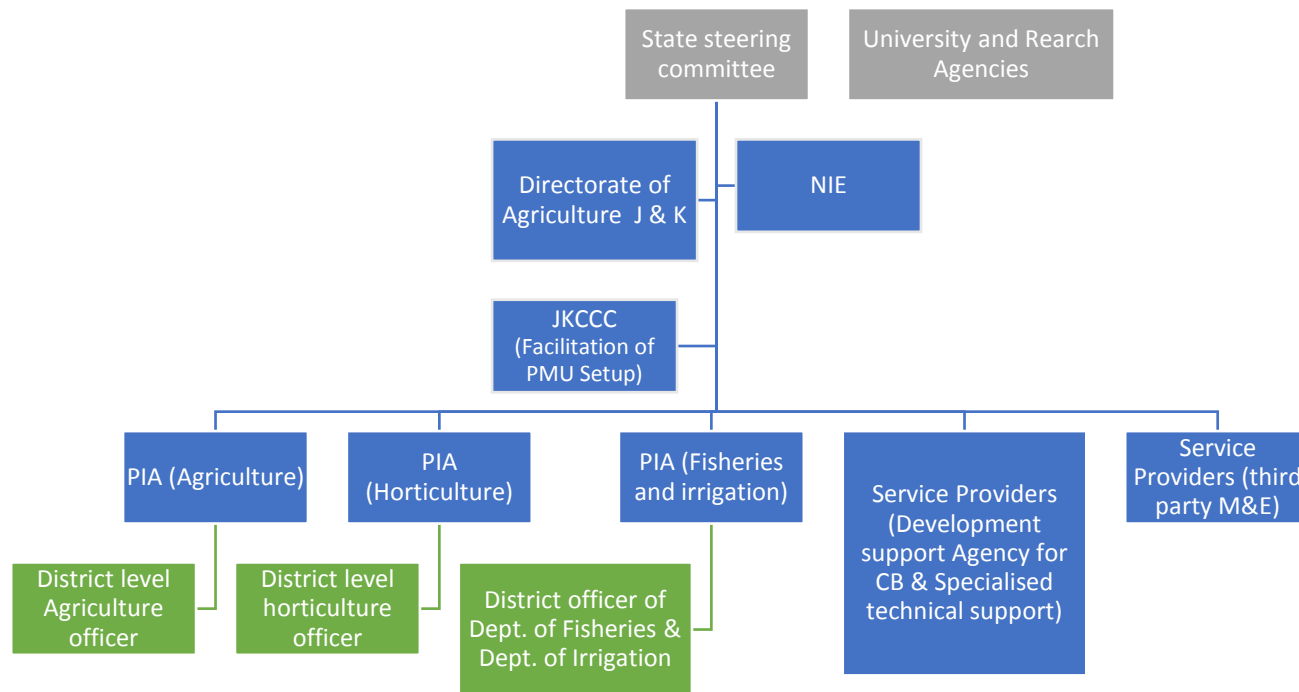
### 3.0 IMPLEMENTATION ARRANGEMENT:

#### (a) Describe the Arrangements for Project / Programme Implementation:

##### (i) Who will implement the project?

The project will be implemented by the Department of Agriculture Production Department, Government of Jammu and Kashmir. The Directorate of Agriculture, Jammu will be the nodal agency for implementing the project in selected area of Jammu Region and Directorate of Agriculture, Kashmir will be the nodal agency for the implementation of the project in Kashmir Valley. The project will be implemented in closed co-ordination and collaboration with J&K Climate Change Cell (JKCCC) who will be part of each and every decision of Agriculture department related to implementation of the project.

The Department is having required expertise and human resource for the implementation of the project and the designated Government agency for promotion and strengthening the agricultural activities. The State Action Plan on Climate Change also suggest that the Dept. of Agriculture should be the nodal agency for agricultural / horticultural activities. Secondly, with the required technical human resources, the suggested activities can be more suitably and effectively taken up by the proposed department and technical inputs on climate related issues will be provided by JKCCC.



Apart from the Department, the local agriculture university is to be associated in the process for taking up research and development activities in climate change areas and piloting / field demonstration of crop varieties that are climate adaptive.

All policy decision will be taken at respective department level as per the implementation work plan. The necessary approval and implementation plan of the same shall be decided in line with designated Nodal Agency. Coordination with NIE and MoEF will be through climate change cell.

#### (ii) How will the Project be Coordinated with (and/or mainstreamed in to):

The project coordination mechanism will be in two ways, i.e., at the State level and at the National level. While the NIE will be the coordinating agency between the Ministry and the State with regard to physical and financial progress appraisal and funds channalisation, region specific coordination will be made by the Department at the State Level. A Nodal Officer may be designated by the Department for the project / programme who will oversee the project implementation process. The Department will also coordinate appropriately with Climate Change Centre and Climate Change Cell of the State along with the local Universities for Research and Development.

Beneficiary PM<U during the project implementation at various levels will be done as follows.

- The block and village will be selected as per sensitivity, exposer and adaptive capacity i.e. based on the productivity trend, ground water depletion and poverty level respectively.
- Small and Marginal farmers coupled with individual having major source of livelihood/income activity as agriculture will be taken on priority basis. All the farmers will undergo training process in phased manner.
- The selection of the farmer will be done in PRA method.

The extension and technical support will be provided by respective project implementing department. For specialized technical support suitable agency will be assigned by nodal department under PMU. The facilitation of extension support will be co-ordinated by PMU for proper handshaking between the activities.

## (b) Measures for Financial and Project / Programme Risk Management:

<b>Risk</b>	<b>Rating (High / Medium / Low Etc.)</b>	<b>Mitigation Measures</b>
Programme	Medium	Project Coordination Framework between Jammu and Kashmir Region
		Fixing up Project Delivery and Time Line for each actions
		Association of Internal Monitoring Units like Climate Change Centre and Cell
		Association of local agriculture university for R&D
Financial	Low	Project specific Guidelines for Fund Management issued by the Ministry
		Adherence to Current Funds management norms of the State Govt.
		Annual Project Performance and Management Audit covering both Physical and Financial Management
Environmental	Low	Baseline Survey and Benchmarking
		Location specific (District / block / project village) vulnerability assessment and adaptation framework in agriculture sector
		Internal Monitoring of Environmental Parameters and tracking system through the climate change centre
Social	Low	Community Mobilisation
		Capacity Building of Stakeholders
		Hand holding and Demonstration of Package of Practices.
		Strengthening Extension Services through the project on adaptation mechanisms.

**(c) Monitoring and Evaluation Arrangement:**

	<b>Monitoring &amp; Evaluation Plan Activities</b>	<b>Responsible Person</b>	<b>Y r. I</b>	<b>Y r. II</b>	<b>Y r. III</b>	<b>Y r. IV</b>	<b>Time Frame</b>
C1	Vulnerability Analysis and baseline data generation	Dept. Of Agriculture	*				Q2 of Yr-1
	Community Mobilisation & Sensitisation	Service Provider agency	*	*			Q4 of Yr-1 & Q1 of Yr-2
	Cropping System Planning (Farmer / Area Based)	Dept. Of Agriculture	*				Q3 of Yr-1
	Orientation on Climate Smart Ag.	Dept. Of Agriculture		*	*		Q1 of Yr-2 & Yr-3
	Farmer Field Demonstration (Demo. Inputs)	Dept. Of Agriculture		*	*		Continuous monitoring from Yr.- 2 to Yr-3
	Seed Support to Farmers (Climate Resilient Varieties)	Dept. Of Agriculture		*	*		Continuous monitoring from Yr.- 2 to Yr-3
C2	Support to farmers for Inter/Mixed Cropping	Dept. Of Agriculture		*	*		Continuous monitoring from Yr.- 2 to Yr-3
	Interface with banks for Credit Support	Service Provider agency	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Scheme Level Convergence Meeting-Other Dept.	PMU	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Support to farmers for Integrated Farming (Livestock etc.)	PMU & other PIAs		*	*		Continuous monitoring from Yr.- 2 to Yr-3
	Farmer Orientation on Farm Residual Recycling	Dept. Of Agriculture & TPA		*	*	*	Q1 of Yr-2, Yr-3 & Yr-4
	Establishing Residual Recycling & Management Units	Dept. Of Agriculture & TPA		*	*	*	Q1 of Yr-2, Yr-3 & Yr-4
C3	Soil Testing	Dept. Of Agriculture	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Nutrition Management Plan-Each crop by Location	Dept. Of Agriculture	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Soil Moisture Management Orientation to Farmers	Dept. Of Agriculture					
	Support to farmers (Micro-nutrients)	Dept. Of Agriculture	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Pest Management Plan-Each Crop by Location	Dept. Of Agriculture	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Support to farmers for Pest Management Instruments	Dept. Of Agriculture		*	*		Continuous monitoring from Yr.- 2 to Yr-3
C4	Drip / Sprinkler Support to Farmers	Dept. Of Horticulture	*	*			Q4 of Yr-1 & entire Yr-2
	Feasibility Study for Farm Pond / WHS	Dept. Of Horticulture	*	*			Q4 of Yr-1 & Yr-2
	Farm Ponds	Dept. . Of Fisheries		*	*		Q4 of Yr-2 & Yr-3
	Water Harvesting Structures (WHS)	Dept. of minor irrigation		*	*		Continuous monitoring from Yr.- 2 to Yr-3
	Introduction of 5% & 10% Models	Service Provider agency		*			Continuous monitoring in Yr-2
C5	Farmers Orientation - Crop Specific Practices	Dept. Of Agriculture	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Orientation for Strengthening Extension Services	PMU & Service Provider agency	*	*	*		Q1 of Yr-1, ,2 & 3
	Exposure of Farmers to similar initiatives	PMU & Service Provider agency		*	*	*	Q3 of Yr-2,3 & 4



	Monitoring & Evaluation Plan Activities	Responsible Person	Y r. I	Y r. II	Y r. III	Y r. IV	Time Frame
	Farmer Led Extension Service Dev. (Trg. & Mobility)	PMU & Service Provider agency	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
NIE	Project Monitoring	NABARD	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Technical Support to the Project (Quarterly)	NABARD	*	*	*	*	Continuous quarterly monitoring from Yr-1 to Yr-4
	Project Review	NABARD	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
	Other Expenses Including HR Cost (Tech. Expert)	NABARD	*	*	*	*	Continuous monitoring from Yr-1 to Yr-4
PEC	Inception Workshop (State Level)	PMU & Service Provider agency	*				Q3 of Yr-1
	Inception Workshop (District Level)	PMU & Service Provider agency	*				Q3 of Yr-1
	Quarterly Monitoring by Implementing Agency	PMU	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	Meeting of Project Steering Committee	PMU	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	Meeting of Technical Advisory Committee	PMU	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	Documentation of Project Benefits / Learning	Service Provider agency		*	*	*	Q4 of Yr. 2,3 & 4
	Dissemination Workshops on Project Learning	Service Provider agency			*		Q3 of Yr-3
	Concurrent Project Evaluation (External)	Service Provider agency	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	Final Project Evaluation (External)	Service Provider agency	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	Stationary / Office Management	PMU	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	Contingency & Unforeseen	PMU	*	*	*	*	Continuous half yearly monitoring from Yr-1 to Yr-4
	HR Support (Technical)	PMU & other PIAs	*	*	*	*	Continuous performance monitoring from Yr-1 to Yr-4
	HR Support (Non-Technical)	PMU & other PIAs	*	*	*	*	Continuous performance monitoring from Yr-1 to Yr-4
	Developing GIS Based Project Tracking System	Service Provider agency	*	*			Q4 of Yr-1 & Q2 of Yr-2

### Reporting Mechanism for Monitoring and Evaluation:

The Executing Entity (EE) will be submitting Quarterly Progress Report, covering both Physical and Financial Progress to NIE (NABARD) for their review and monitoring. Six monthly Progress Report will be submitted by the EE to the Ministry as well as to the NIE for physical and financial progress assessment. The Annual Progress Report, Concurrent Monitoring Report, Mid-Term Evaluation Report and End line Evaluation Report will be submitted by the NIE to the Ministry after its presentation and sharing at the State Level with appropriate authorities.

(d) Result Framework:

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
<b>C1 Assessment of vulnerability of cropping system</b>					
<p><b>Outcome 1:</b> Baseline data of the block (land use system, cropping pattern, yield, soil health, historical time series' data on temperature and precipitation (30 years)) and vulnerability</p> <p>Climate adaptive cropping system minimizes crop loss and improve production &amp; productivity</p>	<ol style="list-style-type: none"> <li>Cropping system suggested as per the agro-climatic condition</li> <li>No. of farmers adapted the cropping system</li> </ol>	<p>Jammu Region: Wheat Followed by maize, paddy, pulses oilseeds, fodder, vegetables and other crops</p> <p>Kashmir Region: Paddy followed by maize, oilseeds, pulses, vegetables, fodder and wheat.</p>	<p>Climate adaptive cropping system targeted for 2500 farming families with special focus on small and marginal holders</p>	<ol style="list-style-type: none"> <li>List of farmers adopted the cropping system</li> <li>Documents on support rendered to target farmers</li> </ol>	<p>Current level of research has identified specific cropping system by agro-climatic zone</p>
<p><b>Output 1.1:</b> Assessment of</p>	<ol style="list-style-type: none"> <li>Change in cropping system based on</li> </ol>	<p>Present Yield of Rice: Jammu:</p>	<p>A minimum of 2500<sup>18</sup> Farming</p>	<ol style="list-style-type: none"> <li>Farmer specific Database</li> </ol>	

<sup>18</sup> The 25 farmers will be selected from each of the 25 five villages across two blocks (total 50 villages). The farmer should belong to small/marginal category/innovators/farmers friend/ farmers from FIG and CIGs . The farmers selected for training from innovators/progressive farmers/ achievers who will in turn help in disseminating the technology to like farmers of their respective village area. (the selection criteria is based on the suggestion forwarded by the Directorate of Agriculture Jammu)

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
cropping system and their vulnerability	<p>delay in rainfall (single crop to double crop and wherever possible intercrop)</p> <p><b>Recommended Cropping Pattern (NICRA, SKUSAT)</b>  Maize(local)  Maize (local) + Beans  Maize(local) + Green gram / Cowpea</p> <p>Instead of oats-  Maize (local)  Beans-Canadian red/  Cowpea (local)</p> <p>2. At least 15% growth in yield of principal crops like Rice, Maize and Wheat;</p> <p>3. Reduction in crop loss percentage by a minimum of 10 %</p>	<p>19.53 Qt./Ha.( Kashmir: 55 Qt./Ha.  Present Yield of Maize: Jammu: 20.99 Qt./Ha. Kashmir: 10 Qt./Ha  Present Yield of Wheat: Jammu: 19.86 Qt./Ha.</p> <p><b>Current Cropping Pattern:</b>  <i>Medium Rainfall</i>  Maize + Green gram  Maize + Rajmash  Maize: C6 , C8  Greengram: Shalimar moong-1  Rajmash: Canadian red  Oats  Note: Village</p>	families with special focus on small and marginal holders	<p>2. Crop specific database</p> <p>3. Tracking tool findings</p>	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
	due to climatic factors / pest attack	specific baseline will be development in the Year 1 within 6 months of inception of the project			
<b>Output 1.2:</b> Recommendation of Suitable variety of crops based on climate variability in Cereals (paddy / rice), Pulses, Maize and other horticultural crops along with package of practices that need modification	<b>Change Suggested:</b> Maize (African tall) Cowpea (EC 4216, Type-2) Cluster bean (Ageta-Guara-III).  Bajra (WCC-75, ICMS-7703) Bajra: MHB-110, MH-179 Intercropping of sesame (Punjab Til-1) + black gram (Local)	Maize (Hybrid: GS-2, Kanchan 517)  Bajra (Hybrid: MHB-110, MH-179)	A minimum of 2500 Farming families with special focus on small and marginal holders	List of varieties under specific crop types and its characteristics	Suitable crop varieties are identified by agro-climatic zone which is having drought resistance characteristics.
<b>C2 Adoption of Integrated Farming System</b>					
<b>Outcome 2:</b> Enhanced food	1. About 2500 farmers supported for	No Specific Baseline figure	Promotion and related adoption	List of farmers supported and adopted	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
security through diversified livelihoods to cope with climate variability	integrated farming in 50 villages (refer activity plan and budget for details); 2. At least 45.0% to 50.0% farmers continue integrated farming during different seasons in agri and allied sectors	available at present. To be developed by location specificity in the first 6 months of the project.	of Integrated Farming System by 2500 Farming families with special focus on small and marginal holders	integrated farming	
		To be developed by location specificity	2500 Farming families with special focus on small and marginal holders	List of farmers supported and adopted integrated farming	
<b>Output 2.1:</b> Mixed farming of Livestock and Agriculture;	At least 50.0% farmers have mixed farming of livestock and agriculture / horticulture	To be developed by location specificity	2500 Farming families with special focus on small and marginal holders	List of farmers supported and adopted	
<b>Output 2.2:</b> Change in Farming Techniques for	Ploughing Ridges and furrow at least in 25.0% suitable land by	General farming system without any such technical	1250 Farming families with special focus on	List of farmers adopted the technology	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
<p>maximum production</p> <p>Promoting ideally suited agronomic practices (improved crop/fallow rotation, use of legumes, cover crops)</p> <p>Promotion of promoting fodder production and improved fodder/feed storage methods</p> <p>Shift from mono-culture to integrated farming system.</p> <p>Promoting cultivation of</p>	<p>70.0% farmers;</p> <p>Sowing across the slope to conserve moisture for specific crop types by 70.0% farmers in 75.0% suitable land.</p> <p>FYM, Cowpea straw of 1 cm thick layers may be used on the sown rows.</p> <p>Conserve soil moisture by laying mulches</p> <p>Use foliar application of urea (3%) during dry spells before silking</p> <p>Ploughing/Sowing across the slope</p> <p>Compartmental bunding is done to</p>	<p>measures. Village &amp; farmer specific baseline to be developed in first year of the project</p>	<p>small and marginal holders</p>		

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
pulses, vegetables	<p>conserve the water Sesame and black gram should be intercropped with 1:1 ratio by following 'Kera' method of sowing.</p> <p>Ploughing/Sowing across the slope</p> <p>Compartmental bunding is done to conserve the water</p> <p>Residual moisture of receding monsoon rains should be conserved in-situ through tillage practice</p> <p>Ploughing/Sowing across the slope</p> <p>Compartmental bunding is done to conserve the water</p>				

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
	Residual moisture of receding monsoon rains should be conserved in-situ through tillage practice				
<b>Output 2.3:</b> Recycling of farm waste for livestock production	About 50.0% target families adopting recycling process in a sustained manner  Recycling increases farm waste utilization by at least 75.0%	No such measure at present barring a few cases where livestock is reared. Village & farmers specific baseline in first year of the project.	2500 Farming families with special focus on small and marginal holders	1. Document on recycling process and its benefits 2. List of farmers by crop type adopting recycling for livestock promotion	
<b>C3 Integrated Nutrition and Pest Management</b>					
	1. Increase in soil nutrient content by crop based requirements 2. At least 50.0% farmers having regular soil test and soil nutrient management measures	No of soil health cards accessed in each location	A minimum of 2500 Farmers with special focus on small and marginal holders to have access to the SHC and recommended micro-nutrients guidance	1. Soil profile difference as per soil test 2. No of farmers adopted 3. Usability in crop types 4. Assessment report on benefits 5. Financial utilization report	
<b>Outcome 3:</b>	1. Rate of growth in	Currently no soil	A minimum of	1. Assessment report	



Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
Improved Soil health and its crop specific profile contributing improved production and minimized occurrence of crop specific diseases through Pest Management Practices	<p>crop production by crop types</p> <p>2. Reduction in disease occurrence</p> <p>3. Soil nutrient content – soil profile by crop type</p> <p>4. Soil conservation measures to be taken in Budgam district</p>	test by farmers regularly for specific crops. So, baseline by farmer and village will be developed by location specificity	2500 Farmers with special focus on small and marginal holders. 2500 Farmers will be provided with paste management Instruments. At least 25 village in Budgam district will be chosen for Soil conservation related interventions for run off management.	<p>/ monitoring reports</p> <p>2. Farmer opinion on production and productivity</p> <p>3. Crop specific assessment findings</p>	
<p><b>Output 3.1:</b></p> <p>Improved soil health</p> <p>Soil health card</p>	Improved nutrient content of soil as per crop specific requirements	To be developed by location specificity	A minimum of 2500 Farmers with special focus on small and marginal holders	Soil testing report	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
<p><b>Output 3.2:</b> Efficient application of nutrients as per requirement</p> <p>Efficient application of nutrients (integrated nutrient management) as per requirement;</p>	<ol style="list-style-type: none"> <li>100.0% target farmers supported with soil nutrient management system;</li> <li>At least 70.0% farmer continue the soil health test &amp; management practices;</li> <li>At least 75.0% farmers follow recommended doses of nutrient application as per crop type</li> </ol>	To be developed by location specificity	A minimum of 2500 Farmers with special focus on small and marginal holders	<ol style="list-style-type: none"> <li>Farm level assessment report</li> <li>Opinion of the target beneficiaries</li> </ol>	
<p><b>Output 3.3:</b> Promotion of Organic Manures through vermi-compost</p> <p>Promotion of green manuring vermi-compost in suitable locations</p>	<ol style="list-style-type: none"> <li>At least 50.0% target families have vermi-compost pits (including low cost)</li> <li>About 200 to 500 low cost vermi-compost pits promoted / supported under the project</li> </ol>	No vermi-composting observed and organic manure application remains low. Farmer and village specific baseline to be developed in 1 <sup>st</sup> year of the project	A minimum of 2500 Farmers with special focus on small and marginal holders	<ol style="list-style-type: none"> <li>List of farmers having vermi compost units</li> <li>No. of farmers supported with vermi compost unit</li> <li>Financial utilization report</li> </ol>	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
	3. At least 70.0 % families applying vermi compost in the field wherever it is necessary for different crops 4. Increase in organic manure application by at least 30.0% to 40.0% during water stress situation	for monitoring and evaluation purposes.			
<b>Output 3.4:</b> Nutrient recycling	1. All the project villages (100.0%) have nutrient recycling and farm residue management system  2. At least 25.0% to 30.0% farmers adopt on-farm and off-farm nutrient cycling method	To be developed by location specificity	A minimum of 2500 Farmers with special focus on small and marginal holders	1. List of farmers 2. Opinion of farmers 3. Assessment report	
<b>C4 Irrigation Management through Micro Irrigation System in water stressed areas</b>					

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
	<ol style="list-style-type: none"> <li>1. Irrigation management system promoted in the project area</li> <li>2. No. of farmers adopted</li> <li>3. Efficiency of proposed irrigation management system</li> <li>4. Quantum of water loss minimized</li> </ol>	To be developed by location specificity	50 villages <sup>19</sup> covering a minimum of 2500 Farmers with special focus on small and marginal holders	<ol style="list-style-type: none"> <li>1. No. of farmer supported with micro irrigation system / low pressure irrigation system</li> <li>2. No. of farmers using it</li> <li>3. List of farmers accessed credit / external support for micro irrigation system</li> <li>4. Amount spend in providing micro irrigation</li> </ol>	The topographical situation is suitable for micro irrigation installation
<b>Outcome 4:</b> Enhancement of Water security by bringing in water use efficiency in	Reduction in water scarcity days, at least by 7-10 days due to water management system in case of delay	To be developed by location specificity	50 Villages and about 2500 Farmers with special focus on small and	Days of water scarcity by crop type as per baseline and assessment report findings	

<sup>19</sup> The 50 villages will be selected by the Technical steering committee based on the outcome of the vulnerability, climate projection and baseline study. Drip / Sprinkler/ drip irrigation/ protected cultivation and others will be applicable for ONLY JAMMU REGION and contour farming, terracing and protected cultivation will be done FOR BUDGAM REGION)

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
rain-fed farming conditions.	in rainfall		marginal holders		
<p><b>Output 4.1:</b> Introduction of polyhouse, promoting protected cultivation</p> <p>Promotion of drip / sprinkler irrigation</p> <p>Creation of water harvesting structures</p>	<p>At least 50.0% target farmers are using micro irrigation systems efficiently like drip or sprinkler irrigation.</p> <p>Water wastage is reduced by at least 25.0% to 30.0% due to irrigation management systems adopted by the target families.</p>	<p>Very low prevalence at present. Farmer specific baseline to be developed</p>	<p>A minimum of 1250 Farmers with special focus on small and marginal holders</p>	<p>List of farmers having and supported with drip / sprinkler system</p>	
<p><b>Output 4.2:</b> Support to farmers with scientific crop-water management system with on field improvement</p> <p>Orientation of farmers on tillage and residue</p>	<p>At least 70.0% farmers using field channels for irrigation</p> <p>Irrigation through on field water management practices to improve water use efficiency by 20.0% to 25.0%</p>	<p>No such measure at present. Baseline need to be developed</p>	<p>A minimum of 2500 Farmers with special focus on small and marginal holders</p>	<p>List of farmers having and supported with field channel</p>	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
management , water management					
<b>C5 Building capacity of farmers and other stakeholders on climate resilient sustainable agricultural practices</b>					
	Training and Exposure visits organized for target stakeholders The target farmers provided with hand holding support in-situ	To be developed by location specificity	A minimum of 2500 Farmers in 50 project villages with special focus on small and marginal holders	1. Report on Training need assessment 2. Capacity building design and delivery framework 3. Target mass enrolled in the process (list)	
<b>Outcome 5:</b> Improved capacity of the farmers on climate resilient agricultural practices and its adoption in farming.	1. 100.0% target farmers trained on climate resilient agricultural practices; 2. At least 75.0% farmers have demonstrated climate resilient agricultural practices with improved capacity.	Some farmers are trained on agriculture and horticulture but training from climate change perspective is to be organized.	A minimum of 2500 Farmers in 50 project villages with special focus on small and marginal holders, 5 Farmers from each village will be given extended support.	1. No. of farmers reported having new skill sets 2. Training module / manual / training window / list of participants etc.	
<b>Output 5.1:</b>	At least 80.0% target	Capacity Need	A minimum of	1. Training Window	

Outcome / Output	Indicator	Baseline	Target	Source of Verification	Risk & Assumptions
Capacity building of farmers on climate resilient agricultural practices, crop specific agronomic practices, INM, IPM and Integrated Farming System	<p>farming families are trained on INM, IPM and Integrated Farming System</p> <p>2 days classroom and 1 day field trainings organized for target farming families</p> <p>2 days refresher training organized for target farming families in subsequent years of the project period</p>	Assessment of farmers and identified training needs in related subject	2500 Farmers in 50 project villages with special focus on small and marginal holders	<p>2. Training Calendar</p> <p>3. Training Manual / handouts / design</p>	
<b>Output 5.2:</b> Capacity Building of Extension Service Officials to promote INM, IPM, Integrated Farming etc.	<p>2 days classroom training followed by one day field training organized for extension officials</p> <p>All extension officials of the project site trained on the project components, INM, IPM and Integrated Farming Practices</p>	Capacity Need Assessment of officials and identified training needs in related subject	All Govt. Officials in Agricultural Extension and Project Management	<p>1. Training Window</p> <p>2. Training Calendar</p> <p>3. Training Manual / handouts / design</p>	

## (e) Detail Budget with Budget Note:

Component	Activity	Unit	Qt.	Unit	Qt.	Unit Cost	Total Cost
C1	Vulnerability Analysis and Baseline Study	Block	2	Block	1	15000000	30000000
	Community Mobilisation & Sensitisation(25 villages from each block will be selected depending upon the vulnerability indexing)	Block	2	Village	25	2000	100000
	Cropping System Planning (Village based)	Block	2	Village	25	1000	50000
	Orientation on Climate Smart Ag.(50 farmers will be selected from each of the above 25 villages from each block -criteria small & marginal farmers, innovators, village leaders, farmers friend, farmers from FIG & CiGs)	Farmer	2500	Phases	1	500	1250000
	Farmer Field Demonstration (Demo. Inputs)	Farmer	2500	Phases	1	2500	6250000
	Seed Support to Farmers (Climate Resilient Varieties)	Farmer	2500	Phases	1	1000	2500000
	<b>Sub-Total</b>						
C2	Support to farmers for Inter/Mixed Cropping	Farmer	2500	Phases	1	5000	12500000
	Interface with banks for Credit Support	Meetings	2	Year	1	10000	20000
	Scheme Level Convergence Meeting-Other Dept.	Meetings	2	Year	1	10000	20000
	Investment in Integrated Farming for farmers (Livestock etc.)	Farmer	2500	Phases	1	15000	37500000
	Farmer Orientation on Farm Residual Recycling, Agronomic practices (ONLY FOR BUDGAM REGION)	Farmer	1250	Phases	1	1535	1918447
	Establishing Residual Recycling & Management Units	Village	50	System	1	175000	8750000
<b>Sub-Total</b>							<b>60708447</b>
C3	Soil Testing	Farmer	2500	Season	8	200	4000000
	Soil conservation and run off management intervention (ONLY FOR BUDGAM REGION)	Block	1	village	25	4,00,000	10000000
	Nutrition Management Plan-Each crop by Location	Farmer	2500	Season	2	200	1000000
	Soil Moisture Management Orientation to Farmers	Farmer	2500	Phase	1	500	1250000



	Support to farmers on adopting integrated micro nutrient magement to arrest litching, organic cultivation (ONLY FOR BUDGAM REGION)	Farmer	1250	Season	8	300	3000000
	Pest Management Plan-Each Crop by Location	Farmer	1250	Season	8	300	3000000
	Support to farmers for Pest Management Instruments	Farmer	2500	Phase	1	2500	6250000
	<b>Sub-Total</b>						<b>28500000</b>
C4	support to farmers in developing Poly house, Drip / Sprinkler/ drip irrigation/ protected cultivation and others . (ONLY FOR JAMMU REGION)	Block	1	Phase	1	12500000	12500000
	Feasibility Study for Farm Pond / WHS and water management practices	Village	50	Phase	1	5000	250000
	Farm Ponds / restoration of old rainwater harvesting structures/ percolation ponds/open wells/bore wells /injection wells or other as deemed to be necessary for a particular location (ONLY FOR JAMMU REGION)	Village	25	No.	1	2500000	62500000
	Orientation of farmers on tillage and residue management, water management (contour farming, terracing, water harvesting and other irrigation concepts), protected cultivation. (ONLY FOR BUDGAM REGION)	Village	25	No.	1	250000	6250000
	Introduction of 5% & 10% Models	Village	25	No.	1	5000	125000
	<b>Sub-Total</b>						<b>81625000</b>
C5	Farmers Orientation - Crop Specific Practices , organic farming, pulses and fodder production	Farmer	25	Season	6	500	75000
	Orientation for Strengthening Extension Services	Officials	15	Phase	3	1000	45000
	Exposure of Farmers to similar initiatives	Farmer	500	Phase	3	5000	7500000
	Farmer Led Extension Service Dev. (Trg. & Mobility)	Farmer	5	Village	25	5000	625000
	<b>Sub-Total</b>						<b>8245000</b>
PEC	Inception Workshop (State Level) to be organized by CC cell	State	1	Time	1	100000	100000
	Inception Workshop (District Level) to be organized by CC cell	Block	2	Time	1	50000	100000
	Quarterly Monitoring by Implementing Agency	Quarter	4	Year	4	20000	320000
	Meeting of Project Steering Committee	Half Year	2	Year	4	10000	80000
	Meeting of Technical Advisory Committee	Quarter	4	Year	4	10000	160000

	to be organised by CC cell including travel and stationary						
	Documentation of Project Benefits / Learning to be carried out by CC cell including travel, stationary, OE, infrastructure	No.	1	Block	2	150000	300000
	Dissemination Workshops on Project Learning to be organised by CC Cell	No.	2	Time	2	75000	300000
	Concurrent Project Evaluation (External)	No.	1	Time	1	500000	500000
	Final Project Evaluation (External)	No.	1	Time	1	1000000	1000000
	Stationary / Office Management	Month	12	Year	4	10000	480000
	Contingency & Unforseen	Month	12	Year	4	10000	480000
	HR Support (Technical) and PMU by JKCCCell	Month	48	Person	5	50000	12000000
	HR Support (Non-Technical) by JKCCC	Month	48	Person	5	20000	4800000
	Developing GIS Based Project Tracking System by JKCCCell	LS					1870000
	Project Formulation Cost	LS					1000000
	<b>Sub-Total</b>						<b>23490000</b>
	<b>Project Cost</b>						<b>242718447</b>
NIE	Project Monitoring	Half Year	2	Year	4	125000	1000000
	Technical Support to the Project (Quarterly)	Quarter	4	Year	4	50000	800000
	Project Review	Half Year	2	Year	4	50000	400000
	Other Expenses Including HR Cost (Tech. Expert)	Month	12	Year	4	105866	5081553
	<b>Sub-Total</b>						<b>7281553</b>
	<b>TOTAL</b>					250000000	<b>250000000</b>

### (f) Disbursement Schedule with Time bound Milestones:

Six monthly disbursements of funds with initial disbursement of 50% of the annual budget sanctioned by the Ministry. Detail schedule will be planned in the later stage. The Monitoring plan has been designed as per the fund disbursement schedule.

Component	Activity	Year 1		Year 2		Year 3		Year 4		TOTAL		
		0-6 M	6-12 M	0-6 M	6-12 M	0-6 M	6-12 M	0-6 M	6-12 M	0-6 M	6-12 M	Total
<b>C1</b>	Vulnerability Analysis and Baseline Study	30000								300000	0	300000
	Community Mobilisation & Sensitisation(25 villages from each block will be selected depending upon the vulnerability indexing)	75000	25000							75000	25000	100000
	Cropping System Planning (Village based)	50000								50000	0	50000
	Orientation on Climate Smart Ag.(50 farmers will be selected from each of the above 25 villages from each block -criteria small & marginal farmers, innovators, village leaders, farmers friend, farmers from FIG & CiGs)		62500		62500					0	125000	125000
	Farmer Field Demonstration (Demo. Inputs)		20833	10416	10416	10416	10416			208333	416666	625000
	Seed Support to Farmers (Climate Resilient Varieties)		83333	41666	41666	41666	41666			833333	166666	250000
	<b>Sub-Total</b>	<b>30125000</b>	<b>3566667</b>	<b>1458333</b>	<b>2083333</b>	<b>1458333</b>	<b>1458333</b>	<b>0</b>	<b>0</b>	<b>33041667</b>	<b>7108333</b>	<b>40150000</b>
										0	0	0
<b>C2</b>	Support to farmers for Inter/Mixed Cropping		41666	20833	20833	20833	20833			416666	833333	125000
	Interface with banks for Credit Support	2500	2500	2500	2500	2500	2500	2500	2500	10000	10000	20000
	Scheme Level Convergence Meeting-Other Dept.	2500	2500	2500	2500	2500	2500	2500	2500	10000	10000	20000
	Investment in Integrated Farming for farmers (Livestock etc.)		12500	62500	62500	62500	62500			125000	250000	375000
	Farmer Orientation on Farm Residual Recycling, Agronomic practices (ONLY FOR BUDGAM REGION)		63948		63948		63948			0	191844	191844
	Establishing Residual Recycling & Management Units		87500	87500	26250	43750				525000	350000	875000
	<b>Sub-Total</b>	<b>5000</b>	<b>181860</b>	<b>921330</b>	<b>1160200</b>	<b>1271300</b>	<b>8977800</b>	<b>5000</b>	<b>5000</b>	<b>2193660</b>	<b>3877170</b>	<b>6070800</b>

		149	33	816	333	16				67	80	447
<b>C3</b>	Soil Testing	50000	50000	50000	50000	50000	50000	5000	5000	200000	200000	40000
		0	0	0	0	0	0	00	00	0	0	00
	Soil conservation and run off management intervention (ONLY FOR BUDGAM REGION)	25000		25000		25000		2500	0	100000	100000	10000
		00		00		00		000		00	000	000
	Nutrition Management Plan-Each crop by Location	50000				50000			0	100000	100000	10000
		0				0				0	0	00
	Soil Moisture Management Orientation to Farmers	62500	62500						625000	625000	125000	12500
		0	0									00
	Support to farmers on adopting integrated micro nutrient management to arrest latching, organic cultivation (ONLY FOR BUDGAM REGION)	37500	37500	37500	37500	37500	37500	3750	3750	150000	150000	30000
		0	0	0	0	0	0	00	00	0	0	00
	Pest Management Plan-Each Crop by Location	37500	37500	37500	37500	37500	37500	3750	3750	150000	150000	30000
		0	0	0	0	0	0	00	00	0	0	00
	Support to farmers for Pest Management Instruments			62500						625000	0	62500
				00						0		00
	<b>Sub-Total</b>	<b>12500</b>	<b>48750</b>	<b>81250</b>	<b>37500</b>	<b>12500</b>	<b>42500</b>	<b>1250</b>	<b>3750</b>	<b>118750</b>	<b>166250</b>	<b>28500</b>
		<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>00</b>	<b>000</b>	<b>000</b>	<b>00</b>	<b>00</b>	<b>000</b>
<b>C4</b>	Support to farmers in developing Poly house, Drip / Sprinkler/ drip irrigation/ protected cultivation and others . (ONLY FOR JAMMU REGION)	62500	62500							625000	625000	12500
		00	00							0	0	000
	Feasibility Study for Farm Pond / WHS and water management practices	25000	75000	10000	50000					125000	125000	25000
				0								0
	Farm Ponds / restoration of old rainwater harvesting structures/ percolation ponds/open wells/bore wells /injection wells or other as deemed to be necessary for a particular location (ONLY FOR JAMMU REGION)			15625	15625	15625	15625			312500	312500	62500
				000	000	000	000			00	00	000
	Orientation of farmers on tillage and residue management, water management (contour farming, terracing, water harvesting and other irrigation concepts), protected cultivation. (ONLY FOR BUDGAM REGION)	12500	12500	25000	12500					250000	375000	62500
		00	00	00	00					0	0	00
	Introduction of 5% & 10% Models			12500						125000	0	12500
				0								0
	<b>Sub-Total</b>	<b>25000</b>	<b>75750</b>	<b>23350</b>	<b>18175</b>	<b>16875</b>				<b>402500</b>	<b>413750</b>	<b>81625</b>
			<b>00</b>	<b>000</b>	<b>000</b>	<b>000</b>				<b>00</b>	<b>00</b>	<b>000</b>

<b>C5</b>	Farmers Orientation - Crop Specific Practices , organic farming, pulses and fodder production	12500	12500	12500	12500	12500	12500	12500	12500	37500	37500	75000
	Orientation for Strengthening Extension Services	15000				15000				45000	0	45000
	Exposure of Farmers to similar initiatives		25000		25000		2500			750000	0	750000
	Farmer Led Extension Service Dev. (Trg. & Mobility)	89286	89286	89286	89286	89286	89286	89286	89286	267857.	357142.	625000
	<b>Sub-Total</b>	<b>15000</b>	<b>101786</b>	<b>2616786</b>	<b>101786</b>	<b>2616786</b>	<b>101786</b>	<b>2601786</b>	<b>89286</b>	<b>7850357</b>	<b>394643</b>	<b>8245000</b>
<b>PEC</b>	Inception Workshop (State Level) to be organised by JKCCCell	10000								100000	0	100000
	Inception Workshop (District Level) to be organised by JKCCCell	10000								100000	0	100000
	Quarterly Monitoring by Implementing Agency	40000	40000	40000	40000	40000	40000	40000	40000	160000	160000	320000
	Meeting of Project Steering Committee	10000	10000	10000	10000	10000	10000	10000	10000	40000	40000	80000
	Meeting of Technical Advisory Committee to be organised by JKCCCell	20000	20000	20000	20000	20000	20000	20000	20000	80000	80000	160000
	Documentation of Project Benefits / Learning to be carried out by JKCCCell including travel,stationery,OE,Infrastructure				15000				15000	150000	150000	300000
	Dissemination Workshops on Project Learning to be organised by JKCCCell	75000		75000			75000		75000	0	300000	300000
	Concurrent Project Evaluation (External)				50000					500000	0	500000
	Final Project Evaluation (External)								1000000	0	1000000	1000000
	Stationary / Office Management	60000	60000	60000	60000	60000	60000	60000	60000	240000	240000	480000
	Contingency & Unforseen	60000	60000	60000	60000	60000	60000	60000	60000	240000	240000	480000
	HR Support (Technical) and PMU by JKCCCell	1500000	1500000	1500000	1500000	1500000	1500000	1500000	1500000	6000000	6000000	12000000
	HR Support (Non-Technical) by JKCCCell	6000000	6000000	6000000	6000000	6000000	6000000	6000000	6000000	24000000	24000000	48000000
	Developing GIS Based Project Tracking System by JKCCCell		9350000	9350000						9350000	9350000	18700000
	Project Formulation Cost	1000000								1000000	0	1000000
	<b>Sub-Total</b>	<b>34900000</b>	<b>33000000</b>	<b>32250000</b>	<b>25150000</b>	<b>27900000</b>	<b>23650000</b>	<b>24400000</b>	<b>33650000</b>	<b>119450000</b>	<b>115450000</b>	<b>234900000</b>

<b>Project Cost</b>		<b>34910</b>	<b>37604</b>	<b>47988</b>	<b>38227</b>	<b>37703</b>	<b>17152</b>	<b>6296</b>	<b>7209</b>	<b>126898</b>	<b>115819</b>	<b>24271</b>
		<b>000</b>	<b>601</b>	<b>452</b>	<b>935</b>	<b>452</b>	<b>935</b>	<b>786</b>	<b>286</b>	<b>690</b>	<b>757</b>	<b>8447</b>
<b>NIE</b>	Project Monitoring	12500	12500	12500	12500	12500	12500	1250	1250	500000	500000	10000
		0	0	0	0	0	0	00	00			00
	Technical Support to the Project (Quarterly)	10000	10000	10000	10000	10000	10000	1000	1000	400000	400000	80000
		0	0	0	0	0	0	00	00			0
	Project Review	50000	50000	50000	50000	50000	50000	5000	5000	200000	200000	40000
								0	0			0
	Other Expenses Including HR Cost (Tech. Expert)	63519	63519	63519	63519	63519	63519	6351	6351	254077	254077	50815
		4	4	4	4	4	4	94	94	7	7	53
	<b>Sub-Total</b>	<b>91019</b>	<b>91019</b>	<b>91019</b>	<b>91019</b>	<b>91019</b>	<b>91019</b>	<b>9101</b>	<b>9101</b>	<b>364077</b>	<b>364077</b>	<b>72815</b>
		<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>94</b>	<b>94</b>	<b>7</b>	<b>7</b>	<b>53</b>
<b>TOTAL</b>												
		<b>35820</b>	<b>38514</b>	<b>48898</b>	<b>39138</b>	<b>38613</b>	<b>18063</b>	<b>7206</b>	<b>8119</b>	<b>130539</b>	<b>119460</b>	<b>25000</b>
		<b>194</b>	<b>796</b>	<b>647</b>	<b>129</b>	<b>647</b>	<b>129</b>	<b>980</b>	<b>480</b>	<b>467</b>	<b>533</b>	<b>0000</b>

Gantt chart is provided below for the implementation schedule of the activity and its expenditure period.

Activity	Year 1		Year 2		Year 3		Year 4	
	0-6 M	6-12 M	0-6 M	6-12 M	0-6 M	6-12 M	0-6 M	6-12 M
<b>COMPONENT 1</b>								
Vulnerability Analysis and Baseline Study								
Community Mobilisation & Sensitisation								
Cropping System Planning (Village based)								
Orientation on Climate Smart Ag.								
Farmer Field Demonstration (Demo. Inputs)								
Seed Support to Farmers (Climate Resilient Varieties)								
<b>COMPONENT 2</b>								
Support to farmers for Inter/Mixed Cropping								
Interface with banks for Credit Support								
Scheme Level Convergence Meeting-Other Dept.								
Investment in Integrated Farming for farmers (Livestock etc.)								
Farmer Orientation on Farm Residual Recycling, Agronomic practices								
Establishing Residual Recycling & Management Units								
<b>COMPONENT 3</b>								
Soil Testing								
Soil conservation and run off management intervention								

Nutrition Management Plan-Each crop by Location									
Soil Moisture Management Orientation to Farmers									
Support to farmers on adopting integrated nutrient management, organic cultivation									
Pest Management Plan-Each Crop by Location									
Support to farmers for Pest Management Instruments									
<b>COMPONENT 4</b>									
support to farmers in developing Poly house, Drip / Sprinkler/ drip irrigation/ protected cultivation and others									
Feasibility Study for Farm Pond / WHS and water management practices									
Farm Ponds / restoration of old rainwater harvesting structures/ percolation ponds/open wells/bore wells /injection wells or other as deemed to be necessary for a particular location									
Orientation of farmers on tillage and residue management , water management (contour farming, terracing, water harvesting and other irrigation concepts), protected cultivation									
Introduction of 5% & 10% Models									
<b>COMPONENT 5</b>									
Farmers Orientation - Crop Specific Practices									
Orientation for Strengthening Extension Services									
Exposure of Farmers to similar initiatives									
Farmer Led Extension Service Dev. (Trg. & Mobility)									
<b>PROJECT MANAGEMENT COMPONENT</b>									
Inception Workshop (State Level)									
Inception Workshop (District Level)									
Quarterly Monitoring by Implementing Agency									
Meeting of Project Steering Committee									
Meeting of Technical Advisory Committee									
Documentation of Project Benefits / Learning									
Dissemination Workshops on Project Learning									
Concurrent Project Evaluation (External)									
Final Project Evaluation (External)									
Stationary / Office Management									
Contingency & Unforeseen									
HR Support (Technical)									

HR Support (Non-Technical)								
Developing GIS Based Project Tracking System								
Project Formulation Cost								
<b>PROJECT SUPPORT BY NIE</b>								
Project Monitoring								
Technical Support to the Project (Quarterly)								
Project Review								
Other Expenses Including HR Cost (Tech. Expert)								