ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PROJECT CONCEPT

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY**: REGULAR PROJECT/PROGRAMME**

COUNTRY/IES**: INDIA**

SECTOR/S: **Agriculture and Water**

TITLE OF PROJECT/PROGRAMME: **Addressing climate change risk on water resources and agriculture in the dry lands of Maharashtra.**

TYPE OF IMPLEMENTING ENTITY: **National Implementing Entity**

IMPLEMENTING ENTITY: **National Bank for Agriculture and Rural Development – (NABARD)**

EXECUTING ENTITY/IES: **Watershed Organization Trust (WOTR)**

AMOUNT OF FINANCING REQUESTED**:** (IN U.S Dollars Equivalent):**1,860,847**

1. PROJECT BACKGROUND AND CONTEXT

Climate change is an undeniable threat. It is one of the most challenging and complex issues for humankind, which if not dealt in time may lead to serious consequences. A natural resources based economy, India, is at high risk to changing climatic conditions. Amid increasing population, rapid urbanization and industrialization, climate change induces an additional stress. Impacts of temperature and precipitation fluctuations are experienced all over the country but ecologically and socio-economically fragile areas are the worst affected. Climate variability has direct bearing on the key sectors of Indian economy: *Agriculture, Water, Natural Ecosystems & Biodiversity and Health*. A vast population depends on climate sensitive sectors like agriculture, forest, fisheries. More than half of India's population directly depends on natural resources for their livelihood and sustenance; these people are at higher risk

to climate change irrespective of the fact that they contribute least to the country's greenhouse gas emissions, which is considered to be the major anthropogenic cause of changing climatic and environmental conditions.

About 69 percent of the country is dry land- arid, semi-arid and dry sub humid. The bio-physical characteristics of the region- highly erratic rainfall, extremes of temperatures and intense solar radiation make these the most vulnerable regions in India.

The various constraints faced by the inhabitants of dry lands are broadly grouped into:[1]

- Climatic constraints: highly erratic rainfall, aberrations in monsoon behaviour, prolonged dry spells, high atmospheric temperature, low relative humidity, hot dry winds and increased potential evapotranspiration (PET) due to high atmospheric water demand.
- Soil related constraints: inadequate soil moisture content, poor organic matter content, poor soil fertility, soil deterioration due to erosion, soil crust problems.
- Crop related constraints: Lack of suitable crop varieties for dry land farming and injudicious use of water for irrigation.
- Socio-economic constraints: poor access to inputs, non-availability of credit, low adaptive capacity.

One third of Maharashtra, falls under semi-arid climatic zone. More than 80 percent of its total area under agriculture is rainfed. Deficient rainfall is reported once every 5 years. Severe drought conditions occur once every 8-9 years. The frequency of drought in *Marathwada and Madhya Maharashtra*, is one in every five years.

According to a study conducted by TERI, Maharashtra is identified as one of the most vulnerable states in India. Based on biophysical, social and technological indicators, the state has low adaptive capacity. It falls in the zone of high to very high climate sensitivity, with a widespread dependence on agriculture. The region is also interpreted as area of double exposure where globalization and climate change pose simultaneous challenges to agriculture sector.[2] Studies by ICRISAT and Vulnerability atlas developed by Central Research Institute for Dry land Agriculture shows the districts of *Marathwada and Vidarbha* to be at very high risk to the climate change[3,4]

1 Watershed Organisation Trust (2013): Community-Driven Vulnerability Evaluation Tool "CoDriVE-Programme Designer" A Handbook – Incorporating Vulnerability to Climate Change into Project Design and Implementation

[2]O"Brien, K.,Leichenko, R., Kelkar, U., Venema, H., Aandahl, G., Tompkins,H., Javed, A., Bhadwal, S., Barg, S., Nygaard, L. And West, J. 2004.Mapping vulnerability to multiple stressors: climate change and globalization in India. *Global Environmental Change*,14,pp. 303-313

[3] Singh,N.P. et.al. Vulnerability to Climate Change: Adaptation Strategies & Layers of Resilience,ICRISAT, Hyderabad

[4] Rama Rao C.A., Raju B.M.K., Subba Rao, A.V.M. , Rao K.V., Ramachandran K., Venkateswarlu B.and Sikka A.K., 2013, Atlas on Vulnerability of Indian Agriculture to Climate Change. Central Research Institute for Dry land Agriculture, Hyderabad. p116

Figure 1: Map of India

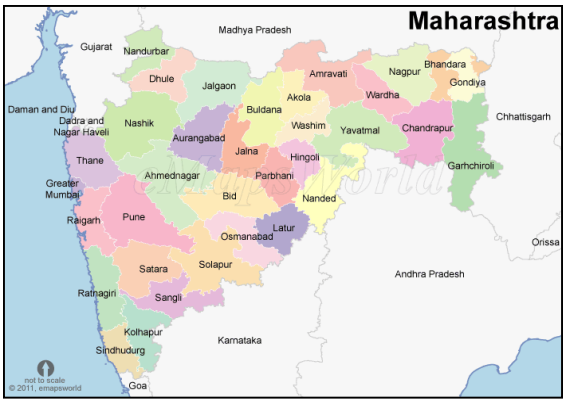


Figure 2: Map of Maharashtra

Figure 3: Map of Jalna

1.1 Climate Profile of the State and focussed District

Maharashtra is located in western plateau and hill region, one of the 15 agro climatic zones of the country. It is delineated into nine agro climatic sub zones on the basis of rainfall, soil type and vegetation. A large variation in the rainfall exists in different parts of the state, while the hilly regions and coastal districts receive annual rainfall of 2000 to 4000 mm, most part of the state lies in the rain shadow belt of the Sahyadri Mountain ranges where rainfall is as low as 500 to 700 mm. Maharashtra is divided into four regions: *Konkan, Western Maharashtra, Marathwada, and Vidarbha*. The normal annual rainfall in Marathwada is low, and it is characterized as a frequently drought prone area. Different agro ecological zone and agro ecological sub zones of Maharashtra are described in table 1.

Jalna district in Marathwada has a semi-arid climate with an average annual rainfall of 729.7 mm. The average monsoon ranges from June to September with rainfall of 606.4 mm. It is categorized as a drought prone district by Department of Land Resources, Ministry of Rural Development, Government of India. The district often experiences drought with rainfall recording as low as 400 to 450 mm. There is some variation in the rainfall pattern across the blocks constituting Jalna district, with its northern blocks (Bhokardan, Jafrabad, Badnapur, and Jalna) recording lower rainfall than the southern blocks (Ambad, Ghansavangi, Partur, and Mantha)[5]

5 TERI, 2013,EXTREME RISKS, VULNERABILITIES AND COMMUNITY - BASED ADAPTATION IN INDIA (EVA): A PILOT STUDY. accessed at http://www.teriin.org/projects/eva/caseStudy.php viewed on 14-05-2014

Table 1: Agro ecological Zones of Maharashtra[6]

State: Maharashtra						
Agro ecological Zones Agro ecological Subzones	Districts	Rainfall(mm) (PET -mm)	LGP	Soil	Crop	Constraints
Hot Semi-arid Eco region with shallow and medium Black soils 6.1 Deccan (Western Maharashtra), Plateau, hot semi-arid ecosystem with Black soils medium and deep Black soils as inclusion	Eastern half of Pune, Satara and Sangli, Solapur,Osmanabad, Bid,Ahmadnagar	600-750 (1500-1800)	90-120	Soils are moderately to gently sloping. They are either shallow, loamy skeletal and highly calcareous at one place or clayey, calcareous and moderately alkaline at others	Groundnut, Sugarcane, Gram, Spices, Urd, Safflower, Tur Cotton, Safflower, vegetables & Fruits	• Prolonged dry spells • High run off during stormy cloud bursts in rainy season leads to heavy soil loss • Deficiency of N,P and Zn
6.2 Deccan (W. Maharashtra), Northern Karnataka Plateau), hot semiarid ecosystem with shallow Black soils (deep and medium Black soils)	Dhule, Nasik, Jalgaon(W.Part), Aurangabad,Northern hilly part of Ahmadnagar, Jalna,Parbhani Naded, Latur	700-1000 (1700-1900)	120-150			
6.3 Deccan (NW Maharashtra) Plateau, hot semi-arid ecosystem with deep Black soils	Jabalpur (E part), Buldhana, Akola, Amravati, Yavatmal	800-1100 (1600-1800)	120-150			
6.4 Deccan (W. Maharashtra and Karnataka), Plateau, hot dry sub humid ecosystem with shallow black soils	Western parts of Pune, Satara, Sangli, Kolhapur (E. Part)	(1600-1700) 1100-1200	150-180			
Hot Semi-arid Ecoregion with Red and Black soils 7.1 Deccan (Telengana) Eastern Ghat) Plateau hot semi-arid ecosystem with mixed red and black soils	Satara and Sangli, Solapur, Osmanabad,	700-750 (1800-1900)	90-120	soils are moderately to gently sloping, Black soils are clayey, calcareous	Rice, Ragi, Jowar, Kodra, other cereals, Gram, Groundnu	• High runoff leading to soil and nutrient loss • Un judicious use of irrigation water and

[6] Mandal,C. And Gajbhiye,K.S., 2008,Agro-ecological zones, their soil resource and cropping systems National Bureau of Soil Survey and Land use planning.

	Bid, Ahmednagar			and strongly alkaline. Red soil are non-calcareous and neutral in reaction	t, Sugarcane Niger	imperfect drainage conditions results in high ground water table • Deficiency of N,P and Zn in soils • Frequent Doughtiness
Hot sub humid eco region with Red and Black soils 10.2 Deccan (Satpura) Plateau, hot dry sub humid ecosystem with deep black soils (shallow and medium deep black soils as inclusion) , parts of Jabalpur, Narsimpur	Wardha, Nagpur	1000-1200 (1300-1500)	150-180	The soils are largely medium. deep black soils are interspersed with patches of Red soils, red soils generally occur on ridges and on pediment surfaces. They are shallow to moderately deep, clayey, neutral to slightly acidic in nature	Sorghum, Tur, Wheat, Other Pulses, Oilseeds, Cotton, Paddy, Ragi	• Cracking clayey soils having low soil moisture content • Dry tillage and inter-tillage practices are difficult to perform • Risk of inundation and risk of doughtiness due to prolonged dry spells • Soil loss due to run off

1.2 Socio economic profile of the State and focussed District

Maharashtra has a total population of 112 million, 58 million male and 54 million female (census 2011). 55 percent of the total population is rural which rely on agriculture as a main source of livelihood. The state has a sizable population of scheduled castes (11.8 % of the total population), while tribal population makes up another 9.4 percent.

Jalna has a population of 1.9 million, 1,011,473 males and 947,573 females. The district has performed relatively poor on gender indicators. Literacy rate of the district is 61% with 52.35% female literacy. It is lower than the national average of 65%. 85% of the land under agricultural use is largely rain fed. Jalna is among the lower income districts in Maharashtra. 60% of people are involved in agriculture. The total

number of farmers in the district is 3.71 lakhs, of which, 30 % and 60% are marginal farmers and small farmers, respectively.

1.3 Climate change projections

Study done by TERI with Met Office Hadley Centre, UK, projects an increase in temperature over Maharashtra for monsoon season with a range of 1.5 degree Celsius and 3 degree Celsius. Such a rise can cause severe drought like conditions leading to water scarcity and crop failure. The percentage of days with temperatures above 35 degree Celsius is projected to increase. Rainfall is also expected to increase for the region. Number of days with high and very high rainfall i.e. greater than 25 mm per day is projected to increase, which suggests an increase in monsoon's rainfall in warmer climate of future.[7]

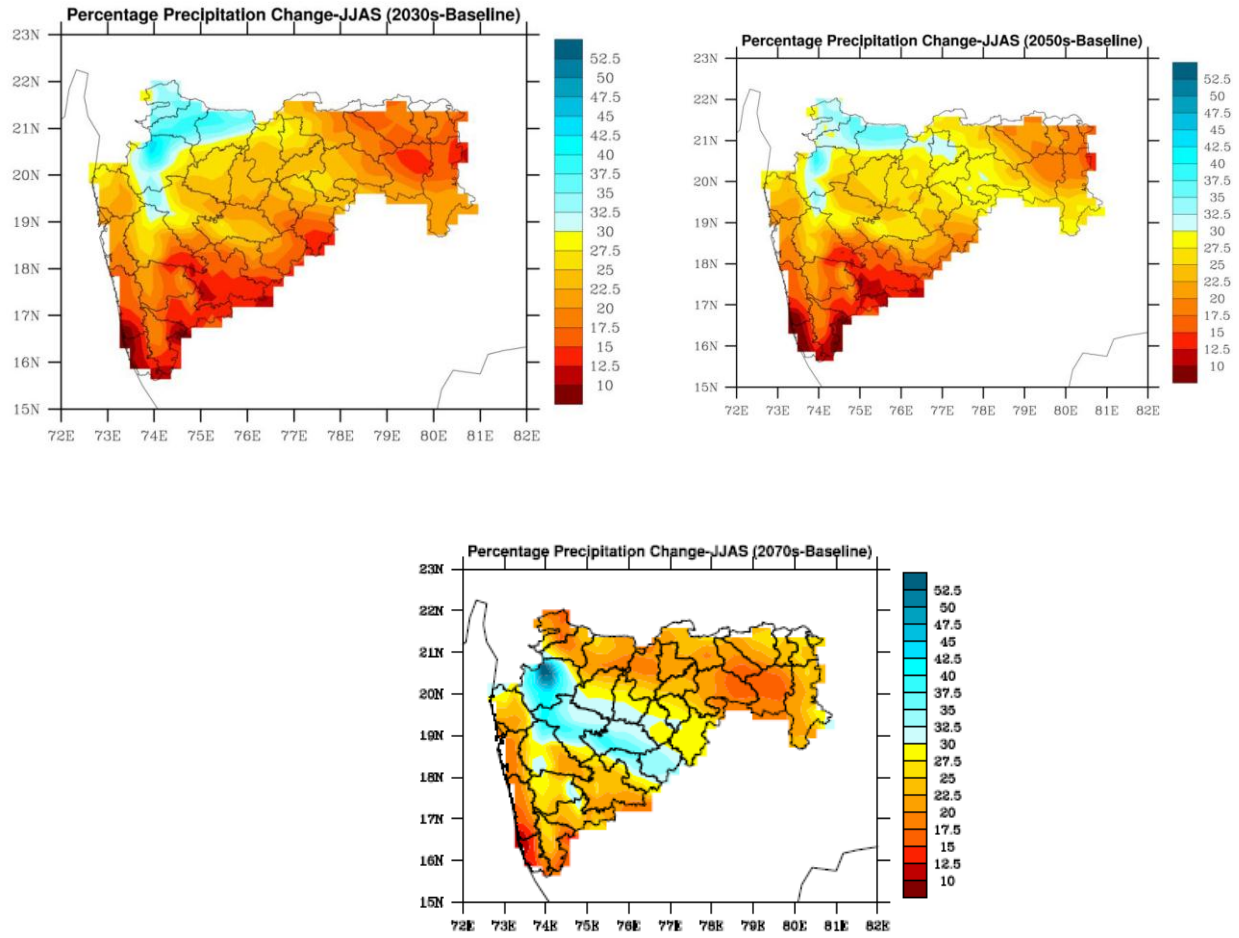


Figure 1: Percentage increase in rainfall in 2030s, 2050s, and 2070s with respect to baseline (170-2000) in Maharashtra
Source: Parasnis,A.2013, Water challenges and business opportunities in India, presented at The CEO Water Mandate, Mumbai, TERI.

[7] http://www.metoffice.gov.uk/media/pdf/c/a/GOM_brochure_for_web.pdf

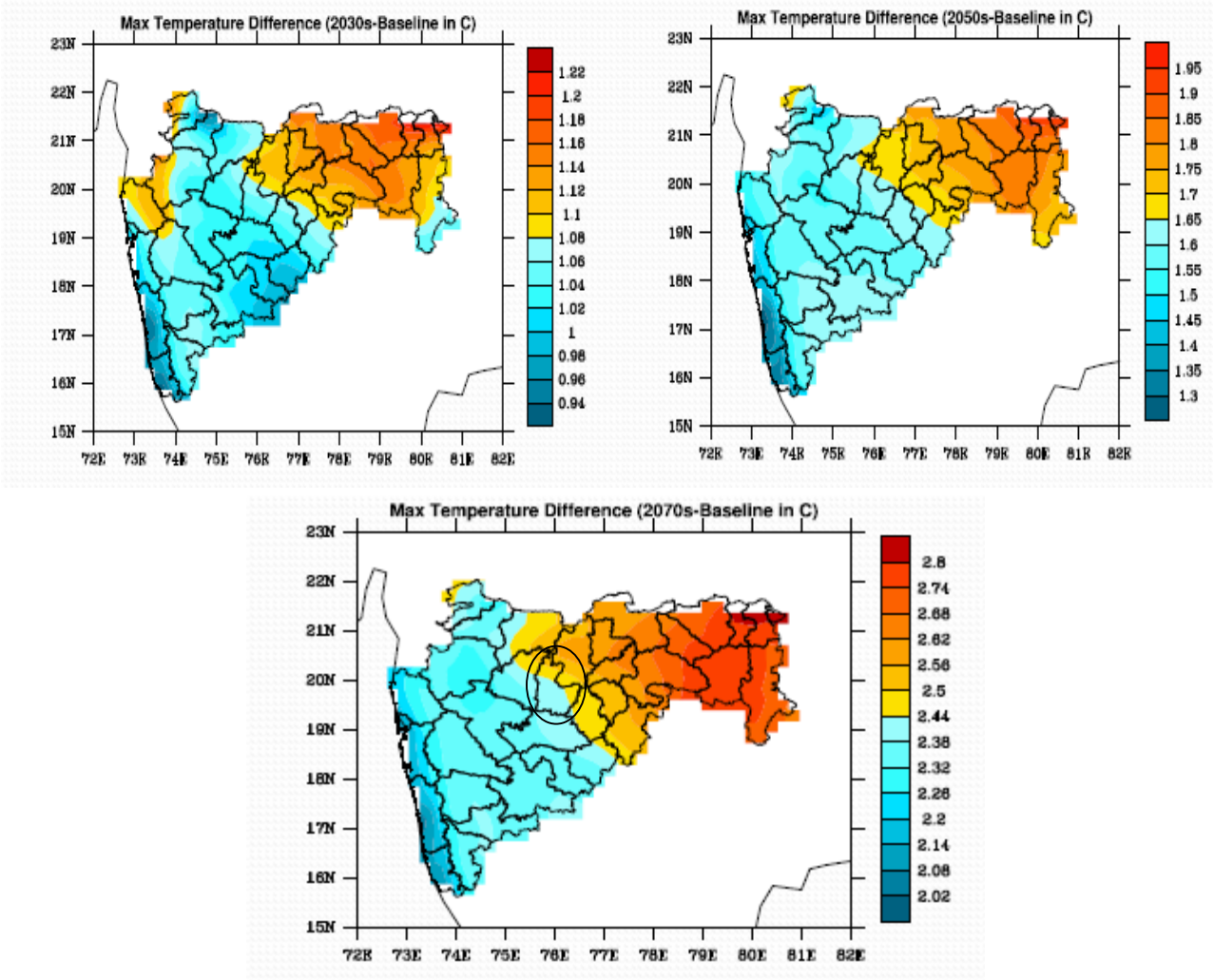


Figure 2: Annual Maximum temperature anomalies for 2030s, 2050s, and 2070s with respect to baseline (1970-2000) for Maharashtra Source: Parasnis,A.2013, Water challenges and business opportunities in India, presented at The CEO Water Mandate, Mumbai, TERI.

As is clear from the figure, the rainfall during monsoon is expected to increase by 20-25 percent by 2030 which can go as high as 30-37 percent by 2070s. Maximum temperature is also projected to rise by 1 degree Celsius by 2030 to 2.44 degree Celsius by 2070. Study by TERI suggests an increase in average rainfall in Jalna which may be accompanied by large variations from year to year and within a season. Incidences of erratic and uncertain rainfall are expected to increase.

1.4 Vulnerability to Climate Change

More than 30 percent of Maharashtra falls under dry lands, with agriculture as the main livelihood. It has the lowest proportion of irrigated land among western states where only 17% of the net cropped area is irrigated. The Dry lands in Maharashtra face the risk of frequent drought and dry spells. Water scarcity is

one of the major challenges that the inhabitants of the region face, poverty and high rates of land degradation add to the stress.

1.4.1 Indicators of Vulnerability for the state[8]

Indicators of Sensitivity: The state is highly sensitive to climate variability as a large percentage of geographical area is under cultivation i.e. 80 percent therefore more area is subjected to climate variability, low rainfall in the semi-arid tracts of the state and drought proneness of the region.

Indicators of Exposure: Maharashtra is categorised under the states with very high exposure. Change in rainfall during monsoon, increased incidences of dry spells and drought, high intensity rainfall events, rise in minimum temperature are the factors contributing to the same.

Indicators for adaptive capacity: High prevalence of poverty, high dependence of population on climate sensitive sectors like agriculture. Low ground water availability and low net irrigated area are the factors that lead to low adaptive capacity.

In the Vulnerability Atlas prepared by CRIDA[9], out of 33 districts of Maharashtra 12 fall under the category of districts with 'very high vulnerability', 5 under 'high vulnerability', 3 under 'Medium vulnerability', 6 under 'low vulnerability' and 7 under 'very low vulnerability'. Marathwada and Vidarbha fall under region highly sensitive to climatic variations and low adaptive capacity. The districts of these regions have very high vulnerability to climate change.

1.4.2 Vulnerability of the focussed District

Jalna is situated in the semi-arid regions of Marathwada, the drought prone region of the state. The region is highly sensitive to climate variability due to the large dependence on agriculture for livelihoods. About 85 percent of area is under agriculture where 75 percent of this is under Kharif (Monsoon) crops and 40 percent under Rabi (winter) crops. Only 13 percent of the agricultural land is irrigated. Rainfed agriculture, depleting ground water levels, drought proneness, and uneconomic land holding size results in high vulnerability of the region to changing climatic conditions. Most parts of the district are cultivated primarily with cotton and sorghum. In addition to this, horticultural crops like sweet lime and pomegranates are grown in some areas. The practice of intercropping is prevalent in many parts of the district.

According to census 2011, 47.21% of total population is engaged in cultivation, 30.99% employed as agricultural labours, 20.28% of population is engaged in cottage and household industries and 1.52% in other activities. Most farmers in the district are small and marginal farmers (81%), with a few medium-farmers (18%). There are only 3,000 large farmers in the district (1–2%)[10]

[8] Rama Rao C.A., Raju B.M.K., Subba Rao, A.V.M. , Rao K.V., Ramachandran K., Venkateswarlu B.and Sikka A.K., 2013, Atlas on Vulnerability of Indian Agriculture to Climate Change. Central Research Institute for Dryland Agriculture, Hyderabad. p116

[9] Ibid

[10] Vedeld, T., G. Aandahl, L. Barkved, U. Kelkar, K. de Bruin and P. Lanjekar, 2014, Drought In Jalna: Community-based Adaptation to Extreme Climate Events in Maharashtra, TERI, New Delhi

Figure 5 and 6 shows rainfall trend for Jalna for period 1950 to 2014. A large year to year variability and decreasing trend has been observed in annual rainfall. Last two decades have observed many rainfall deficit years, years 2000 to 2005 were consecutive rain deficit year and 2012 being a major drought year. The percent decadal variation of the rainfall shows a significant decrease in the rainfall, from 1971 a continuous decrease in the rainfall has been observed. (Table 2)

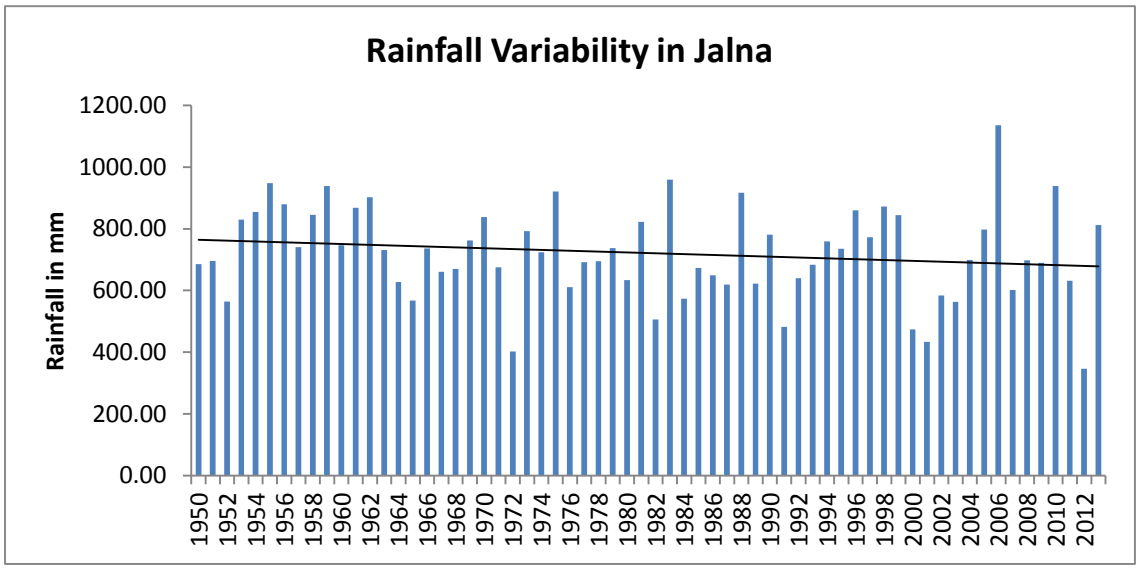


Figure 3: Rainfall trend for Jalna (IMD gridded data)

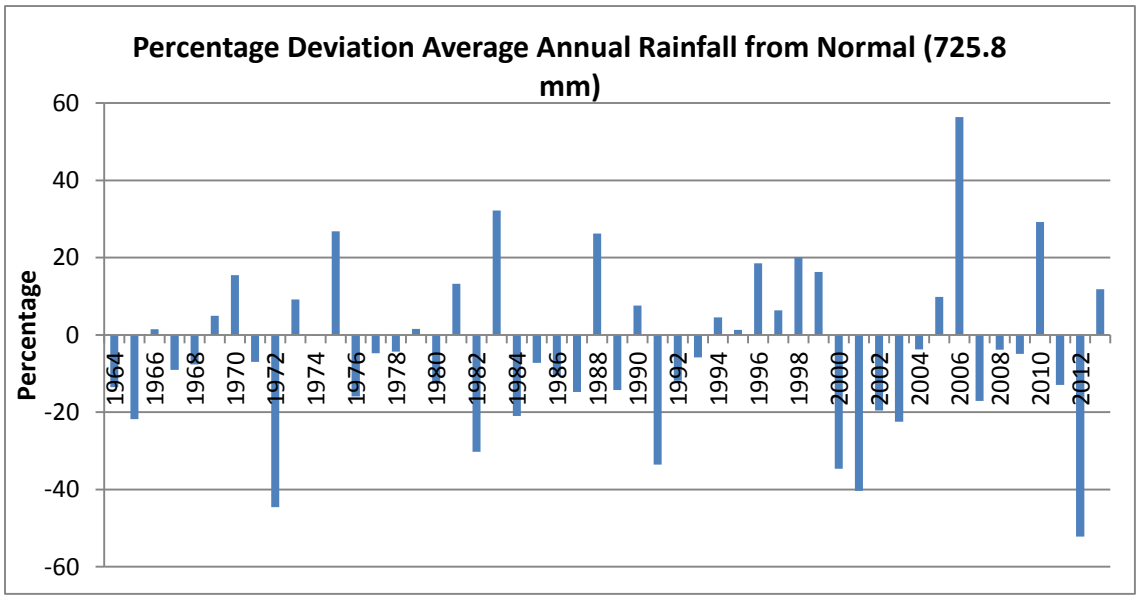


Figure 4: Percentage deviation from normal (IMD gridded data)

Table 2: Decadal variation in rainfall

Decades	Deviation from mean rainfall
1961-1970	1.46
1971-1980	-5.17
1981-1990	-1.86
1991-2000	-1.86
2001-2010	-1.64

1.4.3 Key Vulnerability of Agriculture

Due to frequent droughts, improper land husbandry, poor cultivation practices, excessive pressure on biotic resources (forests, grasslands, and natural resources) and erratic rainfall, the local habitats and environments have become degraded and fragile. Soil erosion is high thus leading to depletion of soil and nutrients, which in turn adversely affects the local ecology. Poor vegetative cover, hard compacted soils and lack of adequate conservation and retention structures result in high runoff of rainwater, minimal soil moisture retention, low infiltration and slim recharge of ground water aquifers.

The soil of Jalna District is derived from basaltic lava flows and is grouped in different land capability classes. Ambad and Ghansawangi tehsils have more arable soils, i.e., 18.81%, while Jafrabad tehsil has the least area, i.e., 9.44 % of arable soils. The ratio of groundwater use to availability in Jalna District is 43% (the net annual groundwater availability is 917.28 million cubic metre, while the annual groundwater draft for irrigation and domestic purposes is 392.27 million cubic metre). Irrigation accounts for 98% of the groundwater extraction in the district.

Since the major source of livelihood in the region is agriculture and the cotton is the main cash crop, the erratic monsoons affect the production and therefore income. Study by TERI revealed that area under cotton has expanded by 52% from 2000–2010. An exponential increase has been observed in oilseed production like soybean which has grown by 88% during the same period. Horticulture is also widely practiced in the region. Jalna is also a major hub for seed companies (like Mahyco, Mahindra, Bejosheetal) who engage in contract farming with small farmers for cotton seeds and vegetable seeds.[11]

High dependence on hybrid seeds, chemical fertilisers and pesticides the input costs has increased many folds. Since the major crops that are sown in the region viz. cotton and soybean are sensitive to climatic variations, spells of heat and scarce rainfall lead to crop damages that affect the overall income of the

[11] S., Ghosh S., Joshi, P.K., Mahtta, R. and Barkved, L. 2014. Assessment of potential impacts on dryland ecosystems of Jalna District, Maharashtra, India. Final report on WP2.1: Extreme Risks, Vulnerabilities and Community-based Adaptation in India (EVA): A Pilot Study, CIENSTERI, TERI Press, New Delhi, India

farmers with hardly any alternative sources for value addition that can help them enhance their incomes. Studies[12] by WOTR suggest a shift in the agriculture from traditional practices of using indigenous seeds, organic fertilizers to mechanised one with a high dependence on chemical fertilizers and pesticide. Increased use of chemicals results in deteriorating soil quality thus reducing the crop yield. There has been an increased demand of irrigation during kharif and Rabi season due to erratic rainfall and increased incidences of dry spell has made the sector highly vulnerable to climate change. About 62 percent area is under Kharif crops. 12 percent of lands are under Rabbi Crops. The area under double crops is just 11 per cent while area under irrigation is only 7 percent, which is far below the state average. Depleting ground water levels, increasing demand for cash crops in the market and increasing input costs add to the existing stress. Irregular, unseasonal rainfall in the region results in heavy crop losses which lead to high debts among farmers. Recent hailstorms in the month of March have resulted into widespread destruction of standing crops ready for harvest and unrest among the farmers.

Small and marginal farmers depend on rainfed agriculture while large landowners own bore wells, this leads to inequitable distribution of ground water. The large farmers are therefore able to take crops for more than one season while small and marginal farmers have to work on large landowner farms as labours.

Agricultural labour is an important source of income for small and marginal farmers and landless during Rabi season. Due to increased mechanisation of the agriculture and resultant unavailability of work in the village force them to migrate to nearby villages especially during Kharif and Rabi season.

Vulnerability assessments conducted in various villages of the region have identified small and marginal farmers, and landless highly vulnerable to climate variability, owing to their low adaptive capacities. The results show poor status of the livelihood capitals of both these groups of land owners; low or no agricultural land, lack of irrigation infrastructure and complete dependence on rainfed agriculture, lack of storage structures, absence of alternative skill sets, lack of credit facilities and weak social and institutional capital contributes to the same.

1.4.4 Key vulnerabilities of water resources

Jalna district is underlain by basaltic lava and alluvium. Deccan trap basalt (hard rock areas) comprises 98 percent of the district. Occurrence of groundwater is controlled by water bearing properties of the rocks. The formation is thick and comprises scores of lava flows of 5 to 25 meters individual thickness. each flow comprise a lower zone, 40 to 70 percent hard, devoid of primary porosity and permeability and an upper zone, 30 to 60 percent of flow, with limited porosity. Secondary porosity is acquired due to weathering, jointing, shearing, fracturing etc., if the thickness of these zones is appreciable, and the flows from potential aquifers. Hills and higher grounds have hard rocks and are resistant to weathering. The steep gradient causes water to run off rapidly without much infiltration. It is mainly in the lower ground that a

[12] Watershed Organisation Trust (2013): Towards Resilient Agriculture in a Changing Climate Scenario, December 2013. Accessed at : http://wotr.org/system/files/Position_Papers/WOTR%20Agriculture%20Position%20Paper.pdf

deep weathering profile of the Deccan Traps Basalt is preserved, that can form a continuous perennial (lasting) groundwater body of significant storage. In the recharge zone infiltration capacity is fairly good, but storage is generally low. Hence, wells tend to dry out.[13] Shallow aquifers, typical of the region, show erratic variations in ability to store and transmit groundwater within small distances. Hence as a consequence local variations in well water yield across small distances can be seen which can lead to localized impacts of drought.

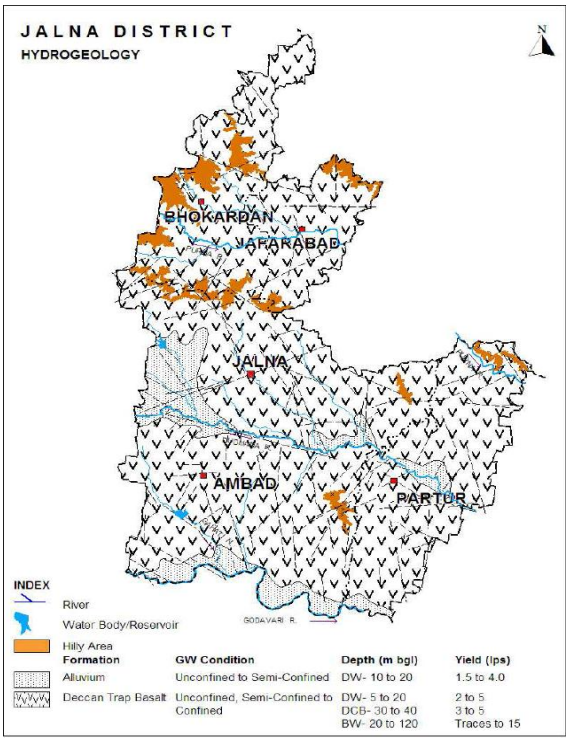


Figure 5: Hydrogeology of the district, Jalna
Source: Waghmare,S.2010. Ground Water Information Jalna district Maharashtra, Central Ground Water Board, Government of India, Nagpur.

Analysis of Water level trend for the period 1998-2007 computed by Central Ground Water Board shows a decreasing trend during pre and post monsoon periods in major part of the district. The fall of 20 cm per year has been observed in northern, eastern and southern parts of the district comprising talukas of Bhokardan, Jafrabad, Ambad and Partur talukas and a major part of Jalna Taluka.[14] A comparison of depth to water level during Pre-Monsoon (May 2009) with decadal mean (1999-2008) reveals that fall in water level of more than 4 meters has been observed in Jalna.[15]

WOTR has been in the forefront of mobilizing vulnerable communities in semi-arid and resource fragile regions to help themselves out of poverty by harvesting rainwater wherever it falls, regenerating the ecosystems they live in through an Ecosystem Based Adaptation approach. WOTR is oriented and equipped to specifically address the challenges and opportunities posed by climate change to vulnerable communities. In the process WOTR has introduced a bottom up, holistic, integrated and system approach towards adaptation and resilience building.

WOTR has been implementing Climate Change Adaptation program in over 70 villages in the states of Maharashtra, Madhya Pradesh and Andhra Pradesh. In the district of Jalna of Maharashta state WOTR is currently implementing Integrated Watershed Development project on public-private-civil partnership model which aims to leverage complementary strength of key sectors, namely the Government, NGOs and local communities. That is, investment funds form government under various schemes like MGNREGA, operational funds and technical support from the private sector (Hindustan Unilever Foundation); mobilization, technological and networking skills of NGO and ownership, implementation

[13] Waghmare,S.2010. GROUND WATER INFORMATION JALNA DISTRICT MAHARASHTRA, Central Ground Water Board,Government of India, Nagpur.
[14] Ibid
[15] CGWB, 2010, Annual report 2009-2010. Central Ground Water Board, Faridabad

and governance of resources of the local communities. The project aims to increase water and biomass availability as a basis of poverty alleviation through empowerment of the village communities across 76 villages in 3 blocks of Jalna.

1.5 Project Area:

The project will be implemented in 3 blocks of Jalna district: Bhokardan, Jafrabad and Ambad, consisting of approximately 19046 households. The target area is characterized by chronic poverty, low agricultural productivity, high variability of rainfall and weather. There is lack of resources for land management and improper land use practices.

This issue of natural resources management and sustainable livelihoods especially in a varying climate scenario adds to the adaptation complexity. No single village can achieve the desired outcomes isolated from the other. Since climate does not respect the geographic conditions and terrain, nor the political boundaries of a village, it is but necessary to bring together a group of villages having similarities in terms of climatic conditions and culture (where possible) into an organized cluster in order to identify the water, land, agriculture and livelihood problems they face and work out sustainable win-win solutions. Villages will necessarily need to come together to identify their common problems, plan their common goal (with village specific priorities / objectives) and work out steps to resolve these in a sustainable manner. The project, therefore, will be implemented in 5 clusters comprising 70 villages. The following table shows targeted clusters, their size and population.

Table 3: Project Area

Sr No	Name of Cluster	No of villages	Total area in ha	No of Households	Population			SC/ST Population
					Men	Women	Total	
1	Anwa	9	7178	3662	9795	8631	18426	4247
2	Chinchkhed 1	7	3922	1134	2897	2776	5673	626
3	Chinchkhed 2	6	5669	1598	4261	4015	8276	245
4	Chinchkhed 3	6	4793	1144	2809	2697	5506	2
5	Hasnabad 1	5	5720	1975	4629	4357	8986	112
6	Hasnabad 2	5	6111	1670	4345	4096	8441	427
7	Hasnabad 3	5	2038	1045	3923	2712	3567	263
8	Khasgaon	5	3077	1264	3129	2881	6010	299
9	Mahora	11	7148	3510	8998	8194	17192	1202
10	Rohilagad 1	5	4847	1470	4236	4138	8374	152
11	Rohilagad 2	6	5841	1250	3543	3364	6907	895
	Grand total	**70**	**56344**	**19722**	**52565**	**47861**	**97358**	**8470**

Project / Programme Objectives:

Overall Goal

Overall goal of the project is to develop climate adaptive and resilient livelihood systems through sustainable practices and technological interventions in a manner that can be widely adoptable, replicable and up-scalable.

Specific Objective

To enhance the adaptive capacity of vulnerable communities of semi-arid region of Jalna to climate variability by introducing measures to enhance water availability and climate adaptive agricultural practices.

Operational Objectives

1. To provide access to locale specific weather information, forecasts and crop specific agro advisories to farmers and local community to enhance their resilience to weather variability
2. To promote adaptive sustainable practices among the communities to build the capacities of vulnerable communities to cope with and adapt to impacts of climate variability and build up the resilience of local agriculture and natural resource base
3. To sensitize farmers to undertake water budgeting assessments and promote water efficient technologies for the judicious use of water for irrigation to enhance the water availability at village and household level.
4. To generate, document and disseminate the knowledge products to communities, wider public, policy makers and implementing agencies with regard to lessons learnt for future scaling up and replication.

3. Project / Programme Components and Financing:

Sr. No	Project Component	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
1.	Climate resilient agriculture	1.1. Access to local climate information, weather forecasting and agro-advisories provisioning. Locale-specific Crop and Livestock advisories are provided to farmers based on local weather data forecasts enabling them to undertake weather-responsive adaptive crop and livestock management measures 1.2. New low-cost, environment friendly, productivity-boosting and climate resilient agricultural technologies such as the System of Crop Intensification (SCI) are introduced and promoted. 1.3. Weather-responsive integrated crop-water-nutrient-pest and disease management practices that are nature friendly and improve and sustain soil health are promoted. 1.4. The Local Community is aware and adaptive capacity of the local communities is strengthen.	1. Farmers and local communities understand and use weather information for agricultural planning and operations and for preparing for adverse weather-induced events 2. Local agriculture is more resilient to climate variability and risks attenuated and target group communities are aware of and capable of using sustainable climate-responsive agricultural practices	537,205

2.	Integrated water resource management through water budgeting	2.1. Communities sensitized to water availability in their village, undertake water balance and water budgeting assessments at the household and village level. Village plan (inclusive of crop planning) for the judicious use of existing water sources developed and implemented 2.2. Use of water conserving and efficiency enhancing irrigation systems such as micro-irrigation – drips, sprinklers etc., are installed and used by farmers. Construction of farm ponds to harvest rainwater for supplemental irrigation.	1. Communities are aware of the "scarcity value" of water and are enabled to efficiently allocate and manage local water resources so as to secure increased productivity gains 2. Agriculture and agri-based livelihoods are buffered against water stress, reduced water supplies and scarcity arising from climate induced rainfall variability	913,570
3.	Knowledge products generated – for communities, wider public, policy makers and implementing agencies	3.1 Research Papers, Policy Briefs and compendium of case studies are developed and tested. 3.2 Workshops/ conferences/ Policy Dialogues conducted at the local/ state and national level.	1. Knowledge products are systematically generated, documented and disseminated to communities, wider public, policy makers and development agencies 2. Strong, locally-grounded research supports increasingly effective, scaled-up integration of adaptation into development initiatives at the local, state and national levels	115,496
Project/Programme Execution cost				148,796
Total Project/Programme cost				1,715,067
Project/programme Cycle Management Fee charged by the Implementing Entity				145,780
Amount of Financing Requested				1,860,847

4. PROJECTED CALENDAR:-

Sr. No	Milestones	Expected Dates
1	Start of Project Implementation	April 2016
2	Mid Term Review (if planned)	April 2018
3	Project Closing	March 2020
4	Terminal Evaluation	December 2019

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience: -

The project is designed to facilitate climate change adaptation based on an ecosystems approach targeting the most vulnerable groups. The project includes 2 components whose overall objective is to make agriculture, the primary source of livelihood in the country, more resilient to climate change through adaptive practices and surface and ground water management in a manner that can be widely adoptable, replicable and up-scalable.

Component 1: Climate resilient agriculture

Activity 1.1: Access to local climate information, weather forecasting and agro-advisories provisioning. Locale-specific Crop and Livestock advisories are provided to farmers based on local weather data forecasts enabling them to undertake weather-responsive adaptive crop and livestock management measures

Agriculture is weather dependent at the local level. Yet, currently, farmers do not have access to reliable locally relevant meteorological and agricultural information to plan and manage their farming operations (including livestock). Information presently available (from service providers such as the India Meteorological Department (IMD)/Department of Agriculture) is based on inputs from weather stations that are located at District or Taluka places and which are manually obtained. Most advisories cover a large area spanning over 1000 square kilometers. These kinds of forecasting and advisories are largely not useful for farmers as there are large variations of meteorological phenomena within these areas. In the monsoon-driven weather system that is ours, local agro-meteorological conditions, especially rainfall, vary within even a kilometer; and such distantly located weather stations are not able to provide data that can generate locale-specific knowledge and advisories.

<u>a. Installation of Agro Met Stations:</u>

Automated agro-met stations will be placed in 14 project village(1 agromet station for 5 adjacent villages). It will help the farmers to link their agriculture planning and operations to data obtained from their local station. The automated weather stations will help generate village specific advisories. The existing collaboration that WOTR has with the IMD, will be extended to the project area. WOTR has a tie-up with IMD, providing round-the-clock weather information on an hourly basis. The Indian Meteorological Department (IMD), based on this weather information provides WOTR with 3-day weather forecasts for the project area, received online, on a daily basis.

b. Preparation and dissemination of local specific agro advisories :

Based on the local weather data provided, the IMD will generate short-term (3-day) weather forecasts specific to the project area and WOTR will provide crop-specific management advisories based on these forecasts. These advisories will be disseminated through the mobile phone (SMS or voice-enabled services), through the village public information system, wall papers or written on a local 'black board' in the villages. On an average 100 farmers will be provided with advisories per village through SMS and indirectly entire population (through wall papers) will be covered through this service.

c. Preparation of season wise crop calendar:

The season wise crop calendar for 4 major crops in the project area will be prepared. The traditional practices will be incorporated in the calendar.

The overall objective of this component is to sustain agricultural productivity in the face of local weather variability by making local weather data available to the farmers; providing them forecasts of likely weather events; training them to understand and use weather information for agricultural purposes and providing them with agro-advisories based on local weather forecasts. Crop specific good agricultural practices are enclosed as Annexure.

Activity 1.2: Farmers accept and adopt new low-cost, environmentally friendly, productivity-boosting and climate resilient agricultural technologies such as the System of Crop Intensification (SCI)

Low external input techniques will be promoted such as System for Crop Intensification (SCI) for major crops. The System of Crop Intensification (SCI), a successful modification of SRI introduced by WOTR, is based on appropriate crop geometry, increasing organic humus content in the soil, crop-water requirement-based supplemental irrigation and fertigation and pest/ disease management using locally produced bio-fertilisers and bio-pesticides.

This low-input crop production methodology enhances productivity and uses inputs more efficiently, while maintaining the resource base. It appears to withstand some shocks due to climate variability. Derived from the now successful System of Rice Intensification (SRI), SCI has been modified and adapted to various crops. It is a four-pronged approach that is implemented systematically, more so in the case of poor soils. It involves soil preparation and management, crop spacing, systematic application of locally available organic inputs supported with micro-nutrient foliar spray and basal applications to support the plants' enhanced growth. Field trials in various WOTR's project location it has been observed that SCI method increases the plant's resilience and adaptive capacity. The plants are healthier with stronger root system. The plants have high tolerance to heat, high intensity rainfall. Almost all field trials have shown significant impacts in increased agricultural productivity while reducing the cost of production.[16]

[16] Watershed Organisation Trust (2013): Towards Resilient Agriculture in a Changing Climate Scenario, December 2013.

a. Identification and Community Resource Person (CRP): It is proposed that Community Resource Person will be identified from the project villages. CRPs are responsible to provide day to day support to the farmers. 1 CRP will be responsible for 6 adjacent villages. The trainings will be organised for the CRPs on the new technology.

b. Identification and training of lead farmers:

The farmers who will take lead to adopt new technology will be identified in all project villages. The inputs will be provided to them through training programs and in regular meetings. 70 training programs per year will be organised.

c. Demonstrations of Agriculture practices and technology:

The demonstrations of the agriculture practices and technology will be organised in the project area. It is proposed that 140 demonstrations will be conducted per year for first 3 years. The methodology will be suggested for crops like sorghum, Pearl Millet, Chickpea, Wheat, Maize and Cotton, since cotton is major crop of the region.

The results of the demonstrations will be regularly discussed in the meetings. Then successful demonstrations suited for the particular village will be replicated in the 4th year.

The package of practices for system of crop intensification has been developed through crop calenders formulated by WOTR with the support from Central Research Institute of Dry land Agriculture and Agriculture University like Mahatma Phule Krishi Vidhyalay, Rahuri.

The following Package of Practices (POP) for a few crops is proposed. The same will be revised based on the feedback from the farmers and results of demonstrations organised. The chemical fertilisers recommended for the region by the agricultural university are used and in such a ratio that they do not interferes and influence the soil health and fertility.

Activity 1.3: Farmers are familiar with and adopt weather-responsive integrated crop-water-nutrient-pest and disease management practices that are nature friendly and improve and sustain soil health.

The objective is to improve overall agriculture productivity sustainably in the context of variations in local weather patterns. This will include improving soil health through use of organic fertilizers and vermi-compost, as well as improving its fertility through judicious use of micro-nutrients and organic and chemical fertilizers. Integrated nutrient management practices will be promoted. In order to reduce costs as well as chemical residues in crops, integrated pest and diseases management practices will also be promoted.

Integrated Nutrient Management (INM):

In integrated nutrient management farmers will be motivated and guided to prepare and use compost, Vermicompost, other organic formulations like of Jeevamrit (an organic manure prepared by Sun hemp,

Gliricidia, Sesbania), green manuring along with the minimum amount of chemical fertilizers. This helps in increasing soil physical, biological and chemical properties.

Integrated Pest Management (IPM):

IPM is a decision making process that utilizes all available pest management strategies, including cultural, physical, biological and chemical control to prevent economically damaging pest outbreaks and to reduce risks to human health and the environment. IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides.

Use of organic formulation will be promoted like that of Amritpani (prepared from cow dung, cow urine, water, jaggery, neem leaves and flour), Neem seed kernel,Extract (NSKE), Dashaparni (formulation prepared from Tree leaves, cow dung, cow urine). Cultivation of trap crops, installation of pheromone traps, yellow sticky traps etc will also be promoted.

Crop diversification and use of local and indigenous cultivars will be encouraged so as to reduce risk and achieve food and fodder security while simultaneously working towards increasing cash income by also growing of vegetables and cash crops for the market. Indigenous crops are more resilient to climate variations, farmers have better knowledge of handling them, and traditional crops like sorghum, Pearl Millet, Chickpea, Wheat, Maize generally meet the food preferences of communities, making it all the more important to create measures to promote and revive them.

Presently about 60% of the area in the project region is under cotton cultivation and rest under the food crops.

In the recent decades the cropping preferences have changed where people have shifted from food crops to cash crops. In the project villages the area under food crops has reduced considerably. These food crops are sown by a few farmers enough only for home consumption, others depend on market.

The communities will be encouraged to preserve the heirloom varieties of seed banks for the traditional crops like sorghum, Pearl Millet, Chickpea, Wheat, Maize while rotating their stock each year to ensure that adaptability is retained. Revival of these neglected and underutilised crops will help provide familiar dietary diversity to address problems of food security. In fact, these crops acted as ‘famine food’ for tribal and rural communities during times of bad weather conditions and crop failures.

a. Demonstrations of INM/IPM: It is planned to organize 280 demonstrations over a period of initial 3 years.

b. Organization of Farmer field schools: The Farmer’s Field School will be organized for 2 cropping seasons in 35 villages for 4 years. The experts on soil science, agronomy, entomology will provide inputs during the FFS.

c. On field support from experts: 2 days expert (3 experts) visit to cluster twice in a season for 4 years will be organized.

Activity 1.4 : The Local Community is aware and adaptive capacities of the local communities is strengthen.

Unless the village and all sections of the village are actively involved in adapting to the climatic changes, sustainability of the project is in jeopardy from the onset. It is planned to mobilize and capacitate the cluster of villages to address the challenges and problems arising from climate variability and climate change. It is also important to motivate villagers of the project cluster as also others to begin adopting adaptive practices to build resilience and mitigate risk.

a. Awareness and mobilisation activities:

The awareness and mobilisation activities will be organised in all the project villages. It will done through documentary films on the subject, street plays, corner meetings etc. A total of 70 activities for 50 participants will be organised.

b. Exposure visits:

The exposure visit will be organised for the key leaders/farmers/village level Community Resource Person. It is planned to organise 1 visit per 2 villages.

The overall objective is the capacities of villagers and clusters are built up to the extent that they are able to adapt to climate variability/ change in a manner that allows for sustainable and equitable development. The CBOs formed are capable of assessing the challenges posed by climate variability/ nature induced stressors, are able to make decisions and undertake measures that require community level involvement.

Component 2: Integrated water resources management through water budgeting

Activity 2.1: Communities sensitized to water availability in their village, undertake water balance and water budgeting assessments at the household and village level

Water is becoming a scarce resource and this is acutely felt especially in the rain dependent regions where the project is located. And yet, despite the regular water scarcity, there is wasteful use of water in agriculture when it is available. To add to this, rainfall is becoming more erratic and far between; hence there is the need for application of the concept of water budgeting so as to better manage this scarce resource and to obtain ''more crop per drop of water".

a. Water budgeting exercise:

The water budgeting exercise will help the village community to understand the implications of the different patterns of water use that are prevalent and that are likely to be there in near future, if behavior patterns remain unchanged. By obtaining village level water availability data (from measuring the rainfall and that obtained from the well data), the people will be able to assess the water available at their disposal for the coming months to meet the needs of crops, households, livestock and livelihoods.

Taking into consideration these various local claims on water resources in the village will provide a strong basis for making decisions regarding the different and appropriate cropping patterns, area to be taken for

cultivation, the method of application of irrigation water, water use charges, if any, that the community would like to impose, etc. Following activities will be conducted:

- People are made aware of the hydrological cycle and their dependence on it followed by quantifying their annual water? through its component-wise analysis
- Training of community on water budgeting and data collection (agriculture, livestock, and domestic, ground water data, rainfall, land use land cover, cropping patterns).
- Rainfall data is collected either by Automated Weather Stations or government sources.
- Since groundwater is the major source of water post monsoon in semi-arid, communities need training on monitoring their groundwater levels using water level indicator or measuring tape.
- Data will be collected bi-monthly to capture the groundwater fluctuation.

Vulnerability assessments in the project villages revealed the unequitable distribution of water between the large and small and marginal farmers. Since the large farmers have the capacities to dig borewells, they have more access to water resource while small and marginal farmers are completely dependent on rainfed agriculture. The region faces acute water scarcity during summers where most of the villages depend on tankers to meet the water demands.

This exercise will enable them to visualize their water balance of the village and check if the stock can fulfill the current water demands. If yes then they may allocate more water to any of the sector depending upon the need. If the stock does not fulfill the needs of the current plan, then they revisit the plan and reallocate water resources based on the need of the sector. They also plan and implement water efficient methods of water usage at home and in their agricultural fields (micro irrigation methods) to conserve more water and ensure “more crop per drop”. It is proposed to conduct 70 water budgeting exercises per year.

Activity 2.2 Use of water conserving and efficiency enhancing irrigation systems such as micro-irrigation – drips, sprinklers etc., are installed and used by farmers; Construction of farm ponds to harvest rainwater for supplemental irrigation.

A crucial constraint for small and marginal farmers that prevents them from optimizing the productivity of their farms is their inability to invest in water collection, distribution and water saving systems such as wells, farm ponds, pumps, delivery pipes, sprinklers, drips, etc., even where water harvesting or ground water potential exists. Availability, timely access to adequate water supplies and its efficient deployment and use is essential to stabilizing and enhancing agricultural productivity especially in rainfed farming systems where erratic rainfall, long dry spells and unseasonal meteorological events are becoming increasingly the norm.

In order to mitigate these risks, in some of the selected villages, it is proposed that enterprising farmers from the poorer sections of the community will be identified and supported to dig

Farm ponds, adopt sustainable agriculture practices and establish an appropriate cropping pattern integrated with micro-irrigation systems, wherever potential exists. Preference and emphasis will be given to group schemes, wherever possible. Low cost irrigation systems will also be widely promoted.

a. Construction of farm ponds It is planned to construct 420 farm ponds of size 10x10x3 mt as per the field conditions in the project villages, on an average 6 farm ponds per village. The stored water is used for providing critical/protective irrigation mainly for Rabi and summer season. The farm pond is proved to be useful for supplemental irrigation during when there is water stress. The farm pond size is designed to suit for marginal farmers. Land size required is less. The water losses (seepage and percolation) can be effectively reduced by making use of plastic sheet lining. Considering the landholding of marginal farmers, farm pond of size (10 x10 x 3m) is one of the best options for the small and marginal to increase land productivity by providing critical irrigation.

c. Installation of Micro-Irrigation systems:

It is proposed that 1050 micro irrigation sets, on an average 15 units per village, based on the scoping study to be done before the implementation of the components on the basis of wealth ranking, farmer categories, will be installed for major crops. The micro-irrigation system will be decided as per the field conditions and major crop of the village.

The expected outcome of this intervention would be increased agricultural productivity with minimal water use (more efficiency per drop of water) and greater resilience to “dry spells’ or rainfall shortfalls resulting in greater returns.

Component 3: Knowledge products generated – for communities, wider public, policy makers and implementing agencies

In order to ensure up scaling, widespread adoption and replication of successful approaches and best practices, the project will be engaged in a number of activities that include:

- Capturing, archiving and analysis of data and information from the field (pre project, during and post) with a view to identifying impacts (on individuals, households, institutions, structures), processes of exchange and interactions and best practices.

- Informing and providing feedback, learnings and insights to NGOs, villagers, development agencies as well as developmental practitioners on a regular basis.

- Documenting, publicising and informing local groups, our supporter and donors, developmental agencies (private, public, civil society) as well as the general public of the works, interventions, impacts and successes with a view to sharing, informing public opinion and catalysing support. The audio-visual documentation of the processes and learnings will be carried out.

- Engaging with opinion leaders, policy makers and governmental institutions with a view to creating an enabling and conducive framework and environment that would facilitate large-scale adoption and replication of successful approaches and good practices.

The activities involved are:

1. Conducting Action research studies in the project: Research studies will be conducted to support scaled up integration of adaptation into developmental initiatives at the local, state and national level. This will include impact assessment studies, applied research studies on key thematic. It is proposed to conduct 4 research studies and 3 impact assessment studies.

2. Training of public/private/civil sector agencies and conducting workshops: Workshops, seminars, meetings, trainings, etc. will be organised with different stakeholders like government officials, PRI members, CBOs, POs, Groups etc. to facilitate different convergences and raise the general level of awareness regarding the climate issues. The workshops will be organised at state and district levels. 2 training programs per year, 2 state workshops per year and 4 district level workshops will be organised

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and groups within communities, including gender considerations will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Vulnerability Assessment of village communities to climate variability and climate change:

A majority of India's population and the project area in particular, is highly dependent on climate-sensitive sectors (agriculture, livestock etc.) and natural resources (water, biodiversity, grasslands) for survival and livelihoods. Climate Change is directly or indirectly responsible for adversely affecting these sectors by creating negative environmental and socio-economic pressures. Any kind of development planning will therefore need to take into account uncertainty due to climate change.

The first step towards this is to know the problem, namely, Vulnerability. Under this component, assessments would be done to measure the relative degree of vulnerability of a community using the 5-Capitals Framework - Natural, Physical, Social, Human and Financial Capital using CoDriVE (Community Driven Vulnerability Evaluation) set of tools developed by WOTR. The data for this vulnerability mapping is collected with the involvement of the entire community and thus findings would be rooted in the current realities and the most felt-need of the communities. Such assessments would be conducted through focus group discussions involving men, women, youth, and elders of the village.

The following information would be collected and analysed using various tools, some developed by WOTR, in order to identify the most vulnerable groups and resources:

- Past history, current scenario, and responses to problems till date in the village and climate sensitive sector like agriculture for the project area.
- Risks and Adaptive/ Mitigative Resources needed for identified climate risks / vulnerable groups
- Drivers and pressures in climate sensitive Livelihood sectors

During the course of implementation most developmental projects are prone to vulnerability due to different factors arising from changes in socio ecological system and climatic variability. This may lead to varied projected outcomes from anticipated results. It is necessary to assess vulnerability not only during project design and development phase but also during implementation phases. The project aims at strengthening the adaptive capacities of vulnerable communities of the project areas through measures contributing to developing climate adaptive and resilient livelihood systems. The key focus areas are agriculture and water availability which is identified as the major issues of the region. Being the agrarian community with more than 70 percent of the people involved in agriculture, as primary and secondary occupation. The vulnerability assessment at larger scale will help in targeting the participants on the basis of the vulnerabilities identified and resources required to cope with the current and future climate risks.

The initial assessments have identified small and marginal farmers as the vulnerable groups.

Small and marginal farmers: Since water scarcity is one of the major issues in the proposed project areas, climate variability and extreme events like drought adds to the existing pressure on the water resources of the region. These group of farmers depend on rainfed agriculture therefore are more vulnerable to weather vagaries. Locale-specific weather advisories will help them undertake weather responsive crop planning and management. Low input crop production and use of local and traditional varieties will be promoted to reduce the input crops and enhance the productivity. The issue of equitable distribution of water resources for agriculture and drinking purposes, the water budgeting exercises will help in water management at village level.

The project activities will help in generating awareness among the community regarding climate change, impacts and benefits of various adaptation interventions. The project also aims at building the local institutions like village level organizations.

Landless: The land less poor in the regions possess skills related to agri based labour so are mostly depended on climate sensitive sectors for their livelihoods. They either work on the farms owned by large land owners or migrate to nearby villages for the same. Few of them are involved in activities like road construction, soil and water conservation work. But since a large population of landless is dependent on agriculture labour for their work, increased mechanization and continuous failure of crops due to weather variability affect their livelihood and income.

Women: Since earlier times, there is a shift in the workload, in terms of the accessibility and control that women have in households. With the mechanization of agriculture and the inclination to reduce external wage labourers, women's share of the workload in agriculture has greatly increased, besides their regular household chores. Women are involved in farm activities, in irrigation, threshing, cleaning and filling grain into gunny bags, etc. The women belonging to small and marginal and landless households migrate in search of agri based labour in the nearby villages. Decisions regarding choices of crops, seed selection, investments, saving, sale and purchases are taken by male members. In earlier times food crops were grown, where women had some say. During summers or water scarce conditions the women folks have to travel to far distances to fetch water which increases the drudgery.

Scheduled castes and scheduled tribes (SC/ST): The population of ST in the project area is very low however the SCs and a very few STs households belong to either small and marginal farmers or landless land holding categories and therefore have the same vulnerability as that of the above mentioned categories of land owners.

Benefit areas	Key benefits	Baseline scenario
Social	• Social awareness of the impacts of climate change and knowledge of how they can be addressed builds social consensus, empowers local institutions and increases public accountability leading to purposeful and effective adaptive and mitigative collective actions • Increased food, water and livelihood security, enhanced water availability due to efficient water management practices, this will also help help resolve conflicts arising out of inequitable water utilisation/extraction, promote water sharing and a sense of collective responsibility for a scarce resource. • Adaptive capacities of farmers as well as their knowledge and skill base regarding environmentally friendly and productive agriculture is increased thus reducing agrarian stress, enhance the soil fertility and reduce the migration	• The community is not aware of the impacts of climate variability on their livelihoods and the impacts of their current practices on the existing vulnerability of natural resource base and the communities themselves. • Changed cropping pattern has impacted the food and nutrition security, inequitable distribution of water and mismanagement of water resources lead to extreme water scarcity during summers therefore increased drudgery among women to fetch water. • The farmers have shifted to water intensive crop cultivation of resilient traditional crops have reduced considerably. In order to ensure and increase the productivity, utilisation of chemical fertilisers has increased many folds which has resulted in poor soil health. Frequent crop failure due to climate variability and unavailability of water for irrigation force farmers to migrate.

Economic	• Increase in agriculture productivity and decrease in input costs leads to sustainably increased incomes • Agricultural diversification increases resilience and diversifies risks thus reducing losses in the event of extreme hydro-meteorological events, agri-advisories based on local weather conditions helps farmer make more informed decisions on irrigation, pest control etc. leading to better yields and lower input costs • SCI and low external input agricultural practices increase the agricultural productivity from 15-20% and reduce the cost of production by 15% • Improved water use efficiency (through drips, sprinklers etc.) lead to higher productivity (more crop per drop) (20-30%) and incomes • Area under cultivation can increase with increase in efficiency of irrigation (drip /sprinkler)	• Hybrid seeds, chemical fertilisers, investment in bore wells due to increased water demand have lead to input costs go high. Investment in bore wells show huge losses due to the fast declining water tables, adding a lot of financial pressures on the farmers. • The rate of adoption of micro irrigation is very low in the project areas. • With climate change, new pests and diseases are emerging and incidences of such attacks have increased, as shared by the villagers, existing hybrid varieties are not able to with stand this and this lead to huge economic losses due to inadequacy of proper pest management practices.
Environmental	• The water-budgeting exercise helps community to understand different patterns of water use that are prevalent and likely to be in the near future • Water conservation and efficiency enhancing measures lead to lower water requirements (ecological footprint) • Increased groundwater recharge, reduction in the GW draft (this will build resilience towards drought as water GW will be available in the absence of adequate surface water • Due to change in irrigation mode, multiple benefits are expected like reduction in runoff, soil erosion and land degradation • Change in cropping pattern, intensity and diversification will improve the health of the soil also	• Water scarcity and increased demand of water has led to an increase in the number of bore wells therefore over exploitation of ground water. • The region faces extremes of temperature and precipitation variation which affects the water availability and soil moisture. • Local variations in well water yield across small distances can be seen, which lead to localized impacts and variations of drought events on the groundwater resources

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

The total finance required to implement the project activities is US$ 1,848,200. The project will be implemented in 70 villages covering 19722 households. The unit costs proposed are in line with government line departments. Only those project activities are mainly proposed for which there is no/low funding is available.

Comparison of the chosen option *vis-a-vis* alternative options may be given below:

Activity proposed	**Current Addressing Mechanisms and Loopholes**	**Cost effectiveness**
Installation of Agro met stations The unit cost of agro-met stations including operation and maintenance is US $ 12,870	Currently the weather data and forecasts available are at district level which cannot be used for locale specific crop planning. So the uncertainty of meteorological parameters increases the risks of crop loss and increases the vulnerability of the farmers.	Timely locale specific weather information helps reduce the chances of greater cash loss due to as a result of extreme events. The purpose of this intervention is to enhance agriculture production, reduce hydrological stress and mitigate the impact of changing weather patterns by providing farmers with real-time management advisories based on weather and water conditions affecting crops in their village or locality.
Demonstrations of agriculture practices and technology	Existing farming practices involve higher use of inputs such as capital and labour per unit land area. This is in contrast to traditional agriculture in which the inputs per unit land are lower. It includes the use of synthetic chemical fertilizers, pesticides and herbicides and genetically modified organisms.	Due to the extreme dependence on external inputs for farming, the production costs of the crops are very high. Through the sustainable agricultural practices like SCI, IPM, INM the production cost can be reduced by 15% and the increase in income may range between 15 and 20% depending on the crop.
Construction of farm ponds	Existing farm ponds, with high investment cost (US $ 2,245) are designed in a way that leads	The farm ponds are constructed at the lower side of the fields and the runoff from the higher side of the fields are

	to high rate of evaporation.	channelized into the pond. This will help in storing water for agriculture, continuous water availability is a must for agriculture work, preserving and maintaining a perennial source is of utmost importance. The cost of construction of farm pond under the project is US $ 1,044 as against US $ 2,245 under Government programmes
Demonstrations of Micro Irrigation systems	Presently, surface irrigation from dug wells and farm ponds are practiced, incurring huge loss of water and energy.	Micro irrigation will increase the irrigated surface; reduce water losses, as well as labor. It will also help in the efficient utilization of the inputs and better nutrient uptake which helps in increasing the productivity by 15%. The per unit cost of micro irrigation is US $ 417

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

Table Key Policies / Programmes and project elements related to policy:

Project Components	**Mission/Policy**	**Policy / Programme Component**
1.1. Access to local climate information, weather forecasting and agro-advisories provisioning. Locale-specific Crop and Livestock advisories are provided to farmers based on local weather data forecasts enabling them to undertake weather-responsive adaptive crop and livestock management measures 1.2. New low-cost, environment friendly, productivity-boosting and climate resilient agricultural technologies such as the System of Crop Intensification (SCI) are introduced and promoted. 1.3. Weather-responsive integrated crop-water-nutrient-pest and disease management practices that are nature friendly and improve and sustain soil health are promoted. 1.4. Agro-biodiversity is conserved, resilient indigenous cultivars are promoted and	The components of the projects are consistent with that of a) National Mission on Sustainable Agriculture, b) National Policy for farmers,2007 and c) National Agricultural Policy, 2000 **National Mission on Sustainable Agriculture**	**Mission Intervention #2 Water Efficiency** Promoting Water Use Efficiency in Irrigation, Developing mechanisms for integrated management of rainwater, surface and groundwater, Strengthen local institutions in managing water allocation and utilization **Mission Intervention #3 Pest Management** Efficient, safe and environmentally sound methods of pest management, Decision and Information Support Systems for Pest & Disease Surveillance **Mission Intervention #4Improved Farm Practices** Improved agronomic practices to reduce farm losses, Conservation and Precision Farming, Knowledge Management, Soil Conservation, Bio-Fertilizer

farmers adopt diversified and integrated farming systems		**Mission Intervention #5 Nutrient Management** Strengthening services for promoting, production and use of bio-fertilizer,
	National Policy for farmers,2007	Goal 2: To protect and improve land, water, bio-diversity and genetic resources essential for sustained increase in the productivity, profitability and stability of major farming systems by creating an economic stake in conservation
	National Agricultural Policy, 2000	It aims to attain: Growth that is based on efficient use of resources and conserves our soil, water and bio-diversity; Growth with equality, i.e. growth which is widespread across regions and famers; Growth that is demand driven and caters to domestic markets and maximizes benefits from exports of agricultural products in the face of the challenges arising from economic liberalization and globalization

		Growth that is sustainable technologically, environmentally and economically.
2.1. Communities sensitized to water availability in their village, undertake water balance and water budgeting assessments at the household and village level. Village plan (inclusive of crop planning) for the judicious use of existing water sources developed and implemented 2.2. Use of water conserving and efficiency enhancing irrigation systems such as micro-irrigation – drips, sprinklers etc., are installed and used by farmers. Construction of farm ponds to harvest rainwater for supplemental irrigation.	**National Water Mission**	Goal – 4: Increasing water use efficiency by 20% Strategy IV.7 Promotion of water efficient techniques and technologies a Promotion of micro irrigation techniques such as sprinkler and drip irrigation. b Expand "Farmers' Participatory Action Research Programme"
	National Water Policy,2002	Strategy IV.8 Incentivize use of efficient irrigation practices and fully utilize the created facilities a Preparation of appropriate guidelines. b Initiation of actions by the States and other agencies. Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro irrigation (drip, sprinkler, etc.),

		automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive ground water use may also be considered. Use of very small local level irrigation through small bunds, field ponds, agricultural and engineering methods and practices for watershed development, etc., need to be encouraged. However, their externalities, both positive and negative, like reduction of sediments and reduction of water availability, downstream, may be kept in view.
3.3 Research Papers, Policy Briefs and compendium of case studies are developed and tested. 3.4 Workshops/ conferences/ Policy Dialogues conducted at the local/ state and national level.	**National Mission on Strategic Knowledge on Climate Change**	Generation and development of the conceptual and knowledge basis for defining sustainability of development pathways in the light of responsible climate change related actions

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc. -

The project components and activities are all in compliance with existing regulations, standards and procedures endorsed by the relevant state and national government ministries.

The agricultural inputs are prepared in consultation with Agricultural experts from premier research institutes like CRIDA, local universities such as MPKV and the government supported agriculture extension centers like the Farmers' Science Centres (KVKs).

Weather forecasts are prepared by the Indian Meteorological Department which is a part of the Ministry of Earth Sciences.

Activity	Technical Standard	Application to the project	Monitoring
Agromet stations	Technical standards of the instruments to be installed in Automatic Weather Stations	By Project Management unit of WOTR	By Project Management unit of WOTR through regular visits
Agro-advisories and Package of practices for SCI	The crop calendars and package of practices for various crops have been developed by WOTR with the support of Central Research Institute for Dryland Agriculture (CRIDA) and Mahatma Phule Krishi Vidyapeeth (Agricultural University) at Rahuri Standards provided by Agricultural University	By Project Management unit of WOTR	By agronomists and para-agronomists and regional unit of WOTR
Water budgeting	The water budgeting manual and tool prepared by WOTR is based on Ground water Resource Estimation methodology provided by Ministry of Water resources, Government of India, 2009	The Project Management unit and hydro-geologists of WOTR	The hydro-geologist and Regional team of WOTR

Micro irrigation	The Bureau of Indian Standards	The project Management unit and agronomists of WOTR	The regional teams of WOTR
Farm Ponds	The standards provided by Department of Agriculture	The project Management unit and community members	Project management unit of WOTR, hydro-geologists at WOTR

F. Describe if there is duplication of project / programme with other funding sources, if any.

There is no duplication of funding involved. There is no funding for activities proposed except Soil and Water Conservation (SWC) work. Compartment bunds /Farm bunds are the main activity undertaken through Mahatma Gandhi National Employment Guarantee Scheme (MGNREGS). In few villages construction of farm ponds will be done through MGNREGS on demonstrations basis at higher locations having no inlets. The proposed farm ponds will be taken mainly in the lower areas/near streams with proper inlet. Hence there would not be duplication and overlap of activities.

The Integrated Watershed Management Project is being implemented in the district aims at enhancing the natural resource base and improving the livelihoods of the communities. However the components of IWMP do not address building the response climate adaptive capacities of communities against the present and future climate risks. However, the interventions proposed in the current project proposal are focused at building up the adaptive capacities of the communities to cope with climate variability. There is no overlap of the activities suggested in the current project with that of the IWMP.

The WOTR-HUF project on integrated watershed development project that is being implemented in the Jalna district focuses on the soil and water conservation measures such as compartment bunding, farm bunding, and formation of Self Help Groups. In order to avoid duplication of the project activities (if any) the proposed interventions will not be implemented in the same geographical area and separate accounts and documents will be maintained for the same. Where proposed activities will have been already funded by other sources, the same will be not be included in project funding.

Potentially overlapping projects / programes	**Objectives**	**Component and Possible linkages and synergies**	**Geographical coverage**
Integrated Watershed Management Programme(IWMP)	To restore the ecological balance by harnessing, conserving and developing degraded natural	Natural resources management interventions aimed at developing the degraded	Jalna, Ghansawangi, Ambad, Jalna, Badnapur,

	resources such as soil, vegetative cover and water	natural resource base and livelihood improvement	Jafrabad, Mantha,
TERI	The main goal of the project is to assess the enabling conditions for effective community-based adaptation to the impact of extreme events at the community level Objectives: To assess capacity needs and design capacity building approaches to adapt to increased risk and vulnerability of extreme climate events at the community level; To design a full-scale and long-term institutional collaboration program in other states and geographic settings based on participatory research and development approaches tested through the pilot phase	Involvement of stakeholders in research on social and environmental impacts of climate change to foster the creation of policy - relevant knowledge Improved scientific basis and knowledge developed and made available by the project on vulnerability and climate risk management	Jalna District
Integrated Watershed Development Project of WOTR	Securing Water And Livelihoods Through Community Led Watershed Development In Semi-Arid Drought Prone Region of Maharashtra with HUF	Assess and reduce current vulnerabilities of the communities in these villages by increasing adaptive capacities of the community through SWC measures, women's promotion activities.	This project is being implemented in 76 villages of Ambad, Jafrabad and Bhokardan blocks of drought prone Jalna district
Climate Change Knowledge Network for the Indian Agriculture	Relevant agricultural actors on union, state and district level increasingly use information and	Demonstration of sustainable agricultural practices for climate	Maharashtra, only in Ahmednagar district,

(CCKN-IA) (GIZ-WOTR)	extension services provided by the CCKN his approach covers the piloting of federal climate change knowledge networks by a variety of state and non-state actors on district, states and union level	change adaptation in the pilot project areas	Jharkhand, Orissa

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned. -

In order to ensure up-scaling and widespread adoption and replication of successful approaches and best practices, it is necessary to (i) Disseminate the learning's and insights acquired as widely as possible amongst developmental agencies (ii) Enter into collaborative arrangements and partnerships with agencies that can provide synergies(iii) Build the human, technical and institutional capacities of existing and prospective partners and (iv) Engage with policy and governmental actors so as to create an enabling and conducive framework and environment.

With a view to realising sustainable outcomes at the field level, generate practice-oriented knowledge; contribute to up-scaling of successful approaches and practices as well as replication on a large scale, a dedicated documentation, research and communications team would be set up. The mandate of this team would be:

1. To capture, archive, analyse data and information from the field (pre project, during and post) with a view to identifying impacts (on individuals, households, institutions, structures), processes of exchange and interactions and best practices.

2. To inform and provide feedback, learning's and insights to the implementation units as well as partners/ other developmental practitioners on a regular and periodic basis.

3. Document, publicise and inform the target groups, our supporter and donors, developmental agencies (private, public, civil society) as well as the general public of the works, interventions, impacts and successes with a view to sharing, informing public opinion and catalysing support.

4. Engage with the opinion leaders, policy makers and governmental institutions with a view to creating an enabling and conducive framework and environment that would facilitate large-scale adoption and replication of successful approaches and best practices.

5. Collaborate with national and international institutions and agencies with a view to mutual learning, capacity building, technology transfer and collaborative undertakings.

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

Consultations were conducted before and during the concept proposal preparation (Table 5). WOTR's field studies using tools such as CoDriVE Livelihood assessment and CoDriVE Programme designer were conducted with the communities to understand the problems, stress and resources.

Stakeholder consultations involving Block development officer, taluka agricultural officer, district collector were conducted in different rounds. Key points that were discussed were the climate risks, region's vulnerability to climate change, climate change adaptation and proposed project activities.

The vulnerability assessment revealed that that the major issue in the region is water scarcity and equitable distribution of water especially among the small and marginal farmers, the project components will help in addressing the issue of water scarcity, water management for equitable distribution of water resources. This will also help enhancing the water availability that will help provide more livelihood options for the landless who otherwise have to migrate in search of agri based labour work as people take crops only during Kharif season.

The another issue that results revealed was decreasing trend of growing traditional crops, the women shared that it affects their health and the labour in the farm has increased. The project aims to promote traditional practices that would help in addressing the issues. Involvement of women in decision making during the project implementation would be ensured and their capacity would be built through trainings and exposure visits.

Table 4: Stakeholder consultations undertaken during project preparation:

Sr.No	Date	Place	Objective	Participants	Outcome
1	9.5.2014	Jalna	Discussion about the proposed project and project components	Chief Executive Officer, Zila Parishad Jalna	Recent climate risks and proposed components were discussed.
2	12.5.2014	Jalna	Discussion about the proposed project and project components	Deputy Collector (Employment Guarantee Scheme) and Maharashtra Rural Employment Guarantee Scheme cell officials	Issues related to climate change adaptation in agriculture sector was discussed

	13.5.2014	Bhokardan	Discussion about the climate risks and climate change adaptation	Block Development Officer	Introduction of proposed project and project components to enhance the adaptive capacity of rural communities were discussed.
3	14.5.2014	Jalna	Discussion on Vulnerability and Adaptation Efforts	Taluka Agriculture Officer, Jalana and Jafrabad, Circle Agriculture Officer, Jalna, and Village community	Discussion on recent climatic hazards in the district like hailstorms in March, Drought conditions in 2013 (Jan- June). The adaptation efforts undertaken by community, support provided by government line department were discussed Current requirements /immediate efforts for sustainable agriculture practices and water management were discussed.
5	16.5.2014	Mantha	Support by Agriculture department in recent climatic hazards	Taluka Agriculture Officer, Circle Agriculture Officer, Talni and Village community	Different programs/ activities implemented by other agencies during hazards were reviewed Planning (survey of damage) and implementation process, Selection of beneficiaries were discussed
6	21.5.2014	Aarad kheda, Jafrabad	To orient about the CCA concept and proposed project	District Collector	He has visited one of the ongoing projects of WOTR. The proposed project, components and intended results were discussed.
7.	09-06-2014	Jafrabad	To assess the vulnerabilities of the communities	Representatives from VDCs, and various farmer categories, women, children, SC and STs households	Impacts of climate variability on their livelihoods, their coping mechanisms to deal with the existing climate risks
8.	10-06-2014	Jafrabad	To assess the vulnerabilities of the communities- Women, landless and Small and	Women and men representatives from the households belonging to these categories	Differential vulnerabilities, mechanism to cope and resources required by them to cope and adapt to climate variability

			marginal farmers		
9.	21-10-2014	Jafrabad, Ambad, Bhokardan	vulnerabilities of the communities- Women, landless and Small and marginal farmers	Community members	Impacts of climate variability, discussion on proposed projects

I. Provide justification of funding requested, focussing on the full cost of adaptation reasoning:

1. *Component I: Climate resilient agriculture Baseline Scenario:*

Agriculture is weather dependent at the local level. Yet, currently, farmers do not have access to reliable locally relevant meteorological and agricultural information by which to plan and manage their farming operations. Information presently available (from service providers such as the IMD/ Dept of Agriculture) is based on inputs from weather stations that are located at taluka places and which are manually obtained. In the monsoon-driven weather system that is ours, local agro-meteorological conditions, especially rainfall, vary within even a kilometer; and such distantly located weather stations are not able to provide data that can generate locale-specific knowledge and advisories.

Triggered by a demand for cash flow, smallholder farmers have shifted from low-water requiring food crops (e.g. sorghum, millets, pulses) to market-driven water-intensive mono-cultivation cash crops This choice has led to the loss of good practices such as crop rotation, inter-cropping, and mixed farming, while soil health deteriorates. Furthermore, the shift has a huge negative impact on the food and nutrition of the poor farmer. The trend of repeated mono-cropping, with the increasing requirement of chemical fertilisers and pesticides, has been cited as the cause of the deteriorating soil quality, poor water-retention capacity, decline in productivity, and ever-increasing input costs, by farmers in Maharashtra

Adaptation Alternative:

Automated agri-met stations will be placed in 14 villages. It will help the farmers to link their agriculture planning and operations to data obtained from their local station. The automated weather stations will help generate village specific advisories. The support of the IMD and Agri University will be taken for this. The information will be displayed on a local 'black board' for the villagers and will be disseminated through SMSs to the individual farmers.

Sustainable agriculture practices will help in improving soil health and soil fertility, improving soil moisture storage capacity, crop diversification, reducing energy consumption, minimizing risk, making agriculture more nature-friendly and climate resilient and reducing external inputs as well as costs, while enhancing productivity. This will not only help in enhancing the overall productivity but also help improving soil health through use of organic fertilizers and vermi-compost, as well

as improving its fertility through judicious use of micro-nutrients and organic and chemical fertilizers. Integrated nutrient management practices will be promoted. In order to reduce costs as well as chemical residues in crops, integrated pest and diseases management practices will also be promoted. Crop diversification and use of local and indigenous cultivars will be encouraged so as to reduce risk and achieve food and fodder security while simultaneously working towards increasing cash income by also growing of vegetables and cash crops for the market.

2. *Component II: Integrated water resource management through water budgeting*

A. Baseline Scenario:

Water is becoming a scarce resource and this is acutely felt in the project area, despite a higher average annual rainfall, the local inhabitants still face water scarcity during the summer. And yet, despite the regular water scarcity, there is a wasteful use of water in agriculture when it is available. To add to this, rainfall is becoming more scarce and far between; hence there is the need for application of the concept of water budgeting so as to better manage this scarce resource and to obtain more crop per drop of water, after meeting the needs for humans and livestock.

A crucial constraint for small and marginal farmers that prevents them from optimising the productivity of their farms is their inability to invest in water collection, distribution and water saving systems. Availability, timely access to adequate water supplies and its efficient deployment and use is essential to stabilize and enhance agricultural productivity especially in rainfed farming systems where erratic rainfall, long dry spells and unseasonal meteorological events are becoming increasingly the norm.

Adaptation Alternative:

The water budgeting exercise will help the village community to understand the implications of the different patterns of water use that are prevalent and that are likely to be there in near future, if unchanged. By obtaining village level water availability data (from the rainfall and that obtained from the well data), the people will be able to assess the water available at their disposal for the coming months.

Taking into consideration these various local claims on water resources in the village will provide a strong basis for making decisions regarding the different and appropriate cropping patterns, area to be taken for cultivation, the method of application of irrigation water, water use charges, if any, that community would like to impose, etc.

In order to mitigate these risks, it is proposed that some enterprising farmers from the poorer sections of the community will be identified and supported to farm pond with drip/sprinkler – water saving devices to adopt sustainable agriculture practices and establish an appropriate cropping pattern integrated with a micro-irrigation system, wherever potential exists. The expected outcome of this intervention would be increased agricultural productivity with minimal water use (more efficiency per drop of water) and greater resilience to “dry spells’ or rainfall shortfalls resulting in greater returns.

3. Component III: Knowledge products generated – for communities, wider public, policy makers and implementing agencies

Baseline For the sustainability of interventions, replication and upscaling of good practices, sharing of the existing knowledge and success and failure is required at local, regional, national and international levels. There is a lack of documentation of the projects at implementation and post implementation which constraints the outreach of the information at various levels.

Adaptation Alternative

The project will ensure dissemination of the learning/outcomes from the project through at various levels and to the different stakeholders. Capturing, archiving and analysis of data and information from the field (pre project, during and post) with a view to identifying impacts (on individuals, households, institutions, structures), processes of exchange and interactions and best practices. Informing and providing feedback, learnings and insights to NGOs, villagers, development agencies as well as developmental practitioners on a regular basis will be carried out. This will help in policy advocacy, upscaling and replication of the good practices and learning from the failures.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project.

WOTR has a clear and strong mandate to build the capacities of villagers and developmental agencies (from all sectors) so that rapid up-scaling and replication of successful models and interventions that sustainably impact poverty can take place. The guiding belief at WOTR is that people must become "architects of their own destinies" and must be in the driver's seat of all developmental interventions. For this to happen, a number of a number of steps are taken such as:

1. Villages are involved fully in assessing their vulnerability to climate change using the 5 capitals framework. Various participatory tools as well as those developed by WOTR in this regard are deployed for this purpose.

2. Based on this resource assessment and vulnerability, risks are identified and the village community discusses how to address it using resources that they have access to as well as exogenous resources that they can draw upon.

3. Village Envisioning exercises are conducted wherein the data obtained from the various participatory exercises as well as Needs Assessment obtained through a gender disaggregated process are used by the community to construct an "ideal" on how they would like their village, as well as their own lives, to be in the next 5 to 10 years. They are then assisted to work out a plan of action involving interventions, expected outcomes, timelines, resources required, resource providers and agencies/ parties responsible for plan execution.

4. The villages are then organized into a representative Village Development Community (VDC) using the Wasundhara approach developed by WOTR wherein all social groups, including women, as well as

geographical areas, are effectively represented. The VDC becomes the sub-committee of the Gram Panchayat thus ensuring social and political legitimacy, as well as main streaming the project into the local developmental framework and network.

5. This VDC supported by the grampanchayat will be responsible for planning, organizing, implementing and maintaining the project in the post project period. Financial and the other resources meant for the project will be managed by the VDC who will be responsible to the community, the authorities, the funders and WOTR. The VDC will execute the governance and management plan approved by the community and enforce compliance of agreed upon rules and regulations to ensure successful project implementation and maintenance. WOTR will play the role of facilitator, capacity builder, knowledge manager, net worker and linkage builder for the community.

6. Robust transparency and accountability enhancing systems, aided by technology where required, will be put in place at all levels in the project.

7. Since the approach of the project will be inclusive with a preferential focus on the poor in terms of asset acquisition and project benefits, existing and likely- to- arise conflicts will be mitigated , resolved and managed so that program can be implemented smoothly and its outcomes realized.

8. By design, the project will be linked into the local governance and development structure so that during and in the post project period, the villages can benefit from existing govt. schemes and programs and avail of new ones that may arise in the future.

9. All the agricultural and water resources activities are maintained by individuals/group of individuals. The proposed activities will result in reviving the natural ecosystem and therefore enhanced food and income security which will encourage people to sustainably manage the resources and therefore ensure the further deployment of the proposed activities.

10. “Nothing succeeds like sustainable success” and success attracts attention and resources. The project will undertake knowledge management activities, dissemination of best practices and learning’s and engagement with policy makers and resource provisioning agencies at the local, state and national level. This would motivate other villages and developmental agencies to undertake similar activities and also facilitate the creation of an enabling policy climate that would result in official support and greater resources (public and private) flowing into adaptation initiatives. It would also draw attention to the successful project villages and incentivize the villagers/beneficiaries to maintain, build on and further develop project created assets.

Expected Concrete Output	Sustainability Measures	Institutions to be involved
1.1 Access to local climate information, weather forecasting and agro-advisories provisioning. Locale-specific Crop and Livestock advisories are provided to farmers based on local weather data forecasts enabling them to undertake weather-responsive adaptive crop and livestock management measures	Linkages with line department and CSR, insurance companies to find out the resources to continue operational and running costs for AWS- Agro advisories. Development of commercial self-sustainable module for agro advisories. Collection of fees from Farmers for agro advisories through mobile SMS. (Rs.100/crop/season) Capacity building of Village volunteers for daily operations and maintenance	Indian Meteorological Department (IMD), the Central Research Institute for Dry land Agriculture (CRIDA), the State Agriculture University, Insurance companies and CSR
1.2 New low-cost, environment friendly, productivity-boosting and climate resilient agricultural technologies such as the System of Crop Intensification (SCI) are introduced and promoted.	Experience sharing workshops at cluster level to replicate the successful case studies, Dissemination of information about successful case studies. Organization of farmers in Groups like Farmers Club, Producers Company etc., to access the similar kind of services and schemes form Line departments	Agriculture Departments Krishi Vigyan Kendra (KVK), Agriculture University, local Agriculture Colleges, NABARD, Lead Banks, and Seed companies
1.3 Weather-responsive integrated crop-water-nutrient-pest and disease management practices that are nature friendly and improve and sustain soil health are promoted.	Promotion of commercial model at village level. Entrepreneurship development. Periodic impact monitoring of use of such practices. Publicity of successful farmers.	Agriculture Department, Agriculture University, KVKs

	Sharing of Vermi culture and Vermi wash with other farmers	
2.3. Communities sensitized to water availability in their village, undertake water balance and water budgeting assessments at the household and village level. Village plan (inclusive of crop planning) for the judicious use of existing water sources developed and implemented	Yearly Water budget and crop planning in Gramsabha. Capacity building of leading farmers, village level Volunteers and School Children's.	Gram Panchayat, ZilhaParishad ZP (PRI), Agriculture department. Ground Survey and Development Agency (GSDA)
2.4 Use of water is conserving and efficiency enhancing irrigation systems such as micro-irrigation – drips, sprinklers etc., are installed and used by farmers. Construction of farm ponds to harvest rainwater for supplemental irrigation.	Enforcing Social discipline for judicious use of Water-non promotion high water intensive crops, bane on bore wells, ban on use of bore well water to fill the farm ponds, ban on big size farm ponds etc.,. Linkages with line department to increase use of improved irrigation and protective systems	Grampanchayt, Gramsabha, Agriculture Department, Agriculture Universities Irrigation Agencies, NABARD, Lead banks
3.5 Research Papers, Policy Briefs and compendium of case studies are developed and tested.	Inclusion of various findings and recommendations in Post project development plans/Exit policy.	Agriculture university, ZP, District Planning Office, Research Institutes, GSDA

	Lobbying for inclusion of the learning's in District Perspective Plans. Long term project impact evaluation studies	
3.6 Workshops/ conferences/ Policy Dialogues conducted at the local/ state and national level.	Linkages of CBOs with knowledge management institutes and networks for constant knowledge sharing.	Agriculture Department, IMD, Research Institutes, KVKs, Agriculture Universities, NGOs, Academic Institutes, Press and Media

The Automated Weather Stations (AWS) will be installed in place, where neighbouring farmer/ family is willing to take care of the unit. This will be also one of the key criteria's to select location for the AWS.

The weather information obtained from the village based AWSs is displayed daily on black boards at accessible places in the village, by village youth who have been trained to read the weather data. This helps inform farmers to actual local weather conditions and alerts them to likely problems that may arise for their farms and livestock. Initially the services of this local youth will be supported by Project. During the project implementation, the 'self-sustainable module' will be developed for sustainability of the AWS. Linkages will be established with various stakeholders (CSR, Insurance Company, Govt programs/scheme etc,) to avail the support to sustain this activities. Under this module, small service charges from farmers will be promoted. The AWS Instrument will be officially handed over to Village Development Committee (VDC), which is a subcommittee of Gram Panchayat. The asses will be recorded in dead stock register of GP. During the project period, the maintenance agreements will be made with service provider (installation agency). The consent of land owner (Agro mate station) will be made to ensure the safety and location of the unit. It will help to avoid the unexpected conflict issues in future. It will a separate VDC portfolio Management to monitor the operation and maintenance of AWS. The VDC will also ensure the security of unit. It will become the agenda of VDC meeting.

The Assets created under agriculture development sector will be monitored on regular basis through regular project monitoring visits, Gram Sabha. The list of beneficiaries will be displayed at public places for more transparency. This list will be shared with Line departments to avoid the double funding. Appropriate contribution will be collected from the beneficial farmers. It will help to build the ownership towards the project activity.

All above strategies will be the part of 'Offer Letter" to the Gram panchayat. It will have clear idea about the roles and responsibility of stakeholders in project implementation as well as post project management.

The VDC and other CBOS will be trained on project management issues. It will include the inputs on project planning, execution, linkage building etc. They will also train on planning and management of post project activities.

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

Checklist of environmental and social principles	**No further assessment required for compliance**	**Potential impacts and risks – further assessment and management required for compliance**
Compliance with the Law	The project complies with Environment (Protection) Act, 1986	None
Access and Equity	• The project provides fair and equitable access to the project beneficiaries and will not be impeding access to any of the other requirements like health clean water, sanitation, energy, education, housing, safe and decent working conditions and land rights. • The project has the component of regular water budgeting that ensures equitable water distribution to beneficiaries. Efficient water use will result in reducing waste thus enhancing the availability to beneficiaries and others. • While the project will provide benefits to all the target communities, preference would be given to small and marginal landholders, women and the landless	None
Marginalized and Vulnerable Groups	The beneficiaries of the project will be those vulnerable communities of the project area that are at higher risks to climate change due to their low adaptive capacity like small and marginal farmers and landless. The major issue with the small and marginal farmers like that of equitable distribution of water resources will be addressed through the interventions. Efforts to involve them in various exposure visits and trainings will be made through the project The components also address the issues raised by the women during various stakeholder consultations, improved accessibility of water will help reducing the drudgery and their participation in village meetings, trainings will be ensured during the implementation of the project	None
Human Rights	The project does not foresee any violation of human rights	None

Gender Equity and Women's Empowerment	Project would ensure participation by women fully and equitably, receive comparable socio-economic benefits and that they do not suffer adverse effect. Women will be motivated to participate through their involvement in SHGs and the apex body of all SHGs at the village level – the Samyukt Mahila Samiti (SMS). The SHGs will work not merely for savings and credit and income-generating activities, but they will be motivated to address their other development needs. Gender mainstreaming will be addressed across the project. The components of agriculture and water resources address the issues raised by women about the importance of traditional food crops and collection of water. Encouraging farmers to take traditional food crops will help in achieving the food and nutrition security and efficient management and usage of water will help improve the water availability in the village. The communities will be sensitized about the interventions and their impacts on men, women and both before the implementation of the project.	None
Core Labour Rights	Payments to labour under the project will be made as per Government approved norms duly following minimum wage rate and hence ensuring core labour rights.	None
Indigenous Peoples	Not applicable to this project as the population of scheduled tribes is very less and mostly the scheduled tribes in the project area belong to landless household so their vulnerabilities will be dealt as that of those belonging to the same category-landless	None
Involuntary Resettlement	The project does not displace any community and hence issue of resettlement does not arise. Interventions proposed are implemented at farm and individual level and are not likely to cause any involuntary resettlements	None
Protection of Natural Habitats	Project does not affect any of the natural habitats	None
Conservation of Biological Diversity	The project does not affect biodiversity in any adverse way. The project proposes to conserve agro-biodiversity; resilient indigenous cultivars will be promoted. The project will not be introducing any exotic or invasive species of crops/animals in the project area. Component I, Activity 1.3 specifically aims at promoting of biological diversity, these interventions proposed include promotion of traditional crops like Sorghum, Pearl Millet, Pulses while simultaneously working towards increasing cash income by also growing of vegetables and cash crops for the market.	None

Climate Change	The project is basically for enhancing the adaptive capacity and building up the resilience and is not expected to contribute to GHG emissions. The emphasis on organic inputs and low external input agriculture will in fact contribute to carbon sequestration and mitigation.	None
Pollution Prevention and Resource Efficiency	Many activities suggested in the project will prevent pollution and improve efficiency of resource use.	None
Public Health	No adverse impact on public health related issues is envisaged.	None
Physical and Cultural Heritage	No adverse impact on cultural heritage related issues is identified	
Lands and Soil Conservation	Many of the sustainable agricultural activities in the project are aimed at enhancing the soil quality like bio fertilizers and organic manures etc. and reduce runoff therefore resulting in land and soil conservation. The chemical fertilizers that are used are recommended by the agricultural university and are used in such a proportion that they do not deteriorate the soil health.	None

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

Village development Committee (VDC) formed by gram Sabha is responsible for participatory planning, implementation, monitoring and maintenance of the project activities in the respective village. This committee will work under supervision and control of the GP and will be accountable to the Gram Panchayat and Gram Sabha. WOTR is responsible for overall project planning and implementation. The detailed roles of involved project stakeholder are as follows:

Village Development Committee (VDC):-.

The Village Development Committee (VDC) is the key village institution and the primary body responsible for development at the village level. The VDC is in charge of managing the implementation and enforcement of the Village Vision and other community development actions.

The VDC resolves conflicts between villagers, enforces other steps of the development process, and mobilises villagers to contribute time, labour and resources to their village's development.

The VDC represents all village stakeholder groups (social, economic, and geographic) and each member is accountable to his/her constituency for his/her performance and transparency. To promote gender equality, 50% of the seats on the VDC are reserved for women. The VDC as a body is a sub-committee of the Gram Panchayat (GP), and is accountable to the GP for its performance and finances. However, it should be independent of all political ties.

Members of the VDC are elected by the adult members of village families through a system of wards and serve 2-year terms. Members can be re-elected by their wards, but WOTR strongly encourages rotational membership and rotation of the leadership positions (President and Secretary). The size of the VDC is determined based on the size of the village or cluster of villages it represents and generally ranges form 7-19 members.

Roles and Responsibilities of VDC

The VDC is an important village institution and has many roles and responsibilities. The base-line roles and responsibilities are as follows, but each village may always decide collectively to assign further duties to the VDC. The VDC will:

1. Mobilise villagers to participate in the project activities
2. Plan, implement, and monitor the project activities
3. Keep relevant records of their meetings, decisions, actions, expenses, etc.

4. Regularly report on their activities in the Gram Sabha and to WOTR
5. Conduct regular monitoring and evaluation activities in the village with the support of the WOTR team, including yearly Project Impact Monitoring (PIM) and quarterly Qualitative Assessment Matrix (QAM)
6. Build linkages with government departments and other service providers.

Cluster level committee (CLC):

The purpose of the CLC is to provide cluster level platform to VDCs to identify and sort out the cluster level operational as well as for post project issues. It will also help to agriculture extension service and to access the guidance and assistance from various line departments and institutes. Cluster Level Committee of project (CLC) will be constituted drawing **two (one male and one female)** representatives from each VDC of the Cluster. CLC Members may be selected in a joint VDC meeting (in presence of WOTR). Prior to the, selection of the members for CLC, the concept of CLC will be shared with VDCs. The VDC resolution will be taken in support to selection of the members. CLC office bearers will be Chairman, a Vice Chairman, and Secretary.

Roles and responsibilities:

1. Conduct quarterly Review and follow up meetings with project team to facilitate the project implementation.
2. Suggest appropriate methodologies and strategies for replication of successful project interventions on large scale in cluster village.
3. Facilitate the effective functioning of Community Based Organisations (CBOs) at project level.
4. Find out opportunities for Agriculture development and marketing issues. This committee will also establish the marketing linkages for products in cluster.
5. CLC will provide forum for linkages with various government departments, agencies, practitioners etc,
6. Provide Issue base support to CBOs in cluster to resolve the any issue.

Gram panchayat:

Gram Panchayat (GP) is the legal governing body at village level. The Village Development committee (VDC) will be the subcommittee of the GP. Being as a subcommittee, the VDC has to report the GP about its planning and progress on regularly basis.

The GP will provide necessary resolutions in favour of project for various purposes like consent for project implementation in village, signing the letter of offer, guidance and moral support to VDC in its functioning etc.,. The overall function of GP is monitored and facilitated by Gram Sabha. The project annual action plans as well as progress reports will be presented in Gram Sabha for its authentication.

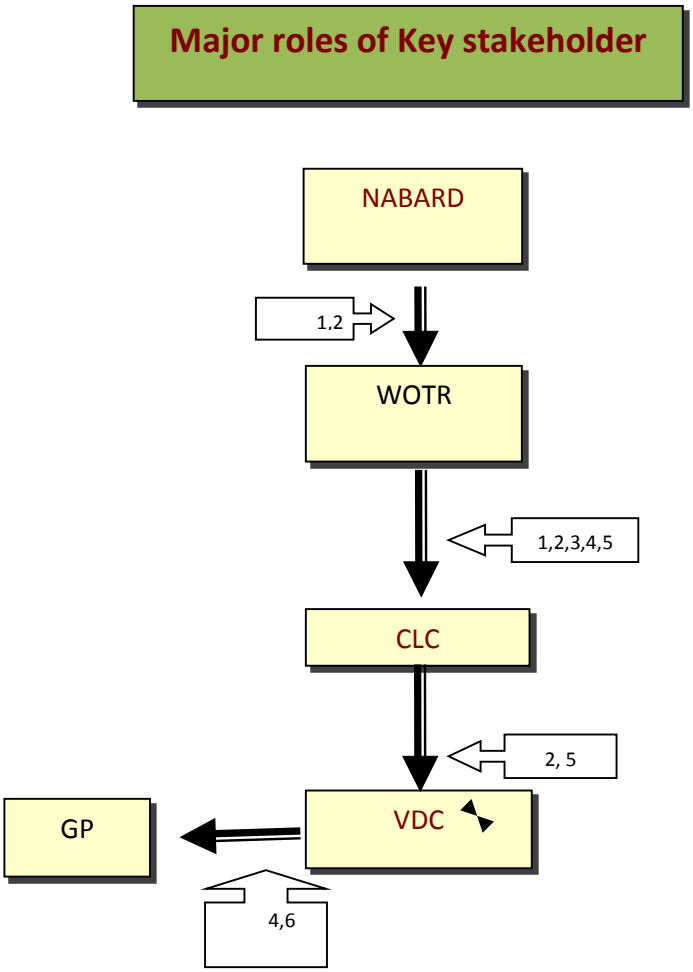
NABARD:

The NABARD will provide financial as well managerial support to the project activities. NABARD will also provide necessary monitoring support to the project. The project will be administered by Pune RO.

WOTR:

WOTR will be responsible for overall project management and effective project implementation. As a specific role, WTOR will provide technical and Managerial support to implementation of the project activities .The technical support will be including the proper selection of farm pond, wells as per the technical parameters. The managerial support will be including the prepare and follow up of Annual Action plans, Periodic reviews of these plans, Facilitating the convergence and linkages etc.

WOTR will conduct capacity building activities through various training programs for different project stakeholders. Village level, as well as cluster level training programs will be organised to build the project planning and management capacities of VDC and CLCs. WOTR has developed the Participatory Monitoring tools for quality participation of the community in project implementation. These tools will be applied. A dedicated team of experts in required disciplines will be appointed at regional level. This team will facilitate and monitor the implementation processes. The regular and need base monitoring support will be provided by monitoring team of head office.



1. Technical & Managerial Support
2. Financial Support
3. Capacity building support
4. Monitoring Support
5. Facilitation Support
6. Information Sharing

B. Describe the measures for financial and project / programme risk management.

Expected Risks	**Perceived Risk Level**	**Proposed Mitigation Measures**
1. Weather forecasts provided by the IMD do not prove accurate enough	Medium	Since field data is provided daily from project villages and 3 day weather forecasts are updated daily, error levels will be progressively reduced.
2. Gaps may exist in the mobile networks resulting in low connectivity and farmers not receiving regularly the SMS based advisories	Low	Multiple dissemination and communication channels will be used especially the public address system in project villages thus ensuring that advisories are accessible to all on a regular basis.
3. Farmers do not adopt integrated, environmentally-friendly and climate adaptive agricultural management practices or do so unsystematically	Low to Medium	Intensive mobilisation and engagement with farmers will be undertaken combined with on-farm demonstrations, use of Farmer Field Schools, technology demonstrations using locally available organic inputs for fertigation, pest and disease management, regular on-site extension support, thus ensuring that farmers progressively adopt the desired practices.
5. Drought or scanty rainfall results in decline in agriculture output.	Medium to High	This will be mitigated by undertaking intensive campaigns on “water budgeting”, promotion of water harvesting structures like farm ponds and in-situ conservation measures like farm bunding and use of conservation irrigation technologies like drip and sprinkler systems
6. Adequate support from the local leadership and governmental departments is not forthcoming	Low	The project will engage with the local administration, self- government bodies (the Panchayat Raj system), elected representatives and local line departments to ensure convergence of interests and access to developmental schemes and services.

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

The project is categorized as "Category C" with no adverse Environmental or Social Impacts and hence no additional measures for risk management are envisaged. The project activities involve organic, low external input agriculture and efficient water management practices that not only enhance the adaptive capacities of the beneficiaries, but also provide resilience to the ecosystem of the region against future climate risks. Even though the project is classified as "Category C" project and is not envisaged to pose any risks indicated under Environmental and Social Policy of Fund, risks if any that may arise during the project implementation would be mitigated as indicated below:

- Project implementation teams would be sensitized on all the aspects pertaining to E&S risk assessment.
- NABARD Regional and Head Office would identify specific risks that may arise during implementation based on the monitoring of the project and built in reporting mechanism for the same
- Community including Cluster Level Committees and Village Development Committees would be sensitized on contents under Environmental and Social Policy of the Fund.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

Primary stakeholders and their representative institutions will play a key role in this process. Monitoring here is an instrument for the stakeholders to understand whether the activities are executed as planned and if the desired results have been achieved.

1. At the village level: The VDC and Gram Panchayat will be responsible for the monitoring of the project in their village. The Qualitative Assessment Matrix (QAM) will be done. The Qualitative Assessment Matrix (QAM) helps understand and grade the qualitative progress of the project interventions and local institutions. This is done on a six monthly basis where the villagers assess their own achievements and lacunae facilitated by the WOTR field team.

2. At Cluster Level: The Peer Group Assessment (PGA), where representatives from each of the project villages/ Clusters assess each other's work, will be done at least twice during the course of the project.

This is necessary so that the cluster "own" the project, acquire a sense of healthy competition and efficiently implement it for their own immediate and long term benefit.

3. At Field Project Level: Supporting both the villages and the Clusters will be the Project Field Team of WOTR who will provide continuous handholding, knowledge transfer and monitoring.

4. At the Overall Project Level: The head office Team of WOTR based at Pune / Ahmednagar and Regional Resource Centre based at Aurangabad will support the Project Field Team by regularly reviewing the

progress and the quality of the project on the ground against established benchmarks and will provide subject matter, specialist guidance and technology support as required.

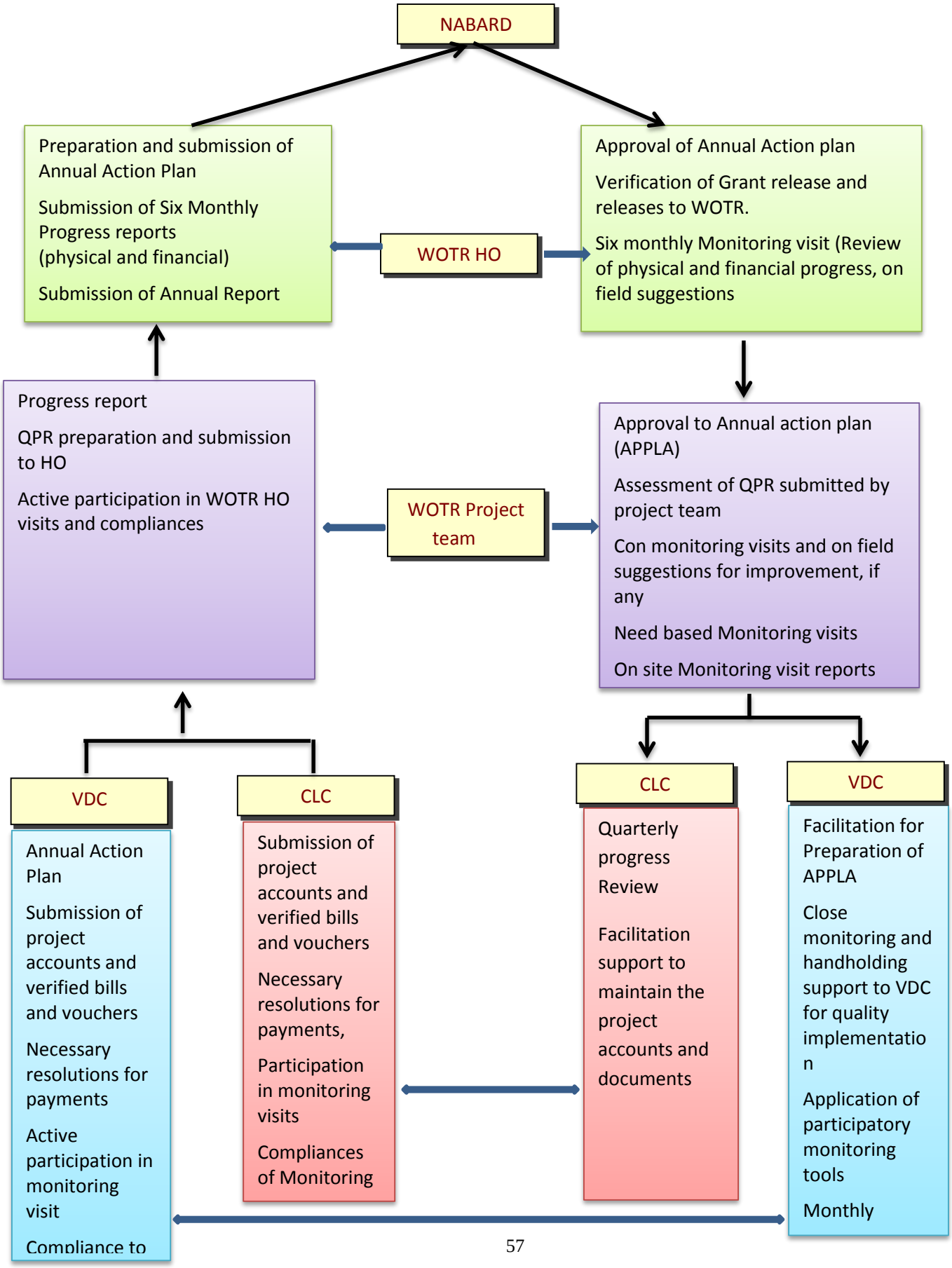
5. Technology assisted tools such as GIS, Remote Sensing and GPS will be used for monitoring and ground truthing. This will be required to assess the impacts on the ground. The services of other institutes will also be taken as and when required.

6. NABARD will also conduct periodic monitoring of the project.

The project team will submit the monthly Progress Reports to WOTR head office as well as demand for grants for project activities. The WTOR head office team will conduct the concurrent monitoring to verify the progress report as well as the demand. In house developed software's and MIS will be used for proper data management.

WTOR will submit the monthly physical and financial progress reports to the NABARD.. The audited statements on yearly basis will be submitted to the NABARD

Reporting Structure



E. Include a results framework for the project proposal, including milestones, targets and indicators.

Project Strategy	Indicator	Baseline	Target at end of Project	Source of verification	Assumptions
Project Objective: To develop climate adaptive and resilient livelihood systems through sustainable practices and technological interventions in a manner that can be widely adoptable, replicable and up-scalable	Percentage of people adopting sustainable agricultural ,water management practices and getting benefitted by technological interventions	Less than 5% of people practice sustainable practices	60% of the target households are 1) benefitted by weather forecasts and agro advisories 2) Practice adaptive sustainable agricultural 3) Budget water resources in their village and collectively manage the water resources	Baseline and end line surveys. Application of WOTR's tool at regular intervals	Climate risk information and agricultural demonstrations convince the communities of the need to and possibility of adaptation at household and community level
Component 1: Climate resilient agriculture					
Outcome 1: Farmers and local communities understand and use weather information for agricultural planning and operations and for preparing for adverse weather- induced events					
Output 1.1 Access to local climate information, weather forecasting and agro-advisories provisioning. Locale-specific Crop and Livestock advisories are provided to farmers based on local weather data forecasts enabling them to undertake weather-	Number of weather stations in place. Number of crop specific advisories generated Number of families benefitted by weather related information	Communities do not have access to local weather forecasts and locale specific agricultural and livestock information	1. Automated agro-met stations placed in 14 of villages.(1 in 5 villages) 2. Communities get 3 days weather forecasts specific to project area. 3. WOTR provides crop specific advisories to	1. Physical visit to agro-met stations. 2. Household survey to understand the reach of weather related information. 3. Feedbacks from the farmers getting agro-advisories for their crops.	Community shows willingness in making use of weather data to ward off Climate risks impacting their livelihood and to plan agriculture according to the advisories.

responsive adaptive crop and livestock management measures.	and advisories		villagers based on weather forecasts disseminated though mobile phones (SMS or voice enabled services). 7000 villagers per year will receive the information through village public information system, wallpapers or written on a local 'black-board' in each village (total 70).		
Outcome 2: Local agriculture is more resilient to climate variability and risks attenuated and target group communities are aware of and capable of using sustainable climate-responsive agricultural practices					
Output 1.2 New low-cost, environment friendly, productivity-boosting and climate resilient agricultural technologies such as the System of Crop Intensification (SCI) are introduced and promoted.	Number of families benefitted by the practice Area brought under SCI Percentage increase in the productivity of crops among farmers	Farmers depend extensively on chemical fertilizers to boost the productivity leading to deteriorating soil quality.	At least 40% of farmers practice SCI.	Baseline and end line survey Feedbacks from farmers practicing SCI	Communities are motivated to enhance their productivity using the methodologies suggested.

	practicing SCI				
Output1.3 Weather-responsive integrated crop-water-nutrient-pest and disease management practices that are nature friendly and improve and sustain soil health are promoted.	Number of families aware of crop specific disease and pest attacks and management of the same. Percentage of households benefitted by reduced incidences and intensity of pest and disease attack	A large percentage (%) of households in project village suffers crop loss due to increased frequency of pest and disease attacks. 40% of villagers depend on chemical based pesticides, affecting the soil health	60% of household practice and is benefitted by one of the following: 1) Integrated nutrient pest management 2) Organic fertilizers 3) Vermin composting	Farmers End line and baseline Field observation Periodic monitoring Reporting incidences of pest attack or disease outbreak and loss incurrent	Communities are convinced and motivated that the practice improves overall agricultural productivity sustainable.
Output 1.4 Agro-biodiversity is conserved, resilient indigenous cultivars are promoted and farmers adopt diversified and integrated farming systems	Percentage of households practicing crop diversification and using local cultivars. Area under diversified and integrated farming	Around 80% of farmers take cash/mono crops and depend on hybrid seeds provided to them by Government on subsidies.	Almost all households are sensitized towards the importance of indigenous cultivars to reduce risks. At least 80% of farmers are benefitted by crop diversification, supply , post-harvest and marketing management	Field observation	Communities show interest in farming practices and are aware of importance of climate resilient indigenous varieties.

Component 2: Integrated water resource management through water budgeting					
Outcome 1: Communities are aware of the "scarcity value" of water and are enabled to efficiently allocate and manage local water resources so as to secure increased productivity gains					
Output 2.1: Communities are sensitized to water availability in their village, undertake water balance and water budgeting assessments at the household and village level. Village plan (inclusive of crop planning) for the judicious use of existing water sources developed and implemented	Number of families benefitted by water budgeting Number of people trained in water budgeting. Ground water level in the village	The agriculture is primarily rainfed. The region experiences highly erratic rainfall. Changing cropping pattern exerts high pressure on available water resources in the project areas	Communities develop protocol for collective management of water use through managing their water usage and crop water requirement and plan their crops accordingly 70 exercises per year will be undertaken.	Water budgeting documentation/records prepared by the villagers according to the crop seasons Field observation	Communities show eagerness in getting trained to monitor the status of water resources in their village.
Outcome 2: Agriculture and agri-based livelihoods are buffered against water stress, reduced water supplies and scarcity arising from climate induced rainfall variability					
Output 2.2 Use of water conserving and efficiency enhancing irrigation systems such as micro-irrigation – drips, sprinklers etc., are installed and used by farmers. Construction of farm ponds to harvest rainwater for supplemental irrigation.	Number of micro irrigation systems in place Number of farm ponds constructed Number of families whose annual income have increased	Less than 5% farmer has micro irrigation system installed on their farmers, other farmers practice flood irrigation which is more prevalent in the	Almost 60% of farmers have drip irrigation, sprinklers, etc. 420 farm ponds are constructed in the village.	Productivity, field observation of water conservation Feedback from farmers who have farm ponds	Communities understand the necessity of deploying micro irrigation systems to reduce over extraction of groundwater for irrigation and farm ponds to collect rainwater

		project areas. There are no structures to harvest the rainwater , therefore the runoff is very high.			and agree to maintain them.
Component 3: Knowledge products generated – for communities, wider public, policy makers and implementing agencies					
Outcome 1: Knowledge products are systematically generated, documented and disseminated to communities, wider public, policy makers and development agencies					
Output 3.1 Research Papers, Policy Briefs, Tools and Frameworks and compendium of case studies are developed and tested.	Number of knowledg e products generated Number of impact studies developed	Regional level studies are very few, and other relevant studies did not cover climatic issues	Impacts, Successes and learning are documented. 4 research studies and 3 impact studies will be conducted	Reports and documents generated	Communitie s willing to participate in public rural appraisal activities for data collection.
Outcome 2: Strong, locally-grounded research supports increasingly effective, scaled-up integration of adaptation into development initiatives at the local, state and national levels					
Output 3.2 Workshops/confere nces/ Policy Dialogues conducted at the local/ state and national level.	Number of workshops and conferenc es organised Number of participan ts in each meetings	No such workshop s or conferenc es were organised with a view to sharing opinions and creating an enabling environm ent for	Local and state level workshops and conferences are organised engaging opinion leaders, policy makers, government organisations and civil society organisations 4 district level workshops, 2 state level workshops will be organised	Workshop minutes, videos and participant lists	Stakeholder s showing willingness to attend and discuss the issues.

		large scale adoption of approaches to deal with climate change			

F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Project Objective	**Project Objective Indicator**	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (USD)**
To develop climate adaptive and resilient livelihood systems through sustainable practices and technological interventions in a manner that can be widely adoptable, replicable and up-scalable	Percentage of people adopting sustainable agricultural ,water management practices and getting benefitted by technological interventions	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.2. Number of people with reduced risk to extreme weather events	
Outcome 1 Farmers and local communities understand and use weather information for agricultural planning and operations and for preparing for adverse weather-induced events	Percentage of target population (Gender Disaggregated) having ready access to and making use of weather data for appropriate responsive adaptive actions to safeguard livelihood assets from climate risks and hazards.	Output 2.2: Targeted population groups covered by adequate risk reduction systems	2.2.1. Percentage of population covered by adequate risk-reduction systems 2.2.2. No. of people affected by climate variability	
Outcome 2: Local agriculture is more resilient to climate variability and risks attenuated and	Percentage increase in area under sustainable agricultural practices and productivity among the beneficiaries	Outcome 5: Increased ecosystem resilience in response to	5. Ecosystem services and natural assets maintained or improved under	

target group communities are aware of and capable of using sustainable climate-responsive agricultural practices	Percentage of households benefitted by reduced incidences and intensity of pest and disease attack	climate change and variability-induced stress	climate change and variability-induced stress 5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)	
Outcome 3: Communities are aware of the "scarcity value" of water and are enabled to efficiently allocate and manage local water resources so as to secure increased productivity gains	Percentage of target households with year round access to water Sources for use in agriculture, livestock rearing and household purposes.	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1 Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses 3.2. Modification in behaviour of targeted population	
Outcome 4: Agriculture and agri-based livelihoods are buffered against water stress, reduced water supplies and scarcity arising from climate induced rainfall variability	Percentage of target population installed water efficient irrigation systems and percentage increase in area under micro irrigation system and income/productivity of the beneficiaries	Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	
Outcome 5: Knowledge products are systematically generated,	Number of knowledge products developed and disseminated among various groups of stakeholders.	Output 3: Targeted population groups participating in adaptation and risk reduction	No. and type of risk reduction actions or strategies	

documented and disseminated to communities, wider public, policy makers and development agencies		awareness activities	introduced at local level 3.1.2 No. of news outlets in the local press and media that have covered the topic	
Outcome 6: Strong, locally-grounded research supports increasingly effective, scaled-up integration of adaptation into development initiatives at the local, state and national levels	Govt. adopted the climate resilient models in their policies The works are being replicated in neighbouring villages along with the project area by farmers own Initiatives.	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy	

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

Sr. No.	Budget Heads	Measure of Units	Unit Cost (in $)	Total Units	Total Cost (in $)
(1)	(2)	(3)	(4)	(5)	(6)=(4x5)
A	**PROJECT INTERVENTION COST**				
1	**Component 1: Climate Resilient Agriculture**				
	Output 1.1 Access to local climate information, weather forecasting and agro-advisories provisioning				
a	Agro met station installation, operation and maintenance	Nos.	12,870	14	180,180
b	Preparing & dissemination of local specific agro advisories through mobile SMS and chart.	per village	175	280	49,000
c	Agro climatic zone specific preparation of season wise crop calendar including package of practices	per crop	3,500	4	14,000
	Output 1.2 Farmers accept and adopt new low cost and climate resilient agriculture technologies				

a	Identification and training of lead farmers	Nos.	100	280	28,000
b	Identification and training of Community Resource Person at village level	Nos.	250	8	2,000
c	Demonstration of agriculture practices and technology	Nos.	100	420	42,000
	Output 1.3 Farmers are familiar with and adopt weather - responsive integrated Integrated Pest Management (IPM)/ Integrated Nutrient management (INM)				
a	Charges to village level Community Resource Person (CRP) to promote technology	Months	6,000	12	72,000
b	Demonstration of organic / verrmi compost , seed treatment, INM, IPM etc.,	Nos.	100	840	84,000
c	Organisation of Farmers Field School for two cropping season	Nos.	30	1120	33,600
d	On field support from experts (Agronomy, Entomology, Soil science etc.)	days	67	240	16,080
	Output 1.4 - the local community is awarded and adaptive capacities of local level organisations is strengthened				
a	Awareness activities and mobilisation activities	Nos.	67	70	4,690
b	Exposure visit of Farmers/Community Resource Person (CRP)/Community members and project staff	Nos.	333	35	11,655
	Total of Component 1				**537,205**
2	**Integrated Water Resource Management Through Water Budgeting**				
	Output 2.1 : Community sensitized to water availability in their village, undertake water balance and water budgeting assessments				
a	Water budgeting exercise and display at public places	Nos.	133	280	37,240
	Output 2.2 : Water conservation and efficiency enhancing irrigation systems are installed and constructions of Farm ponds/Wells				
a	Micro-irrigation systems - Water Saving devices (Drip , Sprinkler)-	Nos.	417	1050	437,850
b	Construction of Farm Ponds	Nos.	1,044	420	438,480
	Total of Component 2				**913,570**
3	***Component 3. Knowledge generation and dissemination to communities, wider public , policy makers and implementing agencies***				

	Output 3.1: Research papers, Policy Briefs and compendium of case studies are developed and tasted				
a	Action Research Studies	Nos.	6,667	4	26,668
b	Impact Assessment and Thematic studies	Nos.	8,500	3	25,500
c	Documentation - Publication of Best practices - Audio / Visual documentation	Lump sump	8,333	4	33,332
	Output 3.2 Workshops/ conferences/ Policy Dialogues conducted at the local/ state and national level.				
d	District level workshops	Nos.	833	4	3,332
e	State level workshops	Nos.	5,000	2	10,000
f	Training of Public/Private/Civil sector	Nos.	2,083	8	16,664
	Total of Component 3				**115,496**
A	Total Project cost (Component 1-Sr 1 to Component -Sr 3)				**1,566,271**
B	Total Project /Programme Execution Cost ((9.5% of total Project cost)				**148,796**
C	Total Project/Programme Cost (A + B)				1,715,067
D	Project/Programmme Cycle Management fee charged by the Implementing Entity (8.5% of total project/ cost)				145,780
E	**Amount of financing requested**				**1,860,847**

Break up of Sr no B

Sr no	**Particulars**	**Nos**	**Unit Cost**	**No of months**	**Total cost**
1	Project Manager	1	667	48	32,016
2	Technical Expert at field level	2	417	48	40,032
3	Agricultural/Social Expert	2	417	48	40,032
4	Monitoring Support	4	50	48	9,600
5	Travel cost	5	8	48	1,920
6	Organisational overheads , Printing, stationary, rent, communication		525	48	25,200
7	**Grand total**				**148,800**

H. Include a disbursement schedule with time-bound milestones

Instalment No.	**Percentage**	**Amount ($)**	**Year**
First Instalment	10	1,715,06	April-16
Second Instalment	10	1,715,06	Jan-17
Third Installment	10	1,715,06	July-17
Fourth Installment	15	257,260	Jan-18
	15	257,260	July-18
	15	257,260	Jan-19
	15	257,260	July-19
	10	1,715,09	Jan-20
Total	100.00	**1,715,067**	

Milestones

Activities	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Component 1: Climate Resilient Agriculture ***Output 1.1 Access to local climate information, weather forecasting and agro-advisories provisioning***				
Agro met station installation, operation and maintenance	14	0	0	0
Preparing & dissemination of local specific agro advisories through mobile SMS and chart.	70	70	70	70
Agro climatic zone specific preparation of season wise crop calendar including package of practices	2	2	0	0
Output 1.2 Farmers accept and adopt new low cost and climate resilient agriculture technologies				
Identification and training of lead farmers	70	70	70	70
Identification and training of Community Resource Person at village level	2	2	2	2
Demonstration of agriculture practices and technology	105	105	105	105
Output 1.3 Farmers are familiar with and adopt weather - responsive integrated Pest Management (IPM)/ Integrated Nutrient management (INM)				
Charges to village level Community Resource Person (CRP) to promote technology	3	3	3	3

Demonstration of organic /vermi compost , seed treatment, INM, IPM etc.,	210	210	210	210
Organisation of Farmers Field School for two cropping season	280	280	280	280
On field support from experts (Agronomy, Entomology, Soil science etc.)	60	60	60	60
Output 1.4 - the local community is awarded and adaptive capacities of local level organisations is strengthened				
Awareness activities and mobilisation activities	70	0	0	0
Exposure visit of Farmers/Community Resource Person (CRP)/Community members and project staff	35	0	0	0
Total of Component 1	921	802	800	800
Integrated Water Resource Management Through Water Budgeting ***Output 2.1 : Community sensitized to water availability in their village, undertake water balance and water budgeting assessments***				
Water budgeting exercise and display at public places	70	70	70	70
Output 2.2 : Water conservation and efficiency enhancing irrigation systems are installed and constructions of Farm ponds/Wells				
Micro-irrigation systems - Water Saving devices (Drip , Sprinkler)-	263	525	263	0
Construction of Farm Ponds	210	168	42	0
Knowledge Products ***Output 3.1 Knowledge generation and dissemination to communities, wider public , policy makers and implementing agencies***				
Action Research Studies	0	0	0	4
Impact Assessment and Thematic studies	1	1	0	1
Documentation - Publication of Best practices - Audio / Visual documentation	0	2	2	0
District level workshops	1	1	1	1
State level workshops	0	1	0	1
Training of Public/Private/Civil sector	2	2	2	2

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. **Record of endorsement on behalf of the government** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Ravi Shankar Prasad, IAS, Joint Secretary, Ministry of Environment and Forest (MoEF), Government of India	Date:

B. **Implementing Entity certification** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Action Plan on Climate Change) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 *(Dr. B. G. Mukhopadhyay)* *Chief General Manager* *NABARD, Head Office, Mumbai* *(Implementing Entity Co-ordinator)*	
Date: *August, 04, 2015*	Tel. and email: Phone (Direct): +91 (022) 26530007 Fax (022) 2653 0009, Mobile: +91 9769690750 fsdd@nabard.org climate.change@nabard.org benu8896@yahoo.co.in
Project Contact Person: Mr. V. Mashar, Dy. General Manager, NABARD, Head Office, Mumbai	
Tel. and Email: +91 22 2653 9632, +91 9769863397 mashar.velapurarth@nabard.org , climate.change@nabard.org	

Annexure

Crop Specific Good Agricultural Practices

Cotton

Practices of crop production		Technological practices given by WOTR, Scientist to farmers
1. Land preparation		One Deep ploughing in once in three years followed by two to three harrowing. Before the last harrowing incorporate FYM @ 12 t/ ha or Vermicompost @ 5 t/ha
2. Sowing time		Kharif – 15thjune to 31thjuly
3. Varieties		Pkvrajat,AKH-8828, AKH-081, DHY-286, AKA-8401, PKV HY-2 AND 3, PKV HY-4 AND 5, PKV DH-1, AKDH-5
4. Seed rate		G. *hirsutum* – 15- 20 kg/ha G. *arboreum* – 10 -15 kg/ha Hybrids – 2- 5 kg/ha
5. Seed treatment		Azotobactor @ 25 gm/kg seed PSB @ 20 gm/kg seed
6. Method of sowing and spacing		**A) Irrigated cotton** 90 x 60 cm **B) Rainfed cotton** 60 x 20 cm
7. Gap filling		Gap filling should be done at 12 DAS
8. Integrated nutrient management		**Rainfed :** RDF : 80:40:40 NPK kg/ ha Nitrogen applied in two split doses **Irrigated** RDF : 100:50:50 NPK kg/ ha Nitrogen applied in equal three split doses
9. Intercropping		i. Cotton + Green gram / Black gram At :1:1 row ratio
10. Interculturing		Two to three hoeing should be done after 20 DAS
11. Protective Irrigation		For rainfed cotton irrigation supplement irrigation should applied at flowering and boll formation stage
12. Application of *amritpani*[17]		Two spraying of *amritpani* @100 ml. in 10 lit of water at 30 & 45 DAS
13. Application of *jeevamrit*[18]		Application of *jeevamrit* @ 200 lit./acre along with irrigation or on the surface of soil
14. Plant protection	**Diseases** 1. Root Rot	Seed treatment with *Trichoderma viride* @ 4g/kg of seed. Apply farm yard manure at 10t/ha or neem cake at 150 kg/ha

[17] Amritpani is organic formulation prepared by 1 kg cow dung + 1 lit Cow urine +1 kg Neem leaves + 100 g jaggery +Chickpea floor 1 kg + 10 liter water Mix it well, ferment for 10 days

[18] Jeevamrit is organic formulation prepared by 10 kg cow dung + 10 lit Cow urine+ 1kg jaggery +Chickpea floor 2 kg + 200 litre water Mix it well, ferment for 5-6 days

	2. Anthracnose	Remove and burn the infected plant debris and bolls in the soil Rogue out the weed hosts Avoid water logging Seed treated with fungicides
	3. Fusarium Wilt	Select fields with no previous record of wilt for at least 3 years. Use disease-free seed Seed treatment *Trichoderma viride* @ 4g /kg of seed
	Pests 1. Aphid, Thrips and white fly	Use yellow stick board @ 10/acre Release egg parasitoid of *Crysoperla carnea* 5000-10000/ha Application of phorate 10 G @ 10 kg/ha Spray 5% NSKE @ 200 ml/15 lit of water at 15 days intervals Spray *dashparni* ark[19] @ 100 ml/10 lit of water
	2. Spotted bollworm/ Pink bollworm/ American bollworm	Pheromone traps @10-15/acre Grow marigold/pigeon pea as a trap crop Spray 5% NSKE @ 200 ml/15 lit of water at 15 days intervals *Chrysoperla carneaat* 1,00,000/ha at 6th, 13th and 14th week after sowing
15.		Cotton can either be picked by hand or by machines Harvest the fully opened bolls Two to three picking should be done at 15 to 20 days interval Picking should be done early in morning

Gram (Chickpea)

Practices of crop production	**Technological practices given by WOTR, Scientist to farmers**
1. Land preparation	One ploughing followed by two harrowing. Before the last harrowing add 10 tons compost/ha at or 2 tons vermicompost/ha
2. Sowing time	15th Oct to 15th Nov
3. Varieties	Vijay, Vishal, Digvijay, Virat, Vihar and P.K.V- 2
4. Seed rate	50 kg/ha
5. Seed treatment	Seed treated with *Rhizobium* @ 25 gm kg of seed seed treatment with 1% OMC fungicide @ 5g /kg seed
6. Method of sowing and spacing :	Drilling 30 x 10 cm^2

[19] Dashparni ark is prepared by decomposition of different ten types of poisons leaves 2 kg of each + 5 kg cow dung and 10 liter gomuta in 180 lit of water mix it well, ferment for 30 days

7. Integrated nutrient management		25 kg N + 50 kg P + 15 kg Zn/ha at the time of sowing
8. Intercropping		Gram + Maize, Gram + sunflower and Gram + Linseed at 4:2 ratio
9. Gap filling		Gap filling should done 10-12 DAS
10. Interculturing		Two hoeing + one weeding before 30 DAS
11. Protective irrigations		1st irrigation at 20-25 DAS 2nd irrigation at 50-55 DAS 3rd irrigation at 70 DAS
12. Application of amritpani		Two spray of *amritpani* @100 ml in 10 lit of water at 30 & 45 DAS
13. Application of jeevamrit		Apply *jeevamrit* @ 200 lit./acre along with protective irrigation
14. Plant protection	**A) Diseases** Blight	Use disease free seeds Give seed treatment with 1% OMC fungicide @ 5g /kg seed.
	Wilt	Deep summer ploughing Follow crop rotation measures continuously. Always use disease free seeds Avoid sowing when temperatures are high Seed treatment with *T. viride* @ 4 g/kg Seed treatment *P. fluorescens* @ 10g/ kg of seed
	B) Pests Gram pod borar, Semilooper, Cutworm	Install 5 feromon traps per ha. Install bird purches 50/ha Spray NSKE 5% @ 150 ml/ 15 lit of water Spray *dashparni* ark @ 100 ml/10 lit of water
15. Harvesting		90% of pods on the plant are golden-brown color Harvested at minimum of 13-14% moisture content

Wheat

Practices of crop production	**Technological practices given by WOTR, Scientist to farmers**
1. Land preparation	One deep ploughing followed by two harrowing. Before the last harrowing add 12t FYM/ ha or Vermicompost @ 3 t/ha
2. Sowing time	15th Oct to 15th Nov
3. Varieties	HD- 2189, HD-2278, Panchwati, NIAW-301, Godavari, LOK-1, Nifad-34, Parbhani -51, Tapovan and HI- 8498

4. Seed rate		100-125 kg/ha
5. Seed treatment		*Azotobacter* @ 25 gm + PSB @ 50 gm /kg of seed
6. Method of sowing and spacing :		Drilling 22.5 cm
7. Integrated nutrient management		50 kg N + 50 kg P + 50 kg K/ha at sowing and remaining 50 kg N/ha at 21 DAS
8. Intercropping		Wheat + Mustard at 6:2 ratio
9. Gap filling		Gap filling should be done 10-12 DAS
10. Interculturing		Two hoeing + one weeding carried out before 30 DAS
11. Irrigations		light irrigation should be given immediate after sowing and then at each critical growth stages of crop
12. Application of *amritpani*		Two spray of *amritpani* @ 100 ml/ 10 lit of water at 30 to 45 DAS
13. Application of *jeevamrit*		Apply *jeevamrit* @ 200 lit/acre along with each irrigation
14. Plant protection	**C) Diseases** Rust and Smut	*Trichoderma viridae* @ 8 g/ kg of seed for control of fungal diseases Collect smutted earheads in cloth bags and destruct by dipping in boiling water. Spray Mancozeb 20gm/10 lit of water
	D) Pests Aphids, Jassids and Brown Wheat Mites	Place Yellow sticky trap @12 /ha Release *Chrysoperla carnea* @ 5000/ ha Spray 5% NSKE @ 150 ml/15 lit of water Use systemic insecticide to control the pest
	Birds	Scaring devices and chemical repellents can also be used in the field
15. Harvesting		At the time of harvest the grains should contain about 20-25% of moisture Harvesting should be done mechanically or manually

Sorghum

Practices of crop production		Technological practices given by WOTR, Scientist to farmers
1. Land preperation		One deep ploughing followed by two harrowing. Before last harrowing add 5 tons compost/ha or 2 tons vermicompost/ha
2. Sowing time		15th Sep to 1thOct
3. Varieties		Phule Mauli, Phule Yoshoda, Phule Revati,M-35-1, CSH-14, CSH-16, CSH- 25, Panchali, Swati and Parbhanimoti.
4. Seed rate		10 kg/ha
5. Seed treatment		*Azotobacter* @ 25 gm + PSB @ 50 gm /kg of seed Seed should be treated sulphur containing fungicides
6. Method of sowing and spacing :		Drilling 45 x 15 cm^2
7. Integrated nutrient management		80:40:40 NPK kg/ha 50 % N at sowing and full dose of P and K at time of Sowing 50 % N as top dressing at 30 DAS
8. Intercropping		Sorghum + Cowpea at 2:1 ratio
9. Thinning		1st thinning -10 DAS and 2nd thinning – 20 DAS By keeping 15 cm distance between two plants
10. Interculturing		3 hoeing and two weeding carried before 40 DAS
11. Protective irrigations		1st irrigation at tillering stage 2nd irrigation at jointing stage 3rd irrigation at flowering stage 4th irrigation at grain filling stage
12. Application of *amritpani*		Two spray of *amritpani* @ 100 ml/ 10 lit of water at 30 to 45 DAS
13. Application of *jeevamrit*		Apply *jeevamrit* @ 200 lit/acre along with irrigation water
14. Plant protection	**A. Diseases**	
	Anthracnose & Zonate Leaf Spot	Crop rotation with pulses crop Eradicate other susceptible plants such as Johnson grass Spray Mancozeb @ 30 g/ 15 lit of water at an interval of 15 days
	Rust	Spray sulphur containing fungicides
	B. Pests	
	Sorghum Shoot fly	Setting of pheromone traps@ 1 trap /acre up to 30 DAS Spray *Dashparni* ark @ 150 ml/15 lit of water Spray chlorpyriphos 20 EC @ 30 ml/ 15 lit of water
	Sorghum Stem borer	Pull out and destroy the affected plants Set up light traps to attract and kill the moths Release the egg parasitoid, *Trichogramma japonicum* @ 5000/ha

		Apply *Bacillus thuringiensis*2.5 kg/ ha Spray 5% NSKE @ 150 ml/15 lit of water
15. Harvesting		Harvesting done after 110 to 130 DAS when hard the grains and make sound cracking when put in mouth. At the time of harvest the grains should contain about 21% of moisture

Soybean

Practices of crop production		Technological practices given by WOTR, Scientist to farmers
1. Land preparation		One ploughing and two harrowing should be done. Before last harrowing add compost @10 t /ha or Vermicompost @ 2 t /ha
2. Sowing time		Kharif – 15thjune to 15thjuly
3. Varieties		P.K. 1029, JS 335, M.A.C.M. 450, Phule Kalyani, Shakti, Parbhanisona and Samrudhi
4. Seed rate		75 to 80 kg/ha
5. Seed treatment		2.5 gm bavistin/kg of seed. 25 gm *Rhizobium* + 25 gm PSB /kg of seed
6. Method of sowing and spacing :		Dibbling 45 x 15 cm^2
7. Integrated nutrient management		30 kg N + 60 kg P + 30 kg K/ha at time of sowing
8. Intercropping		Soybean + Tur at 2:1 and 4:2 ratio Soybean + Cotton at 1:2 ratio
9. Gap filling and thinning		Gap filling and thinning should done 10-12 DAS
10. Interculturing		Two hoeing + one weeding before 35 DAS
11. Protective irrigations		1st irrigation should be given before flowering 2ng irrigation should be given at pod development stage
12. Application of *amritpani*		Two spray of *amritpani* @100 ml / 10 lit of water at 30 & 45 DAS
13. Application of *jeevamrit*		Application of *jeevamrit* @ 200 lit./acre at each irrigation at the soil surface.
14. Plant protection	**A. Diseases** Mosaic Rust	 Control white fly and thrips Spray Mancozeb 75% WP @ 30 gm/ 15 lit of water. **OR**
	B. Pest Leaf eating caterpillar Aphids and Jassids:	Grow castor as trap crop around the main field Install sex pheromone trap @ 5 traps/ ha Spray SLNPV @ 200 LE/ ha Spray *Dashparni* ark @ 150 ml/ 15 lit. of water Apply *Beauveria bassiana* 40 g/ 15 lit of water Spraying of 5% NSKE @ 200 ml/ 15 lit of water Setting up of yellow sticky traps to attract and kill @ 5/ acre Release *Chrysoperla carnea* @ 5000/ ha Collect and destroy egg masses and early instars larvae

15. Harvesting	95% of the pods have reached their mature (brown) colour Soybean should be harvested at moisture levels below 20% but they must be stored at 14% moisture or lower Harvest when before shattering the pods

Maize

Practices of crop production	Technological practices given by WOTR, Scientist to farmers
1. Land preparation	One deep ploughing followed by two harrowing. Before the last harrowing add 12 t FYM per ha
2. Sowing time	15thjune to 15thjuly
3. Varieties	Rajshree, Karveer, Panchganga, Manjri composite, Bio-9637, Maruti, Paras and Maharaja.
4. Seed rate	15 to 20 kg/ha
5. Seed treatment	*Azotobacter* @ 15 gm/kg of seed Thirum @ 2.5 gm /kg of seed
6. Method of sowing and spacing :	Dibbling 60 x 20 cm^2 and 75 x 20 cm^2
7. Integrated nutrient management	RDF is 120:60:60 NPK kg/ha • 40 kg N and full dose of P and K at the time of sowing • 40 kg N at 30 DAS and remaining 40 kg N at 60 DAS • Zinc sulphate 25 kg/ha at the time of sowing
8. Intercropping	Maize + Groundnut/ Soybean and at 4:2 ratio
9. Interculturing	One weeding + one hoeing at 21 and 30 DAS , respectively
10. Protective irrigations	• 1st irrigation at vegetative stage • 2nd irrigation at flowering stage • 3rd irrigation at grain filling stage
11. Application of amritpani	Two spray of *amritpani* @100 ml/10 lit of water at 30 & 45 DAS
12. Application of jeevamrit	Apply *jeevamrit* @ 200 lit./acre at each irrigation at the soil surface.

13. Plant protection	**E) Diseases** Rust & brown spots	Spray diethane M-45 + 1 % Bavistin @ 1.5 kg in 500 lit. of water/ha Spray Mancozeb 30 gm/ 15 lit of water
	F) Pests Stem borer and Army worm,	Set up light traps @ 5 /ha to attract and kill the moths Release the egg parasitoid of *Trichogramma japonicum* @ 50000/ha 1st spray of *dashparni* ark @ 100 ml/10 lit of water 2nd spray of 5 % NSKE @ 200 ml/15 lit of water at 15 days intervals Apply Phorate 10 G @ 10 kg/ha

Groundnut

Practices of crop production	**Technological practices given by WOTR, Scientist to farmers**
1. Land preparation	One shallow ploughing followed by two harrowing. Before the last harrowing add 10 t FYM/ha or 2 tons vermicompost/ha
2. Sowing time	Kharif- 15thjune to 7thjuly Summer- 15 jan.to 7thfeb.
3. Varieties	JL-24, JL-286, TAG-24, TAG-26 and SB.11
4. Seed rate	100 kg/ha
5. Seed treatment	Seed treated *Rhizobium* @ 25 gm + PSB @ 25 gm /kg of seed Treat the seeds with *Trichoderma viride* @ 4 g/ kg **OR** *Pseudomonas fluorescens* @ 10 g/kg seed
6. Method of sowing and spacing :	Dibbling 30 X 10 cm^2
7. Integrated nutrient management	25 kg N + 50 kg P/ha at sowing 10 kg ferrous sulphate + 10 kg zinc sulphate/ha at the time of sowing

8. Intercropping		Groundnut + soybean and Groundnut + sunflower All as 6:2 ratio
9. Gap filling		Gap filling should done 10-12 DAS
10. Interculturing		Two hoeing + one weeding before 35 DAS
11. Protective irrigations		1st irrigation at flowering stage 2nd irrigation at peg formation stage 3rd irrigation at pod formation stage
12. Application of *amritpani*		Two spray of *amritpani* @100 ml in 10 lit of water at 30 & 45 DAS
13. Application of *jeevamrit*		Apply *jeevamrit* @ 200 lit./acre along with protective irrigation
14. Plant protection	**G) Diseases** Rust &Tikka	Two spray of diethane M-45 @ 25 gm in 10 lit. of water at 45 and 70 DAS
	A) Pests Aphids, Jassids and leaf eating caterpillars	Spray 5% NSKE @ 200 ml/15 lit of water at 15 days intervals Spray *dashparni* ark @ 100 ml/10 lit of water Use systemic insecticide to control the sucking pest infestation