Increasing Adaptive Capacity to Climate Change through Developing Climate-Smart Villages in Select Vulnerable Districts of Madhya Pradesh

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Ministry of Environment, Forest and Climate Change

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Submitted By

Government of Madhya Pradesh

Urban Development and Environment Department

Environmental Planning and Coordination Organization (EPCO)

MP State Knowledge Management Centre on Climate change

Enhancing Adaptive Capacity to Climate Change through Developing Climate-Smart Villages in three Vulnerable Districts of Madhya Pradesh

Project Submitted under National Adaptation Fund for Climate Change

Brief Profile of the DPR

Title of Project/Programme:	Enhancing Adaptive Capacity to Climate Change through Developing Climate-Smart Villages in three Vulnerable Districts of Madhya Pradesh
Project/Programme Objective/s:	I. Increasing Adaptive Capacity to Climate Change through Developing Climate Smart Villages in Select Vulnerable Districts of Madhya Pradesh II. Participatory implementation of various climate-smart interventions through different climate-smart village models linking with other community development activities and ongoing NAPCC/SAPCC missions III. Strengthen the capacity of farmers, PRIs and other stakeholders in conjunction with ongoing missions/schemes; IV. Generate evidence from climate-smart villages in farming communities (economic, environmental and institutional impact assessment); and *V.* Facilitate integration and the scaling-up/out the climate-smart village model in collaboration with key stakeholders to implement CSA practices and technologies envisioned by different missions/schemes and Madhya Pradesh State Action Plan on Climate Change (SAPCC)
Project/ Programme Sector:	*Agriculture / Rural Development and Environment (Climate Change)*
Name of Executing entity/Department	State Knowledge Management Center on Climate Change Environmental Planning and Coordination Organization (EPCO) Urban Development and Environment Department Government of Madhya Pradesh
Beneficiaries:	This project will be implemented through existing farmers group

	or formation of farmers' group including women and marginalized farmers in the tribal regions. (Direct beneficiary : 73450 Farmer families Indirect Beneficiary : 55000 farmers)
Project Duration	*Three Years* *Start Date: To be decided* *End Date: 36 month since the date of implementation*
Amount of Financing Requested (Rs.):	*25.00 Crores*
Project Location:	*State: Madhya Pradesh* *District:* Sehore, Rajgarh and Satna
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1. Project Background

Despite impressive progress in food production, India remains home for almost 40% of world's poor, 20% of the world's hungry and 40% of the world's malnourished children and women. Achieving the Millennium Development Goals has remained a daunting task for most states of the country. The majority of poor and under-nourished lives in rural areas and depends on agriculture for food and livelihoods. The impressive economic growth and remarkable increase in food production during last few decades have not contributed to alleviating poverty and reducing hunger in rural areas. Therefore, future growth strategies should include sustainable agricultural development.

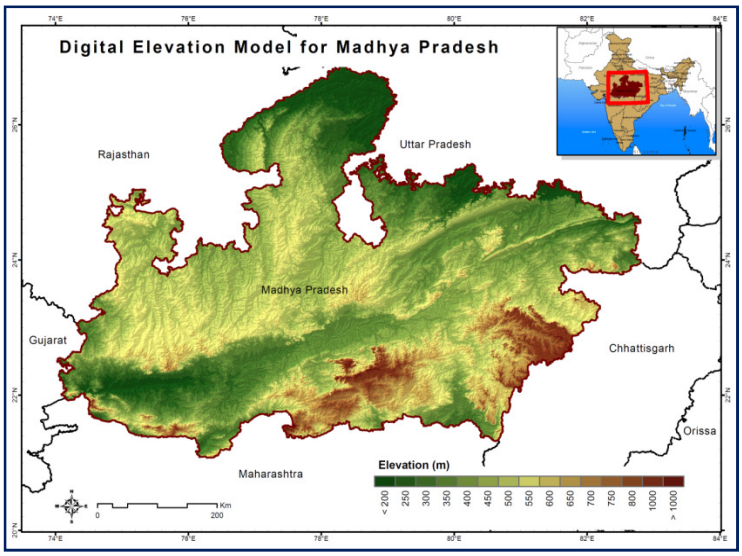
Climate change and increasing climatic variability are likely to compound the problem further. IPCC has projected that the global mean annual surface air temperature increase by the end of this century is likely to be in the range of 0.3 to 4.8°C (IPCC, 2014). Overall, the temperature increases are likely to be much higher in winter season than in monsoon season. It is very likely that hot extremes, heat waves, and heavy precipitation events will become more frequent.

Several studies have shown that, unless we adapt now, India could lose 10-40% of crop production by the end of the century due to global warming, despite the beneficial aspects of increased CO_2 (Aggarwal, 2009; Nelson et al., 2009; Knox et al., 2011). In fact, there is some evidence that changing climate has already impacted rice and apple yields. Projections indicate the possibility of losing of 4-5 million tons of wheat production with every rise of 1^{o}C temperature throughout the growing period (Aggarwal, 2009). Recent simulation analysis has indicated that rainfed maize, sorghum and paddy yields are likely to be adversely affected by the increase in temperature. The projected increase in drought and flood events could result in greater instability in food production and threaten the livelihood security of farmers.

Justification is explained through field visits; description is enclosed on Annexure -III and also on Annexure-IV of the DPR.

2. Madhya Pradesh State profile

2.1 Physiography



Madhya Pradesh lies in the heart of India between latitudes 21o 04'N and 26o 54'N, longitudes 74o 02'E and 82o 49'E. It covers an area of 3, 08, 245 sq. km (9.38% of the land area of the country). Madhya Pradesh is the second largest state by area and sixth largest state by population. Madhya Pradesh shares its boundary with seven other states. The northern border of the state has the state of Rajasthan and Uttar Pradesh. The western border of the state is shared by a part of Rajasthan and a part of Maharashtra with Gujarat in between. On the southern part of the state of Madhya Pradesh lie the states Maharashtra and Andhra Pradesh. The entire eastern border of the state is bounded by the states of Chattisgarh and Jharkhand.

Madhya Pradesh consists largely of a plateau streaked with the hill ranges of the Vindhyas and the Satpuras with the Chhattisgarh plains to the east.

Catchments of many rivers of India lie in Madhya Pradesh. The Narmada (originating from Amarkantak) and Tapti (originating from Multai of Betul District) rivers and their basins divide the state in two, with the northern part draining largely into the Ganga basin and the southern part into the Godavari and Mahanadi systems. The Vindhyas form the southern boundary of the Ganga basin, with the western part of the Ganga basin draining into the Yamuna and the eastern part directly into the Ganga itself. All the rivers, which drain into the Ganga, flow from south to north, with the Chambal, Shipra, Kali Sindh, Parbati, Kuno, Sind, Betwa, Dhasan and Ken rivers being the main tributaries of the Yamuna. The land drained by these rivers is agriculturally rich, with the natural vegetation largely consisting of grass and dry deciduous forest types, largely thorny. The eastern part of the Ganga basin consists of the Son, the Tons and the Rihand Rivers, with the Son being the major tributary. This is also the junction point of

the Satpura and the Vindhya ranges, with the Maikal Hills and Kaimur Hills being the fulcrum. The forests here are much richer than the thorn forests of the northwestern part of Madhya Pradesh. The Son is of great significance in that it is the largest tributary going into the Ganga on the south bank and arising out of the hills of Madhya Pradesh rather than from the Himalayas.

The Mahanadi, together with its tributaries such as Hasdeo, Mand and Kharun flows southeast into Orissa. Some of the luxuriant moist and dry deciduous forests with dominant timber species like teak, sal and other hard wood species. These forests are repository of very rich bio-diversity, flora and fauna, on which about 30% of state's population derives sustained livelihood. The Narmada flows through a rift valley, with the Vindhyas marching along its northern bank and the Satpuras along the southern. Its tributaries include the Banjar, the Tawa, the Machna, the Denwa and the Sonbhardra rivers. The Tapi also flows through a rift valley, the Narmada–Tapi systems carry and enormous volume of water and provide drainage for almost a quarter of the land area of Madhya Pradesh.

The Indrawati, the Wainganga, the Wardha, the Pench, the Kanhan and Penganga rivers, discharge an enormous volume of water into the Godavari system.

2.2 Climate

Madhya Pradesh has a subtropical climate. Hot dry summer extends from April to June followed by monsoon from July to September and winter months (November to February) are cool and relatively dry. The average rainfall is about 1,370 mm (53.9 in). It decreases from east to west. The south-eastern districts have the heaviest rainfall, some places receiving as much as 2,150 mm (84.6 in), while the western and north-western districts receive 1,000 mm (39.4 in) or less.

Summer mean maximum temperature rises to about 42.5°C in northern Madhya Pradesh and ranges from 40°C to 42.5°C. The days in the month of May are usually hotter than those of June. The average temperature during winters is as low as 10°C in the north, while in the south it varies from 10°C to 15°C.

2.3 Water Resources

Nearly 60% of the surface water can be retained for different uses thus there are a scope for almost more than double the irrigation capacity by building small dams in different streams. It is also seen that, the eastern and south-eastern part of Madhya Pradesh has more runoff because of relatively higher rainfall, high gradient and occurrence of crystalline rocks in the major portion of the area. The central part receives lesser rains and therefore proportionate decrease in runoff water and cropping patterns. Western part of Madhya Pradesh receives much less rain and hence the relatively runoff is less. Most of the streams are almost dry for 4 to 6 months in the year (Jan to June). It is essential that this runoff water should be harnessed by putting a series of small and medium dams on small and big streams. This will not only provide sufficient water on the surface for different uses but also the percolation into the ground. It will increase the level of the ground water to a great extent.

The total quantity of surface and ground water is distributed in different catchments areas of Madhya Pradesh including. Chambal – Betwa – Ken catchment (Watershed of Yamuna), Khargone, northern part of Jhabua, Dhar, Ujjain, northern part of Indore, Shajapur, northern Dewas, Sehore, Bhopal, Raigarh, Vidisha, northern Raisen, Guna, Shivpuri, Morena, Gwalior, Bhind, Datia, Tikamgarh, Chhatarpur, Damoh and western part of Panna. Total catchment area is 1,25,080 sq.km with total available surface water of 45 cubic km and total available ground water of 5 cubic km.

Son catchment includes Satna, Rewa, southern Panna, Sidhi, western Jabalpur, Shahdol, north-east Jabalpur, north-east Mandla and northern Sarguja with total area of 54,255 sq.km, total available surface water of 29.29 cubic km and total available ground water of 3.69 cubic km.

Mahandadi catchment includes Raipur, Durg, Bilaspur, Raigarh, northern Bastar and sourthernSarguja with total area of 87,387 sq.km, total available surface water of 52.43 cubic km and total available ground water of 5.245 cubic km.

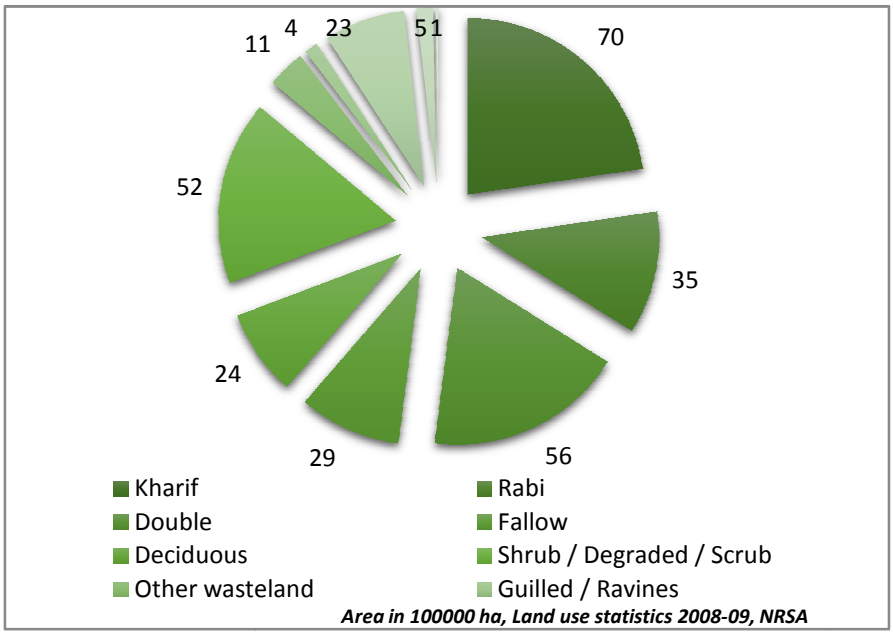
Narmada catchment includes Southern Jhabua, Dhar, Khargone, Southern part of Indore, south Dewas, south Bhopal, South of Raisen, Hoshangabad, northern part of Betul, Chhindwara, Narsimhapur, southern Jabalpur, northern part of Seoni, Mandla,

north Balaghat, south –west Shahdol with total area of 90715 sq.km, total available surface water at 40.82 cubic km and total available ground water at 4.52 cubic km.

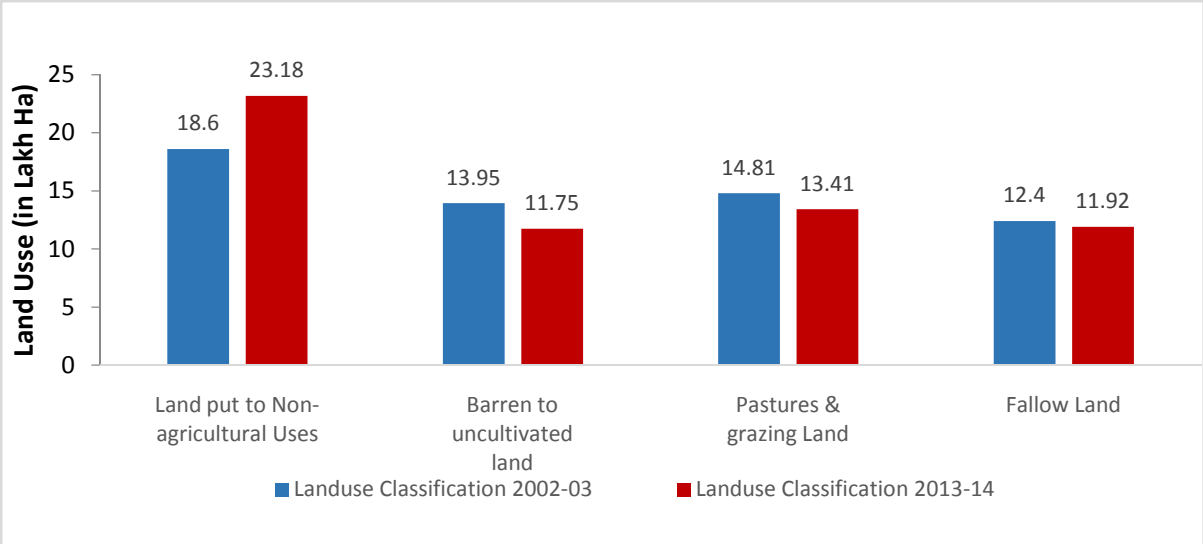
Banganga and Pench catchment include Southern part of Chhindwara, southern east Betul, South Seoni and southern part of Balaghat with total area of 12,326 sq.km, total available surface water at 4.53 cubic km and total available ground water of 0.91 cubic km.

2.4 Landuse

There are 11 Agro-climatic zones in Madhya Pradesh reflecting the climatic diversity due the large size of the state. Major land use in Madhya Pradesh is agriculture (52%), Forest (25 %) and about 10 % wasteland.

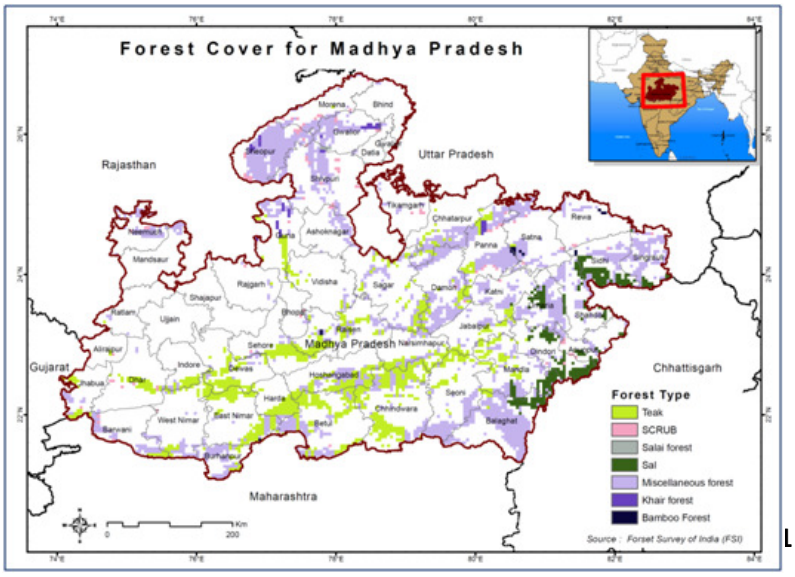


Change in Non-agriculture and Uncultivable Land Use from 2002-03 to 2013-14



2.5 Forest

The area under forests in Madhya Pradesh is estimated by Forest Survey of India at 7.77 Mha, accounting for about 25% of the geographic area which is about 12.44% of the forest area of the country. Legally this area has been classified into "Reserved Forest, Protected Forest and Unclassified Forest", which constitute 61.7%, 37.4% and 0.9% of the forest area respectively. Per capita forest area is 2,400 m2 as against the national average of 700 m. Open forests account for about 46% of the total forest area followed by moderately dense forests accounting for about 45%. Dense forests account for only about 9% of the total forest area. Among the forest types, according to the Champion and Seth (1968) classification, Madhya Pradesh has 18 forest types The two dominant forest types are tropical dry deciduous



forest, accounting for about 80% of the total forest area and tropical moist deciduous forests, accounting for about 18%. Biodiversity rich forests are likely to be less vulnerable to climate change while fragmented and disturbed forests are more vulnerable to projected climate change. MP lost a good amount of forest recently when Chattisgarh was carved out of it, as that region was the richest reserve of forests in MP.

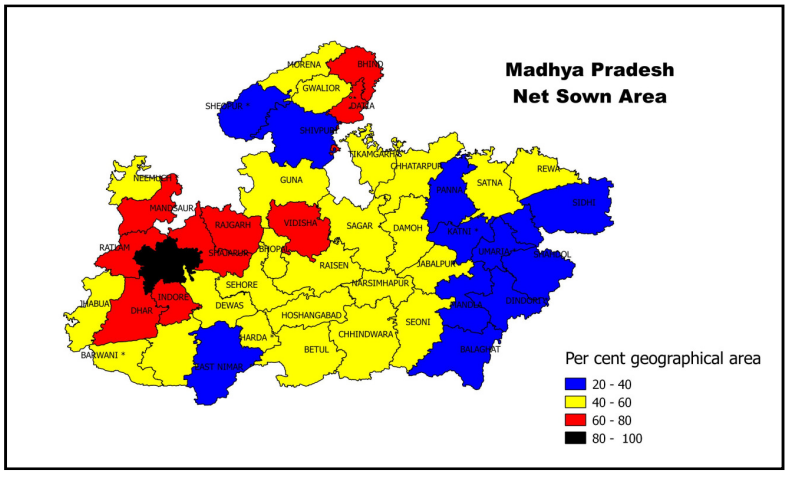
The area under forests in Madhya Pradesh has increased during the period 2001 to 2007 according to the State of Forest reports of the Forest Survey of India. There is a continuous increase in the very dense forest category during the same period. Further, moderately dense forests have marginally declined, leading to an increase in the area under open forests during 2003 to 2007.

2.6 Biodiversity

Madhya Pradesh has a wide variety of wild animals inhabiting the vast expanse of its forest areas. It has 11 national parks and 35 sanctuaries covering nearly 11% of the forest area of the state. It has nearly 25% of the tiger population of the country. Herbivors like the chital, sambar, black buck, chinkara, nilgai, wild boars etc., roam about freely in the forests of the state. Important recognized breeds of cattle considered as native breeds of Madhya Pradesh are 'Malwi' and 'Nimari'. 'Gaolao' breed is found all over 'Vidarbh' region of Maharashtra and adjoining areas of Madhya Pradesh (Chhindwara district) and 'Kankattha' breed of cattle in Panna district. Similarly, 'Bhadawari' breed of Buffalo is found in abundance at Bhind and Gwalior districts. 'Jaloni' breed of sheep is found in Tikamgarh and Shivpuri which forms the border with Jhansi and Jalaun districts of Uttar Pradesh. 'Jamnapari' breed of goat is found in various villages of Bhind district situated near Chambal river. 'Malwi camel' is also found in Mandsaur district of Madhya Pradesh. In the poultry sector 'Kadaknath' is the native breed of Madhya Pradesh found at Jhabua and Dhar districts where as 'Aseel' is found in abundance at Bastar district of Madhya Pradesh.

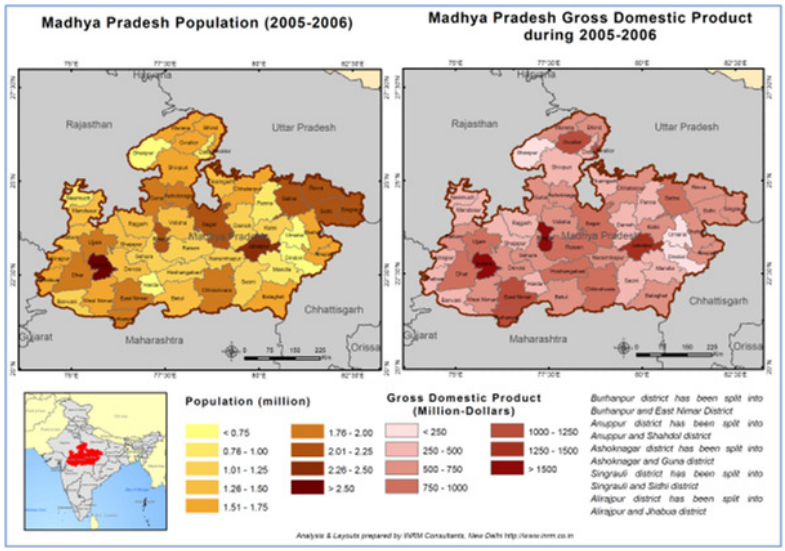
2.7 Agriculture

Agriculture is the main stay of economy of Madhya Pradesh. About 74% population is rural,



which directly or indirectly depends on agriculture. The Agriculture and allied services contributes about 31% share in state economy and 71% of its working force is directly engaged in agriculture. About 72% of cultivated area is subject to rain fed agriculture. Low cropping intensity (135%) is prevalent in some parts of Madhya Pradesh, due to practice of keeping land fallow in kharif and taking only one crop on residual/conserved moisture in rabi. Wheat is the main crop of rabi season. The other main crops are pea, oilseeds, and gram. The cropping intensity is 135 percent and varies. Agricultural production of the state is at present more than 16.0 million tonnes of food grains and about 5.7 million tonnes of oilseeds. Madhya Pradesh is the highest producer of oilseeds and pulses in the country.

2.8 Demography



Madhya Pradesh is administratively divided into 10 divisions, 50 districts, 342 sub-districts, and 45,903 villages. The population of Madhya Pradesh is 7,25,97,565 million (2011 census), with a decadal growth rate of 20.3% and the population density is 236 people per square kilometre. More than 75% of state population resides in villages whose main occupation is agriculture, while the rest of the population lives in towns. Indore district is the most populated district. Number of females per thousand male (sex ratio) in the state is 930 where as the literacy rate is 70.6%.

2.9 Economy

Agriculture is the primary source of the economy of the State. Food grains cultivation includes; rice, maize, millet, wheat, pulses, sugarcane, ginger and oilseeds. About 74% of population living in rural area is dependent on agriculture and about 71 % of total working populations are engaged in agriculture. Forest-products are the secondary source in the sector of the economy. Madhya Pradesh is also ideal for horticulture and fruit orchards. Major industries of sawmills and plywood, rice mills, fruit preservation units and handloom handicrafts contributes their share to the economy of the state.

Per capita income is around Rs. 15647 per annum in 2005-2006 (national average is Rs. 31,000/-). In Human Development Index rating of the states, Madhya Pradesh ranks at 33rd position.

Madhya Pradesh registered a growth rate of 6.86 percent in GSDP against GDP growth rate of 7.8 percent (All-India) during the Tenth Plan. Agriculture and animal husbandry constitutes major part (34%) of the state GSDP followed by industry (27%).

2.10 Infrastructure

Physical infrastructure like road and transport, irrigation, power, telecommunication etc contributes to economic growth through generation of income and employment and social infrastructure consisting of education, health, housing and financial infrastructure like banking and insurance contributes to the process of growth through generation of human capabilities and capacity building.

2.11 Transport

Madhya Pradesh has 72,000 km of roads, of which 60,000 km are surfaced. It has 4,286 km of national highways, 8,728 km of state highways, 10,817 km of major district roads (MDRs), and 48,590 km of other district roads (ODRs)/village roads. The road network is 45 km/100 km in Madhya Pradesh (national average is 75 km per 100 sq km).

2.12 Irrigation

The net area under irrigation was 5.66 million hectare in the year 1999-00. Of this, 0.24 mha was under paddy, .3.40 m.ha. under wheat, 1.08 m.ha. under pulses, .0.32 m.ha. under oilseeds, 0.19 mha under cotton, 0.23 m.ha. under spices, 18 m.ha. under fruits and vegetables and 0.55 m.ha. under other crops. Government canals irrigate one million ha., non-government canals 1600 ha., tanks, 0.132 m.ha, wells 3.71 m.ha, and other sources irrigate 0.81 mha There are 7.36 million holdings which operate 16.37 million hectares of land. Of the 15 million hectares of net sown area, about 38 percent is irrigated. Surface water sources account for less than 20 percent of the net irrigated area and the remaining is provided by groundwater.

2.13 Power

Madhya Pradesh has total installed power generation capacity of 8,324 MW, which comprised 4,582.9 MW under state utilities, 3,525 MW under central utilities and 216.1 MW under the private sector. Coal-based thermal power and hydro power contribute

around 51.4% and 38.7% to the total installed capacity, respectively. Balance generation capacity is based on nuclear and renewable energy sources.

The present average energy consumption per capita in the State is 580.34 kWh. The percentage of villages electrified to total inhabited villages is 97.43 % as on 31st March 2006.

2.14 Telecommunication

The state has a tele-density of 40.4 (telephone connections per 100 populations). The state has about 2560 telephone exchanges with 28.6 million telephone connections.

2.15 Urban infrastructure

Under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), 22 projects have been sanctioned for urban centres such as Bhopal, Indore, Jabalpur and Ujjain. Projects for water supply, solid-waste management and urban transport have been identified for development under the JNNURM. 50% of the population is connected to sewage network in major cities.

2.16 Water supply

The average per capita supply of water in major cities such as Indore is around 80 litres per day. Under the JNNRUM, cities are planned to achieve per capita water supply of 135 litres per day between 2015 and 2021.

2.17 Industrial infrastructure

There are 19 industrial growth centres (located across 7,147 ha) that are close to major cities in Madhya Pradesh. There are around 171,000 small scale industrial units. Major industrial sectors are auto, auto components, textile, cement, agriculture, forest based industries, minerals and tourism

2.18 Education sector

Madhya Pradesh had a literacy rate of 63.7 %. The state has about 159 engineering colleges, 139 management institutes and five medical colleges.

2.19 Health infrastructure

The healthcare services network of Madhya Pradesh comprises 50 district hospitals (13,400 beds), 333 community health centres, 1,155 primary health centres and 8,659 sub-centres. The total number of in-patient beds in Madhya Pradesh (excluding medical colleges) are 26,971.

3. Climate Change Scenario of Madhya Pradesh

Climate change scenarios for Madhya Pradesh project an increase in maximum and minimum temperatures, changes in spatial and temporal distribution of monsoon, increase in frequency and intensity of rains, loss of rainy days and increase in the frequency and intensity of extreme climatic events including droughts, floods and heat waves. The rainfall variability in Central India including Madhya Pradesh is increasing. The occurrence of low and moderate rainfall events is decreasing over time, while the heavy and extreme rainfall events are increasing over time. Managing increased frequency of extreme events is a priority in immediate future, especially in respect of agriculture. Studies at Indian Agricultural Research Institute, New Delhi showed that climate change is projected to increase the monsoon season mean maximum temperatures by 1.1 to 1.9^{o}C in 2030 (2020-2050) period in A1b scenario in Madhya Pradesh. Similarly seasonal mean minimum temperatures are projected increase between 1.4 and 1.8^{o}C.

With 72 per cent area under rainfed cultivation and predominance of small holders with low adaptive capacity, agriculture sector is therefore highly vulnerable to climatic variability and climate change. Furthermore, incidence of high level of poverty and food insecurity in the State indicates that the rural communities have low adoptive capacity to climate change and variability (Rao et al. 2013). Therefore, any climate change adaptation plan for the state should have agriculture sector at the centre-stage.

Specifically, some of the projected climate risks faced by MP relate to changes in maximum and minimum temperatures, changes in spatial and temporal distribution of monsoon, increase in frequency and intensity of rains, loss of rainy days, extended summers, and increased incidences of droughts and floods. Rainfall during monsoon is projected to increase between 0.5-30.0 % over the baseline period values (Naresh Kumar et al., 2014). The winter season mean maximum temperatures are projected to

increase by 1.4-2.2°C in 2030 (2020-2050) period in A1b scenario in Madhya Pradesh. Similarly, seasonal mean minimum temperatures are projected to increase between 2.1 and 2.7°C. Rainfall during monsoon is projected to change between -35 and +20%. Detailed Climate Profiles of the three districts of the project area is given in (*Annexure V*)

Projected Changes in Climate Parameters for MP		
Projected climate Changes	2021-2051	2071-2100
Daily Max Temp	Increase by 1.8-2^{0}C	Increase by 3.4-4.4^{0}C
Daily Min Temp	Increase by 2.0-2.4^{0}C	Increase by >4.4^{0}C
Monsoon Precipitation	Increase in precipitation by 1.25 times than the current observed rainfall in most parts of Madhya Pradesh; No change in Morena, Shivpuri, Gwalior and Bhind; Increase in precipitation in eastern parts of Hoshangabad, northern part of Betul, north eastern parts of Betul and Southern part of Sehore	More than 1.35 times increase in precipitation with respect to observed climate in most parts of Madhya Pradesh; with major parts of Hoshangabad and Damoh, Manldla and northern parts of Balaghat will experience rain in excess of 1.45 times the observed climate now; the extreme northern and western part of the state will also experience excess rainfal
Winter Precipitation	Decrease in precipitation	Substantial increase in precipitation in Central and South western part of Madhya Pradesh increasing from between 1.45 to 1.85 times
Source: MP State Action Plan on Climate Change (SAPCC), GoMP 2013		

4. Rationale

Madhya Pradesh is a large state of with a population of 70 million people; diverse agro-ecological systems experience large climatic variability, and projected increase in climatic extremes. Agriculture supports

nearly 70 per cent of the rural population in the state. Rice, wheat, soybean and pulses are the main food crops of the state. In recent years, Madhya Pradesh has shown very high growth in agriculture-reaching upto 25% in 2013-2014. This is attributed largely to expansion in irrigation combined with appropriate support of extension, policies and markets. Despite such phenomenal success, agriculture in the state remains vulnerable to climate change and variability. In recent years, the state has also witnessed an increase in climate related factors like droughts, excess rainfall, frost and hailstorm resulting in increased variability in production.

The rain fed nature of rivers of Madhya Pradesh has made them highly susceptible to variations in the distribution and patterns of rainfall. Reduction in the stream run off will have adverse impacts on irrigation and hydro-power projects besides reducing the availability of water for all the other purposes. Studies suggest that these incidences are likely to get more frequent and severe in future given the warming of the earth because of the anthropogenic emissions of greenhouse gases.

Given that Madhya Pradesh's economy is dependent on natural resources and large proportion of its population is dependent on agriculture and forestry, any adverse impact on these and allied sectors will negate the efforts to alleviate poverty and ensure sustainable livelihood for the population. As for forestry, over the years, MP has strengthened the joint management forest management (JFM) involving local communities but the state still faces significant constraints and challenges with regard to safeguarding its forests and waste lands and promoting their development and utilization in optimally and climate friendly way – to protect its forests from deforestation and degradation.

The MP state government is also implementing a number of programs to slow down the pace of deforestation. However, the demand for forest resources, from within and outside the state, is far exceeding the supply making it difficult to accomplish the objective of containing deforestation. Indigenous agro-forestry systems are being affected by factors such as water scarcity and changing socio-economic situation including migration of youth in search of more remunerative jobs. In the process, poverty

incidence among MP's rural areas especially in forest communities has been high (about 80%) while nutritional indicators are very low.

In the interest of coping with the emerging climate change, besides addressing poverty and nutrition issues, there is a need to regulate exploitation of forest and waste lands for infrastructure development, mining and quarrying.

EPCO/ SKMCCC is in unique position to help assist the GOMP's concerned departments to bring about the convergence both at the sectoral level and and among district level offices of these departments to be able to effectively interpret future climate change projections and accordingly undertake climate change adaptation planning and implementation using community/participatory methods

5. Vulnerability Assessment – Overview

Vulnerability and Risk Assessment with respect to Climate Change was carried out in Madhya Pradesh under the Climate Change Adaptation in Rural Areas of India (CCA-RAI) project. Vulnerability Assessment (VA) was also a key component in the structure that was proposed by Indian Ministry of Environment and Forests (MoEF) for the State Action Plans on Climate Change.

Assessing vulnerabilities is the process of identifying, quantifying and prioritising the vulnerabilities in a system. Vulnerabilities from the perspective of climate change means assessing the threats from potential hazards to population, infrastructure, development goals etc. VAs can help to improve adaptation planning, allocation of resources and raising awareness about climate change at different levels. Vulnerabilities cannot be measured directly; it has to be inferred with the help of various variables.

The projections in Vulnerability Assessment have been made for mid-century and end-century based on baseline scenario. To arrive at the composite vulnerability index, drilling down exercise has been carried out based on social, economic, climate, water, agriculture, forest, health and environment vulnerabilities incorporating appropriate indicators for each. The three districts included in the pilot project proposal, namely, Sehore, Rajgarh and Satna have varying vulnerabilities according to individual indices.

Sehore: The composite vulnerability of Sehore district is **high** in all the three scenarios. Social indicators show a high vulnerability in all the three scenarios. Economic, Climate, Water and Environment vulnerability will be increasing in coming decades as compared to baseline scenario. Health vulnerability is projected to remain in very high category for all the three scenarios. The district has been selected based on the current status as well as future projections as outlined in the Vulnerability Assessment report and the villages are selected based on interviews with top district authorities as well as villagers concerned. The consultations with villagers in this regard have been recorded and enclosed as Annexure-IV.

Further, the villages selected in this district were traditionally Soybean/ wheat/ Gram growing villages, however due to market pressure and concurrent losses in soybean they have shifted to paddy. Paddy growing villages have high water, energy and nutrient consumption. This increases the pressure on already stressed and vulnerable resources. The project aims to address these concerns through appropriate interventions like nutrient management, water conservation techniques and energy smart techniques.

Rajgarh: The composite vulnerability of Rajgarh district is **high** in the baseline scenario and is projected to increase to very high vulnerability in the mid-century and end-century scenarios, which calls for taking necessary and timely adaptation interventions. Social, Agriculture, Forest and Environment indicators show a very high vulnerability in all the three scenarios. Economic vulnerability is high in all the three scenarios. Water vulnerability, in particular, is projected to increase from low to high category in mid and end centuries. The district has been selected based on the current status as well as future projections as outlined in the Vulnerability Assessment report and the villages are selected based on interviews with district authorities and field level officials as well as villagers concerned The consultations with villagers in this regard have been recorded and enclosed as Annexure-IV.

Adding to this, the villages selected in this district have undulating topography with very thin layer of top soil. This necessitates to frequent requirement of irrigation to crops. In crop growing season during dry spell, a loss of productivity of crops will be visible leading to concerns of food security and income of farmers. The project aims to reduce

these concerns through adoption of appropriate water conservation and soil rejuvenation techniques, and farmers' income can be ensured through financial literacy drives, which forms a part of the project.

Satna: The composite vulnerability of Satna district is **high** in the baseline scenario and is projected to increase to very high vulnerability in the mid-century and end-century scenarios, making it necessary for interventions. Agriculture, Forest and Environment indicators show a very high vulnerability in all the three scenarios. Climate vulnerability, in particular, is projected as very high vulnerability category in mid and end centuries. The district has been selected based on the current status as well as future projections as outlined in the Vulnerability Assessment report and the villages are selected based on interviews with top district authorities as well as villagers concerned. The consultations with villagers in this regard have been recorded and enclosed as Annexure-IV.

Moreover, the selected villages have challenges of water availability and infrastructure, energy scarcity and human health related issues. Increasing area under mono-cropping is leading to destruction of traditional local crops. Besides, the area is highly sensitive to climate extremes like heat waves and hailstorms. Agriculture is the only source of livelihood of major population of the area. The villages also house tribal population who have a low adaptive capacity due to social and economic conditions prevalent in rural areas. This project aims to increase their adaptive capacity, diversify livelihood options and minimize the climatic risk. Theproject also aims to sensitize, train and build capacities of the farmers in these villages.

The indicators outlined in the Vulnerability Assessment of Madhya Pradesh related to cropping pattern, water availability, etc. have been used in evaluating the composite vulnerability index of the districts. The data which is required to have such an assessment for villages is not readily available at the village level which restricts efforts directed at making projections for baseline as well as long term scenarios. To select villages for the study, district-level vulnerabilities have been utilized and primary consultations with farmer groups have been carried out. The district administrative authorities have also been consulted to validate and give thrust to the entire process.

5.1Methodology

Focus of this study has been on generating Composite Vulnerability Index (CVI) for Madhya Pradesh. The composite indices would facilitate the identification of districts, which are vulnerable to climate change and need special attention towards adaptation. Vulnerability to climate change in Madhya Pradesh has been derived using integrated vulnerability assessment approach. Accordingly socio-economic, environmental, agriculture, water resource, health, climate and forest indicators of vulnerability are employed and classified into adaptive capacity (A), sensitivity (S), and exposure (E).

To analyze the data, multivariate statistical method of Principal Component Analysis (PCA) is performed to obtain the component scores. These are used as weight for the indicators before arriving at the indices. The selected indicators explained the differences in vulnerability between districts with good agreement. Districts are ranked based on the composite indices. Further, this index is developed for the current climatic conditions and for future projected climatic conditions, using PRECIS simulated weather parameters for IPCC SRES A1B. Furthermore, cluster analysis is performed on the indices to group the districts according to their degree of vulnerability using Ward Method of Agglomeration. The districts are grouped into low (1), moderate (2), high (3) and very high (4) categories of vulnerability. The outputs are shown spatially using maps. Blue colour denotes low (1), yellow denotes moderate (2), Red denotes high (3) and dark brown denotes very high (4) vulnerability category in the layouts.

CVI has been created by standardizing indicators across the range of data for districts of Madhya Pradesh, not across a normative range with theoretical high and low values of the indicators. Therefore districts which are at the bottom end of the range with “low” scores nearing zero have the highest relative vulnerability. The districts at the top of the range with “very high” scores nearer to 1 do not necessarily have low absolute vulnerabilities; rather they are better off compared to other districts of Madhya Pradesh.

The analysis of the pattern of vulnerability of districts in Madhya Pradesh to climate change has shown that generally the north, east, south east and south western districts are more vulnerable to climate change. This is explained by the greater exposure to drought and climate extremes as well as low levels of technology and socio-economic and infrastructure development. Vulnerability can result from environmental, social or economic issues. Hence a single policy for all of the districts would not be appropriate.

Rather, judicious and different combinations of policies for different districts could help them in moving closer to achieving sustainability and climate resilience.

Nevertheless, this exercise can be regarded as a modest attempt, amidst multitude of limitations, to assess the preparedness of the districts of Madhya Pradesh to cope with the vulnerability issues and board the development pathway.

Adaptation to climate change requires integrated solutions that simultaneously address livelihood improvements and environmental sustainability. Proactive measures for adaptation to climate variability and change can substantially reduce many of the adverse impacts, and thus contribute to livelihood security of the vulnerable rural population. While climate change will affect the nation's economy as a whole, its impact will be more severely felt by the poor who also have the least adaptive capacity. Recognizing this, the National Action Plan on Climate Change (NAPCC) clearly outlines its first principle as "protecting the poor and vulnerable sections of the society through inclusive and sustainable development strategy, sensitive to climate change".

The vulnerability assessment can be used to address the following questions of immediate relevance to policy-makers and planners:

- To what extent are the anticipated benefits from existing development projects sensitive to the risk of climate variability and change?
- In what way can considerations of future climate risk be incorporated into the design and implementation of development projects?

Climate change is one of the biggest environmental threats facing the world. Scientists around the world now agree that the climatic changes occurring internationally are the result of human activity. Although responsibility for the causes of climate change rests primarily with the developed and industrialized nations, the costs of climate change will be borne most directly by the poor.

It is now increasingly realized that even with the currently agreed regime of emissions control, concentrations of greenhouse gases (GHG) are likely to rise over the next few decades and over the millennia. Climate change is likely to threaten all life forms on earth with the extent of vulnerability varying across regions and populations within regions.

The effects of climate change—higher temperatures, changes in precipitation patterns, rising sea levels, and more frequent weather-related disasters like flood, cyclone, drought, etc. pose risks for agriculture, food, human health, water resources, infrastructure, coastal settlements, and natural ecosystems. At stake are recent gains in the fight against poverty, hunger and disease, and the lives and livelihoods of billions of people in developing countries.

The findings of the recent fourth assessment report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) has clearly brought out the seriousness of the climate change issues and the need for taking urgent measures for dealing with them. India is among the countries that are most vulnerable to adverse impacts of climate change with economic losses potentially as high as 5-9 per cent of GDP (Stern Review). To study these issues in detail, the Ministry of Environment and Forests (MoEF), Government of India, and the Department for Energy and Climate Change (DECC), Government of UK, undertook the Indo-UK collaborative research program on the impacts of climate change in India. Result of this study indicated that Madhya Pradesh would be a severely affected region in the event of climate change.

The State of Madhya Pradesh is vulnerable to natural disasters owning to its unique geo-climatic features. The major natural hazards for the State are earthquake, floods, drought, fire, etc. The State is also vulnerable to manmade disaster. There are more than 400 industries are working in various districts. The State has witnessed a great manmade disaster such as the Bhopal Gas Tragedy 3rd December, 1984 etc. These disasters result in loss of life and property – public and private – and disrupt economic activity, besides causing immense misery and hardship to the affected population.1

A vulnerability assessment is the process of identifying, quantifying, and prioritizing (or ranking) the vulnerabilities in a system. Assessment of vulnerability to climate variability and change broadly helps in:

- Understanding current vulnerability.
- Identify the factors that render some districts more vulnerable than others.
- Inform and facilitate the decision-making process.
- Selection of adaptation strategies and practices.

[1] Madhya Pradesh State Disaster Management Policy (MPSDMP)

In the present study, an assessment of the overall implications of climate change and vulnerability in Madhya Pradesh for seven major sectors social, economic, agriculture, water resource, forest, health and climate has been carried out to identify the vulnerable sectors and regions (districts) to climate change. The objective is to understand the sector-wise vulnerabilities at the district level so that the targeted policies by development agencies can be designed to improve the most vulnerable sectors. The key components incorporated include socioeconomic and environmental indicators. A range of indicators under socioeconomic and environmental indicators as the drivers of vulnerability have been identified.

6. State Action Plan on Climate Change (SAPCC)

The Madhya Pradesh Government has prepared State Action Plan on Climate Change (SAPCC) with an objective to address the existing as well as future challenges of climate change and to take actions to reduce the associated risks and vulnerabilities in different sectors (GoMP 2013). The SAPCC of MP has identified six major sectors: agriculture, forestry, water, urban and transport, energy, industries, which can be potentially impacted by the climate change and variability.

Sector	Key strategies for adaptation to climate change as outlined in MP SAPCC
Water resources	• Increase water use efficiency in irrigation, domestic and industrial purposes
Agriculture sector	• Promoting Soil and Water Conservation technologies • Planning cropping systems suitable for each agro-climatic zone • Capacity building for sustainable agriculture. • Management of risks for sustainable productivity • Enhancing dissemination of new and appropriate technologies developed by researchers and strengthening research • Agriculture Information management • Creation of Rural Business hubs and accessibility to markets • Ensuring availability of adequate feed, fodder and water for livestock • Conservation and management of the fish biodiversity
Energy sector	• Development of Low Carbon Society Pathway • Increase the mix of renewable energy in total energy consumption of the state
Rural development	• Review of existing rural development programmes with Climate Change focus • Convergence and integration with the CC action plans of departments like forest, water, agriculture, energy and health • Climate Change Concerns to be institutionalized in the annual plans of Panchayat • Training and capacity building of rural communities
Source: Madhya Pradesh State Action Plan on Climate Change (Government of MP 2013	

Table above presents key strategies for adaptation to climate change proposed in the SAPCC of Madhya Pradesh which have direct or indirect impact on agriculture sector. Therefore, the state requires an actionable programme that can converge and consolidate all ongoing as well as proposed activities in the different missions and SAPCC and setup a sustainable rural development pathway under climate change.

7. Building adaptive capacity through convergence: Key elements of Climate Smart Village approach

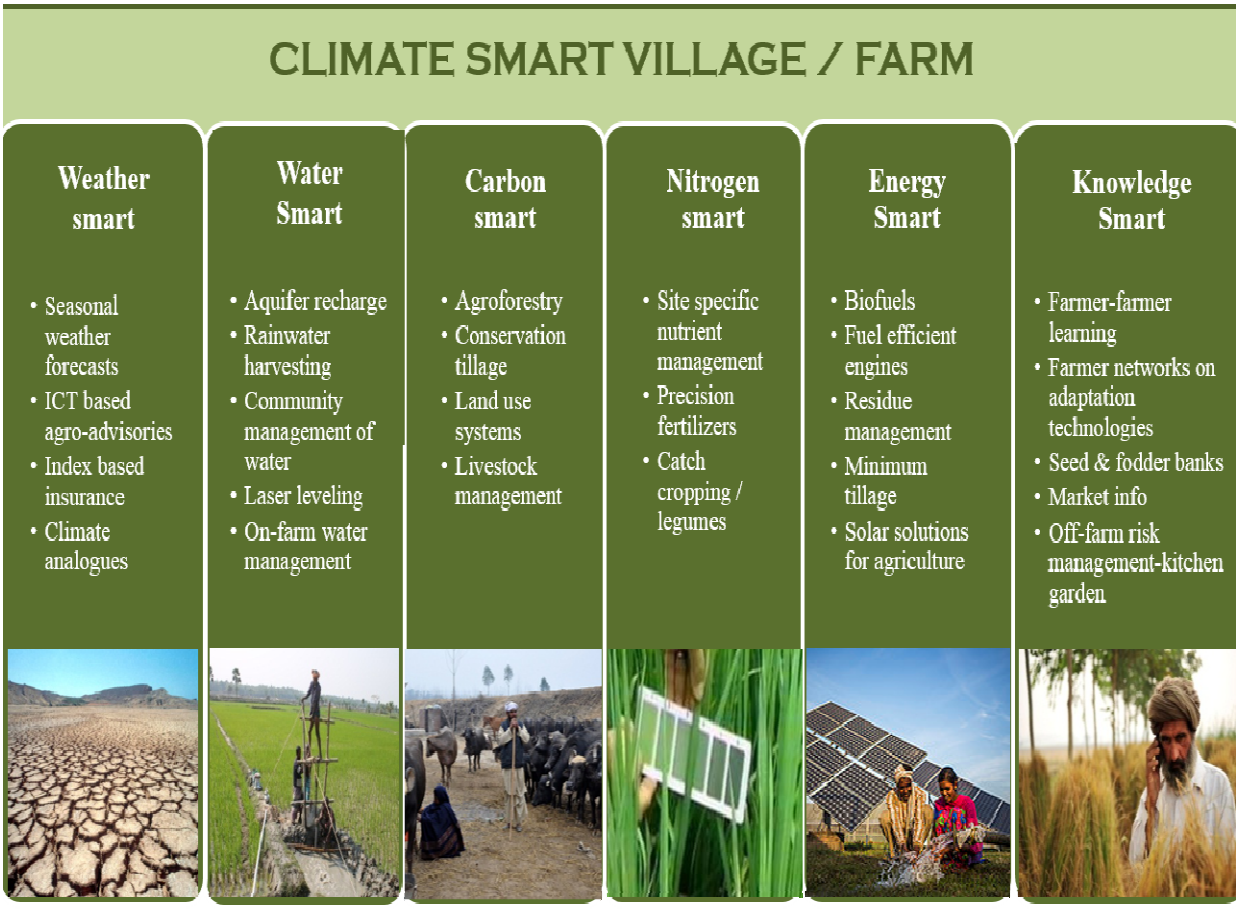
The Climate-Smart Village (CSV) programme is a participatory approach of climate risks management in farming communities that promote adaptation, build their resilience to climate stresses and ensure food security (Aggarwal et al. 2013). The focus of the program is to converge and consolidate all ongoing as well as proposed activities in National Missions and state level policies related to climate change adaptation and mitigation. This programme promotes the judicious utilization of natural and physical resources at village level and alleviates poverty and food insecurity conditions under climate change and variability. The key focus of the climate-smart village program is to enhance climate literacy of farmers and local stakeholders and develop climate resilient agricultural system through linking existing government's agriculture development schemes and investments including rural development programs.

Impacts of climate change on Madhya Pradesh Agriculture

Madhya Pradesh is considered to be vulnerable with respect to Climate Change as it has a large population dependent on agriculture and forests for livelihood. The state's economy is also dependent on natural resources and any adverse impact on these and allied sectors will negate our efforts to alleviate poverty and ensure sustainable livelihood for the population.

Some of the projected climate risks for the state are increase in maximum and minimum temperatures, changes in spatial and temporal distribution of monsoon, increase in frequency and intensity of rains, loss of rainy days, extended summers, and increased incidences of droughts and floods.

The rainfed nature of rivers of Madhya Pradesh has made them highly susceptible to the variations in the distribution and patterns of rainfall. Reduction in the stream run off will have adverse impacts on irrigation and hydro-power projects besides reducing the availability of water for all the other purposes. Studies suggest that these incidences are likely to get more frequent and severe in future given the warming of the earth because of the anthropogenic emissions of greenhouse gases. (Source: IIAR)



Climate smart technologies and climate information are important components of the model and consideration are always given to integrating village development and adaptation plans together with local knowledge and institutions. The model also put emphasis on the involvement of existing community groups consisting of farmers, village officials, civil society organizations, local government officials, community based organizations (e.g. water user groups, forest user groups, and micro-finance institutions), private sector and researchers from the national agricultural research systems (NARS).

The Climate-Smart Village model adopts a portfolio of climate-smart interventions that includes a range of practices and technologies suitable for local agricultural system and community's need (Fig 2). Evidence from various studies in climate-smart village pilot areas in India suggest that these practices and technologies can improve crop yields, increase input use efficiency (water and nutrients), increase net income and adaptation to in-season climatic variability (Jat et al. 2014, Sapkota et al. 2014, Gathala et al. 2011). Within the framework of NAPCC, Madhya Pradesh State Action Plan for Climate Change

(SAPCC) recognizes the vulnerability of the state to climate change and provides for a strategic framework and a range of approaches to address the state's climate change concerns by each of its eleven agro-climatic regions for the following sectors: Forests and Biodiversity, Agriculture, Renewable Energy, Rural Development, Water Resources, Energy, Urban Administration, Health and Industry.

8. Project / Programme Objectives

The general objectives of the project are:

a) Increasing Adaptive Capacity to Climate Change through Developing Climate Smart Villages in Select Vulnerable Districts of Madhya Pradesh

b) Participatory implementation of various climate-smart interventions through different climate-smart village models linking with other community development activities and ongoing NAPCC/SAPCC missions

c) Strengthen the capacity of farmers, PRIs and other stakeholders in conjunction with ongoing missions/schemes;

d) Generate evidence from climate-smart villages in farming communities (economic, environmental and institutional impact assessment); and

e) Facilitate integration and the scaling-up/out the climate-smart village model in collaboration with key stakeholders to implement CSA practices and technologies envisioned by different missions/schemes and Madhya Pradesh State Action Plan on Climate Change (SAPCC)

Brief information on the problem the proposed project/programme is aiming to solve

Madhya Pradesh is considered to be vulnerable with respect to Climate Change as it has a large population dependent on agriculture and forests for livelihood. The state's economy is also dependent on natural resources and any adverse impact of climate change on these sectors will negate state's efforts to alleviate poverty and sustainable livelihood for the population.

With 72 per cent area under rainfed agriculture and more than 70% population dependent on farm based rural economy for their livelihood, climatic variability and climate extreme conditions adversely affects the delicate balance and calls for climate

smart intervention to increase the resilience of ecosystem and enhance the adaptive capacity of vulnerable section of the communities of the state.

With agriculture and allied activities at the fulcrum of climate smart intervention in the vulnerable villages of the three districts they are envisaged to become climate responsive/resilient. Also the cross learning's from the proposed village is expected to have ripple effect in the surrounding villages.

9. Project District Profiles

The three district chosen for the proposed project are home for 4.5 million people of which one million are poor who are unable to meet basic needs. This region has traditionally been water stressed area and now because of the extensive over extraction of ground water the situation has reached to an alarming stage. Clearly the ecological balance of this region is disturbed, environment is degrading and natural resources are getting deteriorated. There are no major initiatives currently on in this region to combat the growing phenomenon of desertification. Keeping these factors in mind it is proposed to take this region for project implementation. Profile of 3 districts is given in following table.

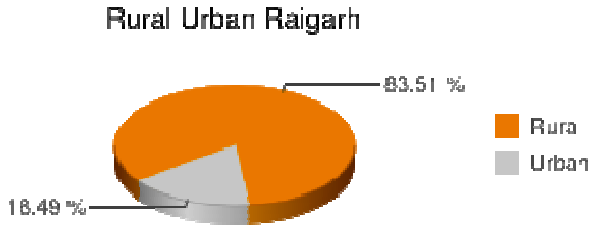
Districts	Sehore	Satna	Rajgarh
Environmental issues	Frequent droughts, invading deserts, crop failure, Rainfall shortage, grassland ecosystems, tribal populations	Frequent droughts, invading deserts, High risk of crop failure, Ravine ecosystem, poor soil quality Rainfall shortage, grassland ecosystems, tribal populations	Frequent droughts, invading deserts, High risk crop of failure, Ravine ecosystem, poor soil quality Rainfall shortage, grassland ecosystems, tribal populations

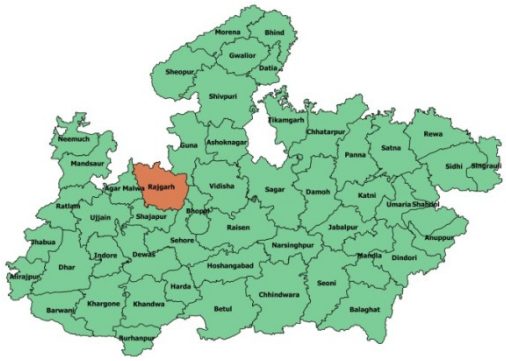
RAJGARH

Agro Climatic Zone (ACZ) – Vindhyan Plateau

Composite Vulnerability Ranking – 34 (baseline), 43 (mid century), 41 (end century)

Total Population (as per census 2011) – 15,45,814





General Information	
Geographical Area (sq Km)	6,154
Tehsil	7
Block	6
Town	13
Census Villages	1,728
Revenue Villages	1,752
Forest Villages	2
Populated Villages	1677
Depopulated Villages	51
Nagar Palika	4
Nagar Panchayat	9
JanpadPanchayat	6
Gram Panchayat	622
KrishiUpajMandi	11
Climatic Information	
Average Rainfall (mm)	813.6
Mean annual rainy days	35 (decreasing trend)
Average temperature	
Average Minimum (December)	11.3° C
Average Maximum (May)	42.4° C

Demographic Information (Population)	
Total	15,45,814
Male	7,90,212
Female	7,55,602
Urban	2,76,457
Rural	12,69,357
Total Household	3,45,297
Urban	53,279
Rural	2,92,018
Population (Total Workers)	7,45,603
Main Workers	4,71,773
Agricultural Labours	1,39,546
Total marginal Agri. labourer	1,91,274
Urban	5,850
Rural	1,85,424
Total SC	2,95,718
Urban SC	2,49,329
Rural SC	46,389
Total ST	53,751
Urban ST	5,083
Rural ST	48,668
Total Literacy	61.21%
Male	73.02%
Female	48.95%
Decadal Growth Rate	23.3%
Density of Population (Per Sq. Km)	251
Sex Ratio (No. of Females per 1000 Males)	
Total	956
Rural	958
Urban	950
Total Population in age group 0-6	2,31,987

Male	1,20,815
Female	1,11,172
Houseless population	2,046
Infant Mortality Rate	
(Rank in MP)	19th
Total	63
Male	61
female	65
Economic Information - Poverty Estimates	
Total %age	37.70%
Rural Poverty	33.59%
Urban Poverty	47.25%
Per Capita Expenditure - Rural	Rs. 7,188
Per Capita Expenditure - Urban	Rs. 10,716
District per capita income (Economic Survey 2010-11)	Rs. 17,944 (in 2008-09)
Gross Domestic Product (Economic Survey 2010-11)	Rs. 2,91,008 (in 2008-09)
Agricultural and allied sector-Major field crops cultivated(in '000 Ha)	
Soybean	291.8
Maize	43.9
Sorghum	34.27
Chickpea	78.90
Wheat	50.10
Lentil pigeon pea Moong, urad	16.80
Horticulture crops - Fruits(in '000 Ha)	
Lemon citrus and orange	1.273
Mango	0.851
Guava	0.370
Horticulture crops - Vegetables(in '000 Ha)	
Potato	1.501
Onion	1.568

Tomato	0.529
Cabbage + cauliflower	0.668
Resources and Infrastructure	
Live Stock (No.)	
Total Live Stock	7,94,122
Total Poultry	1,38,649
Irrigation (In Ha)	
Net Area Irrigated	1,59,877
Gross Area Irrigated	1,60,096
Rain fed area	4,28,910
Sources of irrigation	
Canals	5775
Tanks	3986
Open wells	129500
Bore wells	36236
Land Utilisation (ha)	
Area under forest	17,706
Area not available for cultivation	70,530
Net Sown Area	4,12,714
Public Health (No.)	
Allopathic Hospitals & Dispensaries	11
CHC	5
PHC	31
Civil Hospital	2
No. of beds in civil hospitals	137
District Hospital	1
No. of beds in district hospitals	145
Civil Dispensaries	2
Public Health Centre	27
Sub Public Health Centre	165
Ayurvedic and Others	45
Veterinary Services	

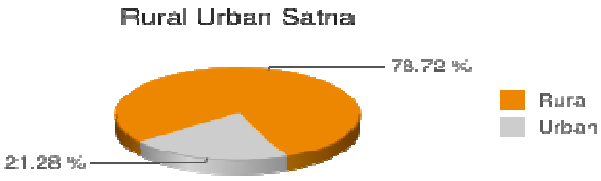
Hospitals	15
Incrimination Centre	6
Veterinary Dispensaries	40
Transport (in Kms)	
Roads	1342
Kuccha	62
Pucka	1280
Education Infrastructure	
Primary School	1926
Middle School	712
High School	121
Higher Sec. School	46
Total Schools	2805
Main Source of Drinking Water(Number of Households)	
Tap water from treated source	
Total	30,897
Urban	25,532
Rural	5,365
Sanitation	
No. of households having Latrine facility within Premises	54,463
No. of households not having latrine facility within premises	2,87,385
Public latrine	1,771

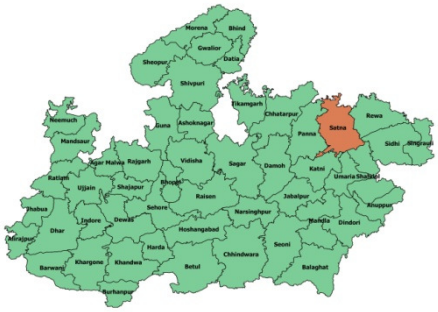
SATNA

Agro Climatic Zone (ACZ) – Kymore Plateau

Composite Vulnerability Ranking – 26 (baseline), 22 (mid century), 22 (end century)

Total Population (as per census 2011) – 22,28,935





General Information	
Geographical Area (sq Km)	7502
Tehsil	10
Block	8
Town	13
Census Villages	1984
Revenue Villages	1816
Forest Villages	
Populated Villages	
Depopulated Villages	
Nagar Palika	01
Nagar Panchayat	09
JanpadPanchayat	8
Gram Panchayat	704
KrishiUpajMandi	
Climatic Information	
Average Rainfall (mm)	1074
Mean annual rainy days	56 (decreasing trend)
Average temperature	
Average Minimum (December)	8.8 ° C
Average Maximum (May)	42.3 ° C
Demographic Information (Population)	

Total	22,28,935
Male	11,57,495
Female	10,71,440
Urban	4,74,418
Rural	17,54,517
Total Household	4,78,741
Urban	92,955
Rural	3,85,786
Population (Total Workers)	9,11,349
Main Workers	6,12,510
Agricultural Labours	3,71,584
Total marginal Agri. labourer	1,80,479
Urban	4,182
Rural	1,76,297
Total SC	3,98,569
Urban SC	77,812
Rural SC	3,20,757
Total ST	53,751
Urban ST	5,083
Rural ST	48,668
Total Literacy	61.21%
Male	73.02%
Female	48.95%
Decadal Growth Rate	23.3%
Density of Population (Per Sq. Km)	251
Sex Ratio (No. of Females per 1000 Males)	
Total	956
Rural	958
Urban	950
Total Population in age group 0-6	2,31,987
Male	1,20,815

Female	1,11,172
Houseless population	2,046
Infant Mortality Rate	
(Rank in MP)	19th
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Guava	0.370
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Tomato	0.529
Cabbage + cauliflower	0.668

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Total Poultry	1,38,649
Resources and Infrastructure	
Irrigation (In Ha)	
Net Area Irrigated	1,59,877
Gross Area Irrigated	1,60,096
Rain fed area	4,28,910
Sources of irrigation	
Canals	5775
Tanks	3986
Open wells	129500
Bore wells	36236
Land Utilisation (ha)	
Area under forest	17,706
Area not available for cultivation	70,530
Net Sown Area	4,12,714
Transport (in Kms)	
Roads	1342
Kuccha	62
Pucka	1280
Main Source of Drinking Water(Number of Households)	
Tap water from treated source	
Total	30,897
Urban	25,532
Rural	5,365
Education Infrastructure	
Primary School	1926
Middle School	712
High School	121
Higher Sec. School	46
Total Schools	2805

Public Health (No.)	
Allopathic Hospitals & Dispensaries	11
CHC	5
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Civil Hospital	2
No. of beds in civil hospitals	137
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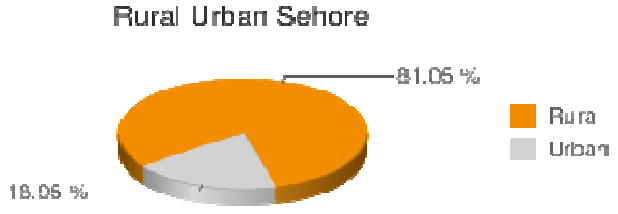
Public Health Centre	27
Sub Public Health Centre	165
Ayurvedic and Others	45
Veterinary Services	
Hospitals	15
Incrimination Centre	6
Veterinary Dispensaries	40
Sanitation	
No. of households having Latrine facility within Premises	54,463
No. of households not having latrine facility within premises	2,87,385
Public latrine	1,771

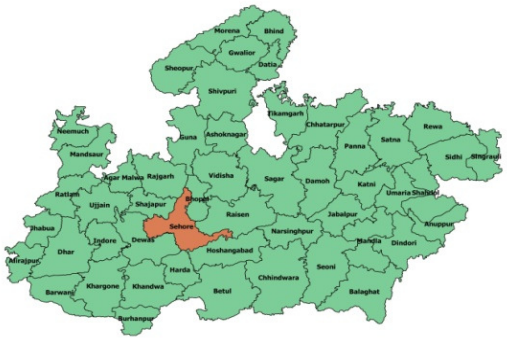
SEHORE

Agro Climatic Zone (ACZ) – Vindhyan Plateau

Composite Vulnerability Ranking – 22 (baseline), 27 (mid century), 26 (end century)

Total Population (census 2011) – 1,311,332





General Information	
Geographical Area (sq Km)	6,578
Tehsil	8
Block	5
Town	9
Census Villages	1072
Revenue Villages	1037
Forest Villages	35
Populated Villages	1011
Depopulated Villages	61
Nagar Palika	2
Nagar Panchayat	7
Janpad Panchayat	5
Gram Panchayat	497
Krishi Upaj Mandi	7
Climatic Information	
Average Rainfall (mm)	1261.1
Mean annual rainy days	51 (decreasing trend)
Average temperature	
Average Minimum (December)	7.9 ° C
Average Maximum (May)	42.4 ° C
Demographic Information (Population)	
Total	1,311,332
Male	6,83,743
Female	6,27,589
Urban	2,48,462
Rural	10,62,870
Total Household	2,57,311
Urban	46,843
Rural	2,10,468
Population (Total Workers)	5,86,087

Main Workers	3,72,150
Agricultural Labours	1,03,531
Total marginal Agri. labourer	1,23,495
Urban	3,705
Rural	1,19,790
Total SC	2,71,281
Total ST	1,45,512
Total Literacy	70.06
Male	80.83
Female	58.33
Decadal Growth Rate	21.54%
Density of Population (Per Sq. Km)	199
Economic Indicator - Poverty Estimates	
Total %age	46.20%
Rural Poverty	49.51%
Urban Poverty	33.61%
Per Capita Expenditure - Rural	Rs.4,476
Per Capita Expenditure - Urban	Rs.7,584
District per capita income (Economic Survey 2010-11)	Rs. 18,786 (in 2008-09)
Gross Domestic Product (Economic Survey 2010-11)	Rs. 2,64,865 (in 2008-09)
Infant Mortality rate (IMR)	
(Rank in MP)	12th
Total	70
Male	74
female	65
Sex Ratio (No. of Females per 1000 Males)	
Total	918
Rural	916
Urban	924
Total Population in age group 0-6	1,97,429

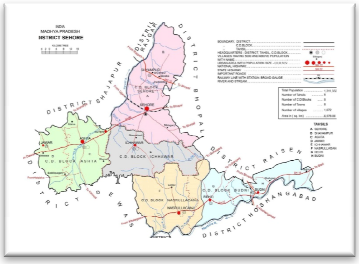
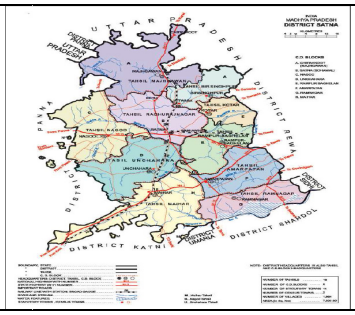
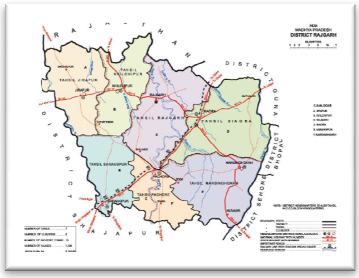
Male	1,03,240
Female	94,189
Houseless population	5,304
Agricultural and allied sector-Major field crops cultivated(in '000 Ha)	
Soybean	265.8
Maize	21.4
Sorghum	4.2
Chickpea	6.8
Wheat	160.1
Lentil pigeon pea Moong, urad	90.1
Horticulture crops – Fruits (in '000 Ha)	
Lemon citrus and orange	0.587
Mango	0.657
Guava	0.555
Horticulture crops – Vegetables (in '000 Ha)	
Potato	0.235
Tomato	0.790
Resources and Infrastructure	
Land Utilisation (ha)	
Area under forest	1,72,554
Area not available for cultivation	
Net Sown Area	3,72,172
Irrigation (In Ha)	
Net Area Irrigated	1,14,041
Gross Area Irrigated	2,29,700
Rain fed area	1,55,500
Sources of irrigation	
Canals	41,200
Tanks	6300
Open wells	83400
Bore wells	53900
Live Stock(No.)	

Total Live Stock	300673
Total Poultry	
Transport (in Kms)	
Roads	2117
Kuccha	1066
Pucka	1041
Public Health (No.)	
Allopathic Hospitals & Dispensaries	3
CHC	6
PHC	16
Civil Hospital	1
No. of beds in civil hospitals	60
District Hospital	1
No. of beds in district hospitals	156
Civil Dispensaries	1
Public Health Centre	17
Sub Public Health Centre	150
Ayurvedic and Others	16
Veterinary Services	
Hospitals	12
Incrimination Centre	2
Veterinary Dispensaries	29
Education Infrastructure	
Primary School	1443
Middle School	656
High School	116
Higher Sec. School	62
Total Schools	2277
Main Source of Drinking Water(Number of Households)	
Tap water from treated source	
Total	24,295
Urban	16,052

Rural	8,243
Sanitation	
No. of households having Latrine facility within Premises	80,229
No. of households not having latrine facility within premises	1,71,357
Public latrine (nos.)	1,454

Project Location details – villages, block/ mandal in the identified districts.

After detailed consultation with district authorities and Chief Executive Officer of respective Zila Panchayat of the three districts a list of 20 villages has been agreed which are as follows:

District	Tehsil	Villages
Sehore	Budni 	Machhwai, Hingnasir, Bisakhedi Dobi, Satramau, Murari, Hoda Chandla Kalan, Khabada, Janwasa, Isharpur,Bineka,Borna Gadar, Jait, khoha, Amnapura Narayanpur, ankhedi, Chikli
Satna	Maihar 	Paraswara , Doondi, Amuwa Naktara, Bineka,Darshanpur Hardua Sani, Gadhwa, Ghunwara, Pipra Kalan, Goraiyakalan, Matwara, Pakariya, Kusedi, Patharhata, Irhara, Mahedar, Gugdi, Sabhaganj, Dhatura
Rajgarh	Rajgarh 	Kotra, Moteepura,khatee, Jaganyapura, Jwalapura, Gawakapura, Jogipura, Chamaree, Devjhiri, Tuteepura, Dhobeepura, Paldee, Fatehpur, Bhaatpura, Bedakapura, Heerapura, Manyapura, Phoolkhedi, Malipura, Manoharpura,

10. Details of Project/ Programme Executing Entity

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme (projects which have four or more than four years of implementation period would require having mid-term review after two years of implementation).

Milestones	**Expected Dates**
Start of Project/Programme Implementation	To be Decided once the concept is approved
Mid-term Review (if planned)	18th Month since the date of project inception
Project/Programme Closing	36th Month since implementation
Terminal Evaluation	3 months before the closing of the project

Project / Programme Components and Financing

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets.

Project /program Components	*Expected Concrete Outcomes*	*Expected Outputs*	*Amount (Rs)*
1. **Seed and Crop Management** Drought Tolerant Kharif and Legume-based Rabi crops 2. **Water Management** Water Harvesting Protective Irrigations Erosion Control 3. **Energy Management** Energy Saving interventions 4. **Nutrient management** Site and crop specific nutrient management 5. **Promotion of residue and legume incorporation/retention** 6. **ICT- Insurance Agro-advisory** Weather-Insurance Two-way Information Exchange 7. **Capacity Building** Trainings including Gender based capacity building	• Increased preparedness of farmers, local institutions, district line agencies, private companies and policy makers on climate risk management. • Increased income and resilience of participating farmers. • Evidences of CSV related to economic (yield, income, employment), social (gender role and group cohesion) and environmental (water efficiency, carbon sequestration and nutrient efficiency) and evaluation of different CSV models	• Operational plans for scaling up/out all five CSV models developed, which will include detailed plans for technological interventions, project implementation and creating enabling policies and plans (e.g. climate change adaptation policies) • A number of knowledge products such as policy briefs, videos on highly promising CSA practices with some interviews of participating farmers and government officials, and peer-reviewed journal articles will be produced and disseminated at various levels; • Financial (e.g. financing and resource leveraging) and institutional (synergy, harmony, synchronization, convergence and integration) mechanisms, implementation strategies (guidelines and schemes) to scale out.	*24.27 Crores*
Project /program Execution Cost		*24.27 Crores*	
Project/Programme Cycle Management Fee charged by the Implementing Entity		*72.80 Lakh*	

Amount of Financing Requested	***24.99 Crores***

Details of project / programme components and financing-

Detailed breakup of cost components for various interventions is given in table below. The cost estimates are based upon discussion with CGIAR team and with department of Agriculture Govt. of Madhya Pradesh.

Component A. Seed & Crop Management

Distribution of drought tolerant seed of field crops

Crops	No. of beneficiary farmer/ village	Quantity of seed (kg) for 1 farmer	area (ha)/ farmer	Seed price Rs./kg	Amount Rs (for One Village)	Amount Rs for 60 village in 3 year	Area covered in 3 yr of 60 villages (ha)
Wheat	15	40	0.5	50	30000	5400000	1350
Gram	15	25	0.5	80	30000	5400000	1350
Lentil	15	10	0.4	80	12000	2160000	1080
Maize	15	10	1	175	26250	4725000	2700
Paddy	15	15	1	80	18000	3240000	2700
Pigeon Pea	15	10	1	300	45000	8100000	2700
Field Pea	15	25	1	125	46875	8437500	2700
Soybean	15	40	0.5	80	48000	8640000	1350
Moog	15	10	0.4	200	30000	5400000	1080
Total	135				286125	51502500	17010

Crop Diversification and Agro-forestry

Crops	No. of beneficiary farmer/ village	Quantity of seedlings per farmer	area (ha)/ farmer	Seedling price Rs./plant	Amount Rs (for One Village)	Amount Rs for 60 village in 3 year	Area covered in 3 yr of 60 villages (ha)
Agro-forestry	20	50	1	50	900000	11250000	4500
Drought Tolerant Fodder crop	20	50	0.2	50	900000	11250000	900
Establishment of Fodder bank (fodder collection charges)	50				900000	9000000	
Total					2700000		

78502500

Sub- total of component A

Component B. Water Smart Intervention

Activities	No. of beneficiary farmer/ village	construction cost of per Pond (Rs)	Area to be benefitted ha	Area to be benefitted in 60 village 3 yr (ha)	Total Cost for 60 village @ 3 Yr
lined Farm Ponds (20 m x 20 m x 3 m)	6	121717	1	1080	131454360
Broad Bed-furrow planting	20	500	10	1800	1800000
Sub- total of component B					**133254360**

Component C. Weather Smart Intervention

Activities	cost of / station Rs	Number	Area to be benefitted	Per village cost (extension/ Dissemination)		Total Cost for 60 villages
Installation of Automated Weather Monitoring station	200000	3	community level			600000
ICT based value-added weather advisory	50	50	community level (*SMS/Bulletin/ Calling*)	2500	150000	450000
Sub- total of component C						**1050000**

Component D. Nutrient Smart Intervention

Activity	No. of beneficiary farmer/ village	Per unit cost (Rs)	Area to be benefitted ha	Area to be benefitted in one village 1 yr (ha)	Area to be benefitted in 60 village 3 yr (ha)	Total Cost for 60 village @ 3 Yr
Macro and Micro-nutrients	20	2000	1	20	3600	7200000

Green-seekers per block	whole village	310	200	200	1800	93000
Promotion of zero tillage	20	500	1	20	3600	1800000
Promotion of crop residue mulching/plastic mulching	20	1000	0.25	5	900	3600000
Sub- total of component D						**12693000**

Component E. Energy Management

Activities	Number of beneficiary farmer/ village	Per unit cost (Rs)	Area to be benefitted ha	Total Cost per village	Total Cost for 60 village @ 3 Yr
Promotion of direct seeding Rice (without bunding and pudling)	25	1000 (weed management charges)	1	25000	4500000
Crop residue management	25	1000	1	25000	1500000
Sub- total of component E					**6000000**

Component F. Energy Management

Activities	Number of beneficiary farmer/ village	Cost of per field (Rs)	Area to be benefitted ha	Area to be benefitted in one village 1 yr (ha)	Area to be benefitted in one village 3 yr (ha)	Total Cost for 60 village @ 3 Yr
Extension, Exchange exp., exposure trips, other IT cost	20	1000	2	40	120	3600000
Activities to ensure insurance uptakes (financial literacy, extension towards insurance)	20	1500	20	400	1200	5400000
Training and capacity building	50	200	100	5000	15000	5100000
Knowledge documentation						400000
Sub- total of component F						**5500000**

Interventions wise details

S. No.	Interventions	Total Cost (Rs.)
1	Seed and Crop Management	78502500.00
2	Water Smart Intervention	133254360.00
3	Weather Smart Intervention	1050000.00
4	Nutrient Smart Intervention	12693000.00
5	Energy Management	6000000.00
6	Knowledge Smart Intervention	5500000.00
7	Administrative expenses	5700000.00
	Total	24,26,99,860.00

G. Convergence of schemes	Cost
(a) Installation of solar water irrigation pump	Not Applicable *These interventions are already been covered under the various govt. schemes of centre and state.
(b) Soil Health Card	
(c) Activities promotion of Organic Farming	
(d) Construction of biogas	
(e) Activities related to Fodder Management	
Cost of all Components of the project (Lakh Rupees/block)	

11. Project / Programme Justification

Component-wise details and justification of the project components are as follows:

What	Why	How	Additional Spin-Offs
Seed and Crop Management **Drought Tolerant Kharif and Legume-based Rabi crops**	Increase frequency of drought and delayed rain has been a major challenge for the farmer communities. To overcome these problems in the region. It is required to introduce drought tolerant Kharif and Legume based Rabi crops, which will mitigate drought	Seed Packets will come at village level through ZSDC/project, from there the implementing agency will distribute it to farmers	Food Security Nutritional Security Income increase Fodder availability through straw etc. Climatic Resilience

	as well as ensure stable Productivity of the region. This will largely improve income, resilience, and adaptive capacity of farmers.		
Water Management **Water Harvesting Protective Irrigations Erosion Control**	Climate change is resulting in erratic rainfall and drought more prominent in the region. In many pockets one day rainfall is resulting in heavy pouring and flooding. However, many time this water is being wasted due to lack of rainwater harvesting and storage management. Thus, it is important to have rain water harvesting. Water is becoming scarce; it has to be effectively using, Thus, available irrigation water supply in managing and controlling the moisture environment of crops to promote the desired crop response, to minimize soil erosion and loss of plant nutrients, to control undesirable water loss, and to protect water quality.	Installation of water flow measuring system and development of water related structures and give related training to farmers	Water Availability and managed agriculture water supply Increased Cropping Intensity Increased Income and improved yields
Energy Management **Alternative energy source**	Access to energy for the most vulnerable rural population is still a luxury. This is a serious deterrent for the livelihood of the population. Solar power can change the same assumption by providing reliable power which will improve the socio economic scenario and water availability for the agriculture use for the	Installation of solar rooftop or solar water pumps for identified more vulnerable groups.	Access to energy and GHG mitigation

	beneficiary. This has also have huge potential for penetration among the people who does not have adequate access to energy		
Nutrient management **Site and crop specific nutrient management Promotion of residue and legume incorporation**	Improve nutrient use efficiency and soil health	Provide training related to nutrient management techniques to farmers	Improve soil health and increase nutrient and water use efficiency
ICT- Insurance Agro-advisory **Weather-Insurance Two-way** **Information Exchange**	Risk Management strategy, knowledge dissemination needed for better adaption practices amongst farmers	Distributing green SIM cards with ICT software, with appropriate trainings by government bodies; enrol farmers in insurance programs	Risk Coverage Increased Farmer Knowledge Farmer Feedback Service-delivery cost savings
Capacity Building **Trainings including Gender based capacity building**	Essential for sustainability of the activities after project period	Conducting regular trainings and establishing farmer resource centres	Increased Skills Sustainability Co-benefits for govt. other schemes

Details on Economic, social and environmental benefits project / programme

Components / Activities	Key Benefits			
	Social	**Economic**	**Environmental**	**Indicators**
Seed and Crop Management	The better seed and crop management will mitigate drought affect as well as ensure stable productivity of the region.	Provide alternative sources of livelihood as well as ensure stable productivity of the region.	Better seed and crop management will reduce the use of fertilizers and pesticides and mitigate the soil and air pollution.	Increase in productivity of a unit size farm (1 acre)
Water Management	Benefits through effective water management	Provide per drop more crop and hence Water Availability and managed agricultural Water supply.	This will promote the desired crop response to minimize soil erosion and loss of plant nutrients to control undesirable water losses.	Increase in poor small land holders' real income.
Energy Management	Better energy management will help vulnerable groups, farmers, students and all part of communities to strengthen them.	Villagers, farmers and vulnerable groups will get access to clean energy which will be beneficial in the long term.	Use of clean energy and replace fossil fuel; reduction/ avoiding GHG emission through climate friendly technologies.	
Nutrient Management	Improve nutrient ratio in local soil, use efficiency and soil health.	Increase farm productivity with less input and hence economical to the farmer communities.	Reduce pressure on natural resources hence maintain the natural resource cycle.	increase in farmers participation in decision making in the area.
Capacity		Help to	Create awareness	More

Building	Result in experience-sharing and knowledge-management for adjacent villagers through visits and trainings.	increase farm production and productivity and also better livelihood.	regarding environmental friendly techniques which will help them adapt to changing climate in the long run	than 1.5 lakhs farmers would be sensitized on climate smart practices
ICT-Insurance and Agro-advisory	Creation of awareness regarding climate change issues and best practices – understanding the true social values obtained from natural resources	Use of climate Resilient technology helping in mitigating climatic risks and losses.	The awareness on climate risk will contribute towards adoption of appropriate environment friendly lifestyle by local communities.	Increase in number of farmers adopting environmental sound practices.

Sustainability of the interventions to be presented component-wise

Activity	Sustainability of intervention
Seed and Crop Management **Drought Tolerant Kharif and Legume-based Rabi crops**	The project and programme since the beginning will involve participation of different group and community. The approach will have flexibility and scope for change throughout the implementation process based on learning. Special attention should be devoted to monitoring and evaluation systems that facilitate community ownership of project outcomes and determining appropriate measures of success. NGOs and other community institutions as true partners, rather than as contractors, and involving them at an early stage of project planning and implementation.
Water Management **Water Harvesting Protective**	The project and programme since the beginning will involve participation of different group and community. The approach will have flexibility and scope for change throughout the

Irrigations **Erosion Control**	implementation process based on learning. Cash for work for water management will be demonstrated. Community can learn and understand its engagement in this kind of programme.
Energy Management **Alternative energy source**	Young volunteer and unemployed youth will be trained and skilled will be developed for installation, commissioning and after service work. The economic and social benefits will be demonstrated and business model will be established for further installation in number of additional houses without govt support.
Nutrient management **Site and crop specific nutrient management** **Promotion of residue and legume incorporation**	The project and programme since the beginning will involve participation of different group and community. The approach will have flexibility and scope for change throughout the implementation process based on learning. Special attention should be devoted to monitoring and evaluation systems that facilitate community ownership of project outcomes and determining appropriate measures of success. NGOs and other community institutions as true partners, rather than as contractors, and involving them at an early stage of project planning and implementation.
ICT- Insurance Agro-advisory **Weather-Insurance** **Two-way Information Exchange**	Appropriate information collection from ICT and sharing is essential in agriculture sectors. With the pilot project, this will demonstrate the advantage of information for mostly marginal farmers. A systematic option pay and use kind of business model will be developed which will help in bringing in sustainable revenue for managing the system.
Capacity Building **Trainings including Gender based capacity building**	Emphasis will be given on capacity development, knowledge management and knowledge sharing. Though the use of ICT the capacity development will be continued.

This project shall be considered as a pilot in the state. It is assumed that the same pattern will be followed after the project period. The farmer communities will be aware and sound enough regarding the climate smart practices and the system proposed in the project would be available too, however the resources may be mobilized from other sources of funding.

Analysis of cost effectiveness of the project

The intervention will result in costs and attribute able physical outputs are spread out over a period of time. The cost-effectiveness analysis has covered 3 years project timeline with the consideration of 3% discount rate for the 60 target project village,as shown in the table given on page During the project implementation the village community and beneficiaries will also contribute to the project activity at various levels. However, the opportunity cost because of village community contribution and associated time engagement for the project has not been considered for the cost effectiveness analysis as a conservative approach.

Duplication of the project with other funding source, if any

A detailed mapping of target village and activities will be done. This will result in identification of existing projects, practices by the village communities and other funding agencies so that duplication will be avoided.

Details on stakeholder consultation including beneficiaries

The project idea of Climate Smart Villages has been emerged in the meeting of State Steering Committee on Climate Change (minutes incorporated in the DPR) headed by Chief Secretary, GoMP. In compliance to the instructions, the project concept was developed. It has been approved in the Technical Scrutiny Committee meeting at MoEFCC.

For gathering inputs and guidance, a stakeholder consultation meeting was held on 09 September 2015 under the chairmanship of Additional Chief Secretary, Rural Development Department, GoMP. In the meeting, officials from line departments, CSOs/NGOs, Subject Experts, etc also participated. The minutes have also been incorporated in the DPR.

After detailed consultation with district authorities and Chief Executive Officer of

respective Zila Panchayat of the three districts a list of 20 villages has been agreed. Hereafter, the real assessment of the beneficiaries will be done at the micro-level during the inception phase of the project.

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

The NAPCC prepared by GOI has set the tone for state level actions on climate change. It highlights the fact that climate change due to accelerated Green House Gases (GHGs) emission has become one of the toughest challenges of the present. NAPCC proposes to implement eight national missions including Solar, Energy efficiency, Sustainable habitats, Water, Himalayan ecosystem, Green India, Sustainable Agriculture, and Strategic Knowledge. These eight missions represent multi-pronged, long-term and integrated strategies with emphasis on the development of new technologies, for achieving key goals in the context of climate change. Taken together, these eight missions will assist the country to adapt to climate change – including mitigation through avoided emission. Within the framework of NAPCC, Madhya Pradesh State Action Plan for Climate Change (SAPCC) recognizes the vulnerability of the state to climate change and provides for a strategic framework and a range of approaches to address the state's climate change concerns by each of its eleven agro-climatic regions.

Details on Stake-holder consultation:

- The MP State Action Plan on Climate change has been developed with large scale stakeholder consultation. During the SAPCC preparation about 30+ consultations were organized in Bhopal with concerning Department and in 14 districts covering 11 Agro-climatic zones of MP.
- The Proposed project idea has emerged in the second meeting of the State Steering Committee on Climate Change headed by Chief Secretary of MP. (Copy enclosed). This committee has representation of all the concerning departments including Rural Development represented by Additional Chief Secretary, GoMP and Agriculture represented by Agriculture Production Commissioner, GoMP.
- One to one consultation meetings were held with the senior policy makers and ACS Rural Development, Principal Secretary Agriculture and Director Agriculture

Department GoMP to get their inputs and *buy in* of their department.

- Structured meetings were organized with the experts including from CGIAR CCFAS program officers and Agriculture Universities to receive technical inputs.
- A consultative meeting of stakeholder departments and other agencies was organized on 9th September under the Chairmanship of Additional Chief Secretary (Rural Development), Govt of MP. The minutes of the meeting are at (*annexure IV*).

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

The project is planned initially for a cluster of 20 villages in three different districts each, it is expected to have a ripple effect in the surrounding villages with the visits and events being organised in the villages through cross learning exercises.

Extensive use of ICT based Agro Advisory techniques is integrated and essential part of the project. Lateral Activities, Capacity Building and Demonstration projects of climate smart practices, training, capacity building will aware more than 2000 people per village. Expected broad, learnings out of the project:-

- Knowledge on use of techniques used in the implementation of the project
- Sensitization on climate change
- Building understanding on adaptation practices applicable while extreme climatic conditions.
- Possibilities of scaling up of the project and developing more CSV in the state
- Strengthening of the institutions involved in the project on climate change issues

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

Expected outcomes	*Expected concrete outputs*	*Sustainability mechanism*	*Responsible party/ies*
• **Increased preparedness of farmers, local institutions, district line agencies, private companies and policy makers on climate risk management.**	• Operational plans for scaling up/out all five CSV models developed, which will include detailed plans for technological interventions, project implementation and creating enabling policies and plans (e.g. climate change adaptation policies)	• SKMCC in association with concerning departments and agencies will facilitate integration and the scaling-up/out the climate-smart village model in collaboration with key stakeholders to implement CSA practices and technologies envisioned.	• Govt of Madhya Pradesh Departments (Agriculture/ Horticulture/ Rural Development and Environment)
• **Increased income and resilience of participating farmers.**	• A number of knowledge products such as policy briefs, videos on highly promising CSA practices	• SKMCC in association with concerning departments and agencies will facilitate integration and the scaling-up/out the climate-smart village model in collaboration with key stakeholders to implement CSA practices and technologies envisioned.	• Govt of Madhya Pradesh Departments (Agriculture/ Horticulture/ Rural Development and Environment)
• **Evidences of CSV related to economic (yield, income, employment),**	with some interviews of participating farmers and government officials, and peer-reviewed journal	• SKMCC in association with concerning departments and agencies will	• Govt of Madhya Pradesh Departments (Agriculture/

social (gender role and group cohesion) and environmental (water efficiency, carbon sequestration and nutrient efficiency) and evaluation of different CSV models	articles will be produced and disseminated at various levels; • Financial (e.g. financing and resource leveraging) and institutional (synergy, harmony, synchronization, convergence and integration) mechanisms, implementation strategies (guidelines and schemes) to scale out	facilitate integration and the scaling-up/out the climate-smart village model in collaboration with key stakeholders to implement CSA practices and technologies envisioned.	Horticulture/ Rural Development and Environment)

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 activities are in compliance with law.*	
Access and Equity	The project is built on the concept that it will be equally accessible to the target group and will follow equity among the different groups.	
Marginalized and Vulnerable Groups	The project will focus on inclusion of marginalised and vulnerable groups specially women	
Human Rights	Human rights protection will be core component of the project plan.	
Gender Equity and Women's Empowerment	The project plan will consider gender equity and women's empowerment during consideration of beneficiaries and project	

	formulation.
Core Labour Rights	Labour rights will be adhered during the implementation of the project.
Indigenous Peoples	It will be observed that indigenous people will not be affected due to project and the focus will be on benefitting indigenous people.
Involuntary Resettlement	The project will adhered to govt regulation for involuntary settlement if there will be any.
Protection of Natural Habitats	*The project will not result in any activities that will affect natural habitats.*
Conservation of Biological Diversity	The project will not affect biological diversity
Climate Change	The project will either be a climate change mitigation or adaptation measures.
Pollution Prevention and Resource Efficiency	Adequate pollution prevention measures and resources efficiency will be done.
Public Health Physical and Cultural Heritage	It will not result is any damage to public health or physical and cultural heritage.
Lands and Soil Conservation	The project will result in lands and soil conservation.

*The blank spaces are due to non-applicability as no further compliance is required.

12. Implementation Arrangements

Describe the arrangements for project / programme implementation.

The Project is proposed to be implemented by the State Knowledge Management Center on Climate Change (SKMCCC) set up within the Environmental Planning and Coordination Organization (EPCO), under the Urban Development and Environment Department, Government of Madhya Pradesh, in close association with the Department of Rural Development and Department of Agriculture, GoMP. Agriculture Universities and CGIAR CCFAS will provide knowledge inputs to SKMCCC.

At the field level PRI will be actively involved to implement the project on site. EPCO as the State designated Agency on Climate Change with the technical support of SKMCCC has the mandate and institutional framework and required infrastructural and human resource base to coordinate with line departments. In Madhya Pradesh no other agency has similar mandate or organizational experience. Therefore SKMCCC at EPCO is the best suited agency to implement the project.

Risk	Rating	Proposed Risk Mitigation Measure
Climatic Risks – arising out of extreme weather events	High	1. Extensive use of ICT based Agro Advisory techniques 2. Use of short duration, drought tolerant, high yielding crop varieties. 3. Surface mulching during dry spells. 4. Use of water saving irrigation. 5. Water conservation structure.
Social Risks –lack of awareness of climate smart practices	Medium	1. Training, capacity building, 2. Demonstration of climate smart practices
Risk due to non-climate drivers that undermines adaptation	Medium	1. Community based participatory planning to check unsustainable agricultural practice
Risk on livelihoods and socio-economic condition of villagers	High	1. Creation of alternate livelihood options to sustain economic support communities.
Financial Risk – Return on Investment?	Low	1. The focus of the climate smart village intervention is on asset creation and capacity building 2. No direct cash transfer to the beneficiaries is envisaged in the project implementation yet tangible returns in terms of efficient use of resources and inputs thereby increasing the adaptive capacity of villagers have been ensured.

Project Management Risk	Very Low	1. Participatory and consultative approach is built-in as part of the project design and implementation phase. This has created considerable ownership among the stakeholders and ensured mitigation of project management related risks, if any. 2. The project is proposed to be implemented with the active involvement of PRIs representatives and officials. Community led organizaton will act as facilitator/ motivator and CEO of Block Panchayat and Zila Panchayat will provide leadership. 3. The project will be governed by the Block Level Panchayat office and managed by a Community based organization with strong participation of stakeholders. The project will be governed by the Block Level Panchayat office and managed by a Community based organization with strong participation of stakeholders.

Result frame work as per the Annexure given in the template is not found enclosed

Attached at Annexure-I

Disbursement schedule with time bound milestones at the component level.

Type of Intervention	**Disbursement of amount(yearly)**			**Estimated total (in lakh Rs)**
	FY1	FY2	FY3	
A. Seed & Crop Management	26167500	26167500	26167500	8502500
B. Water Smart Intervention	40000000	60000000	33254360	133254360
C. Weather Smart Intervention	800000	100000	150,000	1050000
D. Nutrient Smart Intervention	4000000	6000000	2693000	12693000
E. Energy Management	1500000	2500000	2000000	6000000
F. Training & Capacity Building Component	1500000	2000000	2000000	5500000
Administrative Expenditure				5700000
Cost of all Components of the project (Lakh Rupees/block)				24,26,99,860.00

Number of clusters, number of farmers covered vis-a-vis the CSV interventions identified under the project

Total 60 Villages, 20 in each of the three development blocks of the three districts are proposed to be covered. Actual number of farmers/ beneficiaries will be ascertained through the participatory methods and wealth ranking of the villagers. This will be corroborated with the available data and information of the Gram Panchayat.

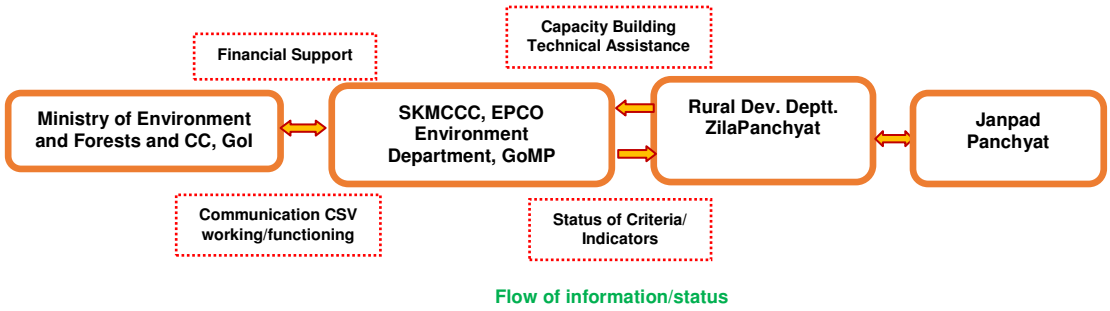
How will the project be coordinated with (and/or mainstreamed into) related development activities of the targeted sector?

As explained above in point no 3a (i), Government of MP has identified EPCO as the state designated agency on Climate Change. State Knowledge Management Center at EPCO will coordinate the project.

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

Risk	*Rating (High / Medium / Low, etc.)*	*Mitigation Measure*
No Environmental Risk	None	Not Required

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

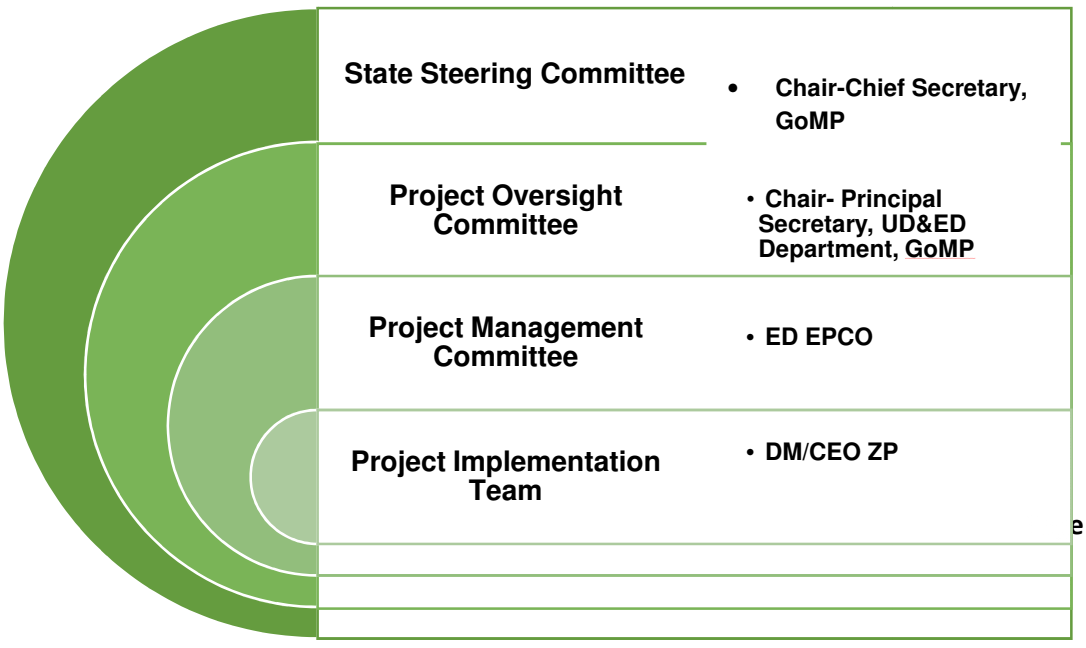


- Continuous assessment of project implementation in relation to defined schedules
- Provide with continuous feedback on project functioning and performance.
- Highlight successes and challenges for enabling timely adjustments to project design.
- Evaluation helps in periodic assessment of a project's relevance, performance and impact in relation to project objectives
- Evaluation also helps improve design of future projects
- For each of the key activities identified, a set of output indicators defined, this will help monitor project performance and allow for any mid-course improvements that may be required
- Project Facilitation Team and Janpad Panchayat will be responsible for ensuring the quality and timeliness of the project activities, implementation activities.

Institutional Mechanism

The Chief Secretary, Govt of MP heads the Steering Committee to provide policy guidance, directives and interdepartmental coordination. An Oversight Committee under Principal Secretary Urban Development and Environment Department, GoMP including the Principal Secretaries of Water resources, Forest, Agricultural & allied sectors and Rural Development Department and Project Management Committee under Executive Director, EPCO.

The Project implementation team will be the headed by the District Collector. CEO, Zila Panchayat will lead the implementation unit and will be assisted by a Project Facilitation Team which will be based at site throughout the entire project duration.



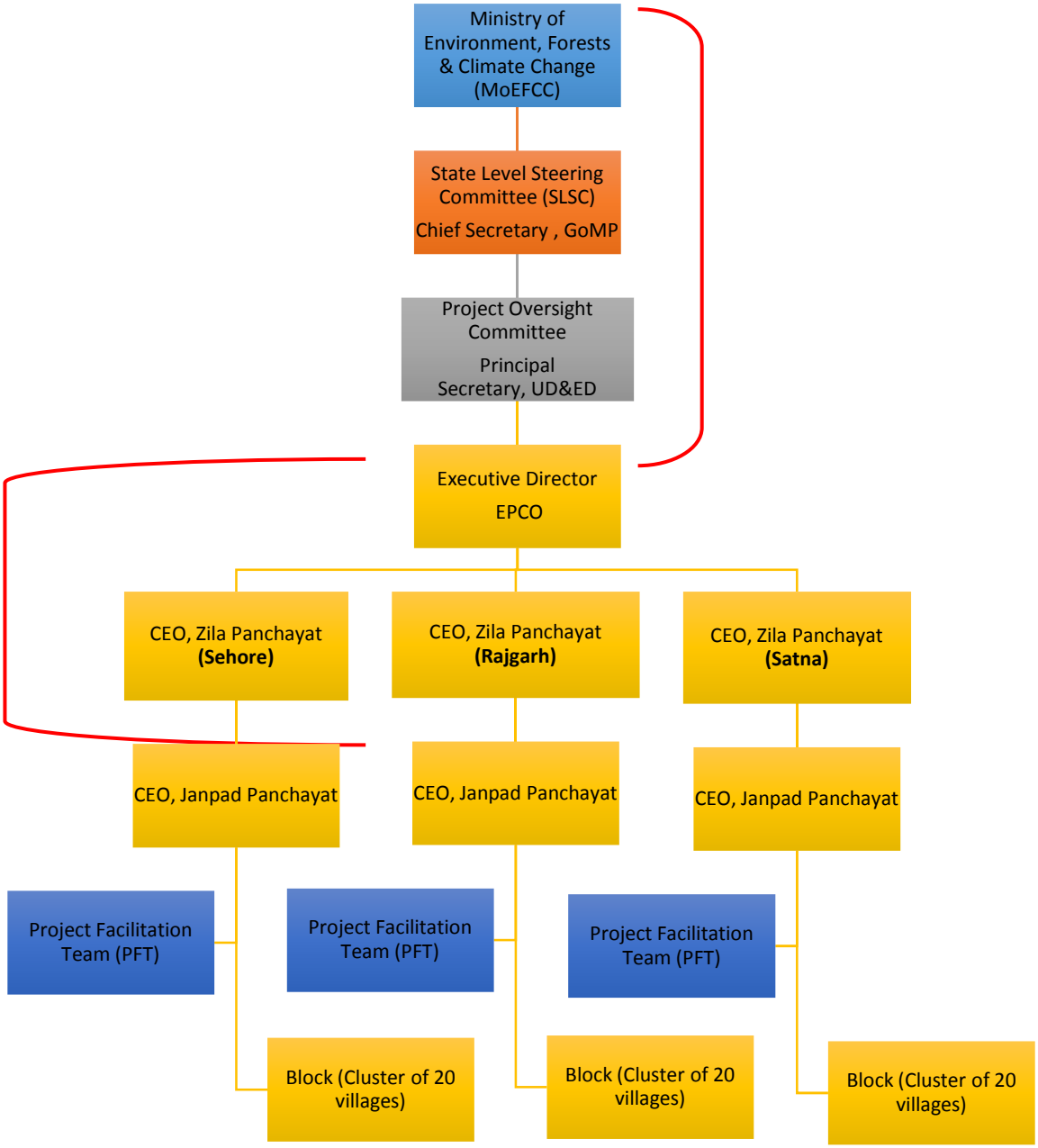
The State Knowledge Management Centre on Climate Change at EPCO, being the State Designated Agency on Climate Change would be facilitating the project implementation at state level. The proposed institutional mechanism and the fund flow chart is indicated as above. It is expected that the funds will be released by Ministry of Environment, Forests and Climate Change (MoEFCC) to Environmental Planning & Coordination Organization (EPCO), a GoMP organization under the Department of Urban Development and Environment, through National Bank for Agriculture and Rural Development (NABARD) including the project management cost of EPCO.

CEO, JP would be the project leader at the Block level in each of the project district, who shall report to Chief Executive Officer, Zila Panchayat (CEO, ZP). A committee will be constituted under CEO, ZP to monitor the activities of the project at district level. All the communication with CEO, JP would be made under the intimation of CEO, ZP. A separate bank account will be opened for operating the funds under the project at the district level also. In turn, the implementation cost would be transferred to respective Chief Executive Officer, Janpad Panchayat (CEO of Block Level) with a responsibility of implementing the project in the respective cluster of villages. The required cost may be released to CEO, JP in instalments per year for 3 consecutive years.

In the next cycle, CEO, JP will utilize the funds for implementing the activities of the project. Officer In-charge of NRLM / Watershed or other programme /scheme may be declared as the Nodal Officer for implementing the project. They may engage the services of nearby communities or local NGOs or subject experts following up a Public Private Partnership (PPP) model to carry out the activities as a Project Facilitation Team (PFT) including the Nodal Officer may be constituted by CEO, JP at district level for operationalizing the project activities.

The utilization certificate as per actual expenditures would be requested from CEO, JP of the respective districts along with a brief report on the progress and expected outputs / deliverables and that would be reported back to MoEFCC.

Framework for Project Implementation and Funds Flow



Activity Schedule and Timelines

The project envisages implementation period of about 3years from the date of inception. Since this project deals with the climate change and rural development sector, which in itself is cross sectoral hence considerable time would be required in setting up the

institutional mechanism and building the ownership. The timelines and activity mix proposes to use participatory methods to identify the local issues and assess the vulnerability because of climate change. The schedule of activity also makes provision for monitoring and evaluation and capacity building of field functionaries. The following matrix suggests the quarterly activities of the project.

No	Activity Mix	Proposed Time Frame											
		Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
A	**Setting the Project Management and Implementation Mechanism**												
1	Project launch workshop at Bhopal to introduce the project and build ownership												
2	Establishing institutional implementation mechanism at State and District Level												
3	Setting up Project Teams and engagement of project facilitation team at the District												
4	District level Workshops to launch the project												
5	Project Team Training/ meeting and cross learning's												
B	**Base line Survey and Stakeholders identification and resource mapping**												
1	Baseline data collection of the project area and mapping it on GIS platform												
2	Conduct Village /Cluster level PRA to understand local issues and record the CC perception of the community												
3	Conduct cluster level Climate Change Vulnerability Assessment and identify weak/ missing links in rural ecosystem												
4	Review of ongoing rural development initiatives and capitalizing possibilities of												

	convergence												
5	Identify vulnerable households in the selected villages as beneficiaries												
6	Formulation of community /stakeholders based Village specific action plan												
7	Identification of technological options for interventions												
8	Entry point activities for rapport building												
C	**On ground Project Implementation – Strengthening the rural ecosystem Linkages of respective Cluster/ Village**												
1	**Seed and Crop Management** Drought Tolerant Kharif and Legume-based Rabi crops												
2	**Water Management** Water Harvesting, Protective Irrigations Erosion Control												
3	**Energy Management** Alternative energy source												
4	**Nutrient Management** Site and crop specific nutrient management, Promotion of residue and legume incorporation												
5	**ICT- Insurance** Agro-advisory, Weather-Insurance Two-way Information Exchange												
6	**Capacity Building** Trainings including Gender based												

	capacity building												
D	**Lateral Activities and Capacity Building**												
1	Establishing procurement chain & enhance market linkages through farmer institutions, CBOs etc												
2	Capacity building and skill development of primary and secondary stakeholders through knowledge sharing and participatory approach												
3	Conduct Village to Village visits and organize events for cross learning's												
E	**Project management and Monitoring & Evaluation**												
1	Midterm evaluation												
2	Final evaluation												
3	Project documentation												
4	Project Completion Report												

Organizational Details	
Name, Registration No. & Date, Registered Address, Project Office Address	**Name -** State Knowledge Management Center on Climate Change Environmental Planning and Coordination Organization (EPCO) Urban Development and Environment Department Government of Madhya Pradesh
	Registration No.
	Address – Paryavaran Parisar, E-5, Arera Colony, Bhopal- 462016 Phone: 0755 2460255, 2464318, 2466859 Fax: 0755 2462136
Available technical manpower for the proposed project implementation:	GoMP has set up a State Knowledge Management Center on Climate Change (SKMCCC) within EPCO which is registered society under the Urban Development and Environment Department, GoMP. SKMCCC is receiving financial support from Department of Science and Technology GoI for engagement of professionals and technical activities. As part of the five year project subject experts and professionals have been engaged.

Three largest Climate Change Adaptation Projects handled Details given in the following Table

Project Name	**Objective**	**Funding Agency**	**Project Amount (In Rs.)**	**Geographical Coverage**	**Implementation Period**
1) Climate Change Adaptation in Rural Areas of India	• Vulnerability and Risk assessment • Development of technical adaptation options • Climate proofing of rural development programmes • Development of adaptation oriented financial instruments • Information and knowledge management to	MoEF& CC , and GIZ	832,00,000	State of Madhya Pradesh	Jan 2010 – Dec 2014

	support mainstreaming national discussions on climate change adaptation				
2) Madhya Pradesh SKMCCC	• To Strengthen MP SCCKMC • Address the Aims and Objectives of NMSKMCC • Assist M&E and Integration of the MP SAPCC • Training, Capacity Building and IEC activities	DST, GoI	500,00,000	State of Madhya Pradesh	5 Years (2013-2018)
3)Strengthening Madhya Pradesh Climate Change Cell	• Developing MP Climate Change Cell into a Knowledge Management Centre to effectively manage the knowledge related to climate change • Development of State level Climate Change Strategy and Action Plan and • Mainstreaming of Climate Change Concern into policy and programmes.	UNDP		State of Madhya Pradesh	2009-2012 (Phase-I) Aug2013-Dec2014 (Phase-II)
4)	• Provide technical	DFID	437,00,000	State of	Feb 2015 -

Strengthening Performance Management in Government	support to SKMCCC in facilitating mainstreaming of climate change concerns into departmental activities, plans and programmes.			Madhya Pradesh	March 2016
5)Vulnerability and Adaptation Assessment	• To conduct impact and vulnerability assessment for understanding climate induced vulnerabilities at household, community and state level. • To analyse existing adaptation practice and assess the techno-socio-economic feasibility of options for adaptation practice. • To link the research output to existing development activities and identify potential areas for capacity development.	Indo – UK joint Project MoEFF& CC + DECC of UK Govt	88.00 lakhs	Malwa and Bundelkhand ACZ of MP	
Three largest community based NRM based projects handled • Environmental monitoring of WB supported District Poverty Initiative Program in 14 District of MP					

- Conservation of the Bhoj Wetland Project in Bhopal
- Biosphere Reserve Management (Pachmari , Panna and Amarkantak)

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

- MoFCC- GIZ joint project on Climate Change Adaptation in Rural Areas of India
- Indo-UK project on Vulnerability and Adaptation Assessment in 2 Agro-climatic regions of MP
- UNDP support for preparation of SAPCC
- DST support for Strengthening of Climate Change Knowledge Center

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

- SKMCCC which is also the State Designated Agency for Climate Change Issues in the state of Madhya Pradesh is housed in a permanent building at Bhopal and has the entire infrastructural wherewithal to coordinate the implementation of the proposed project.

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

- Not Applicable. SKMCCC, EPCO is a Government of MP Organization.

Table for Presenting the Result Framework

Outcome/ Output	Indicator	Baseline	Target	Sources of Verification	Risk and Assumption
Component 1: Seed and Crop Management					
Outcome 1: Drought Tolerant Kharif and Legume-based Rabi crops	- Changes in the demand/disburse -ment of the drought tolerant seed - Change in crop productivity per hectare by 20-25%	To be ascertained during the inception phase of the project	-Enhancing resilience of farmers towards any extreme events and shocks -Increase in farmer's income by 20%	District/block level agriculture departments and research institutions (KVK. etc.)	Assumptions: Cooperation from Agri dept, KVK, relevant stakeholders is expected. Acceptance of interventions by local farmers & communities. Risks: Risk due to extreme
Output 1.1 Creating enabling policies and plans (e.g. climate change adaptation	Quantity of area/population covered under such practices on field	To be ascertained during the inception phase of the project	Integrating policies addressing climate change related issues in government policy making	Agriculture department	

policies)					weather events resulting crop loss and farmer's distress
Component 2: Water Management					
Outcome 2: Water Harvesting Protective Irrigations Erosion Control	• Number of water harvesting structures developed • % changes in net/gross irrigation area	To be ascertained during the inception phase of the project	• Establish effective water harvesting systems to guard communites from climate related shocks • Minimize soil erosion	Water resource and rural development departments, local survey, stakeholder consultation	***Assumptions***: Cooperation from Water Resources dept& relevant stakeholders is expected. Participation from local farmers & Communities . ***Risks:*** Overuse of water may deplete the available water resource in the region, high erosion would lead to removal of top soil
Output 2.1: Increased water use efficiency and reduce wastage	• Changes in local water resource quantity, ground water level, etc. with respect to productivity • Change in crop productivity	To be ascertained during the inception phase of the project	Ensure optimum usage of water and reduction in overuse		
Component 3: Energy Management					
Outcome 3: Use of renewable energy sources like	Number of renewable energy(solar energy, biogas energy) based	To be ascertained during the inception phase of the project	Better waste management and tapping of renewable energy	Department of renewable energy, FGD	***Assumptions***: Cooperation from Agri dept, N&R Energy

solar, biogas, etc. in the region	installations		potential		dept & relevant stakeholders is expected.
Component 4: Nutrient management					
Outcome 4: Site and crop specific nutrient management	-Number of farmers adopted CSV suggested management techniques -Area benefitted from techniques	To be ascertained during the inception phase of the project	Ensure better nutrient management and reduce expenditure on the same	Soil health card and District/block level agriculture departments and research institutions (KVK. Etc.)	

The overall benefit from the project with the target area given in table below:

S. No.	Components	Benefits/indicators	Target
1.	Improved seed (Certified seed) distribution including drought tolerant seeds for Soybean, Paddy, Maize, Wheat and Pulses.	Farmers income	**22050 hectare** To enhance farmer's income by atleast 20%
2.	area benefitted from different activities of water smart intervention	Crop Yield, farmers Income	**1650 hectare** 30 % changes in net/gross irrigation area
3.	Crop Diversification	Crop Yield, farmers Income, soil Health	**5040 ha** to ensure availability of seedlings to all farmers of 60 villages
4.	training, capacity building activity	Awareness about Climate Change	**1,000 farmers**
5.	Weather smart interventions	Community level	**60 Villages** to send SMS to all farmers of all 60 villages
6.	ICT based value-added weather advisory		150 families

7.	demonstration project		all farmers from 60 village
8.	Nutrient Smart Intervention	Crop Yield, Soil Status	**46800 ha** To enhance farmer's income by atleast 20%
9.	Energy Management	Crop yield, farmers Income	**300 ha, 300 House holds** To enhance farmer's income by at least 10 %

Annexure- II

Ist Stakeholder consultation meeting for "Developing DPR for Pilot Project on Climate Smart Village" on 9th September

A consultation meeting for "*Developing DPR for Pilot Project on Climate Smart Villages*" was convened on 09September, 2015 at Bhopal. The meeting was chaired by Additional Chief Secretary, GoMP, Rural Development Department.

The excerpts of the discussions held in meeting are as follows:

- Team leader, CGIAR – South Asia explained the concept of Climate Smart Village (CSV) to all and how climate smart development is different from traditional development.
- Director, Alternative Futures said that the development plan of a climate smart village focuses on latest technology and innovations which are applicable locally along with capacity building component.
- Director, TAAL suggested exploring possibilities of incorporating the concept of ecosystem services as part of the indicators in the DPR.
- CGM, NABARD suggested that specific practices viz. crops varieties, etc. be suggested as per the suitability in respective Agro Climate Zone. He suggested that information on existing schemes being implemented in the project areas be included so that the possibilities of convergence with existing schemes be explored.
- It was decided that the proposed project be implemented in 3 districts i.e. Sehore, Rajgarh and Satna of MP. However, their criteria for selection be elaborated in the DPR as per their vulnerabilities towards climate change. Also, 20 villages in each district be selected from same cluster in a contiguous manner and these should be the vulnerable villages of the district.

- It was also suggested that implementation strategy in the DPR be robust enough so that the expected outputs of the project be tangible, practical and specific in order to measure the progress with respect to baseline.
- Suggestions to include marketing linkages in the DPR.
- It was suggested by chair that the one of the outputs of the project should be enhancing on enhanced livelihoods of the households in the DPR. The household incomes be competitive & sustainable to signify adaptive capacity of the villagers.
- Chair instructed that the project should include all the parameters & requirements for Climate Smart Village for which additional finance, if need be, can be mobilized.
- It was also suggested that Officer In-charge of Watershed / NRLM could be made Nodal Officer for implementation of the project in the district. The Nodal Officer will work under respective CEO of respective Janpad Panchayat.
- Since, State Knowledge Management Centre on Climate Change (SKMCCC) at EPCO is developing the project and would continue to facilitate the project implementation, hence MoEFCC, GoI will directly release the funds to EPCO and EPCO in turn will release the funds to respective Janpad Panchayat under intimation to CEO, Zila Panchayat.

State Steering Committee on Climate Change
Minutes of the Meeting
18th Feburary 2015

The second meeting of the State Steering Committee on Climate Change took place on 18th February 2015. Chief Secretary, Govt of Madhya Pradesh chaired the meeting. Following members of the committee were present.

S No	Name	
1	**Shri Anthony de Sa** Chief Secretary, Govt of MP	In Chair
2	**Mrs Aruna Sharma** Additional Chief Secretary Rural Development and Development Commissioner Govt of MP	Member
3	**Shri S R Mohanty** Additional Chief Secretary New and Renewable Energy Department	Member
4	**Shri R K Swain** Agriculture production Commissioner	Member Secretary
5	**Shri A P Shrivastava** Principal Secretary Forests Department, Govt of MP	Member
6	**Shri Radheshyam Julania** Principal Secretary Water Resource Department, Govt of MP	Member
7	**Shri S N Mishra** Principal Secretary Urban Development and Environment and Director General EPCO	Member
8	**Shri Rajesh Rajoura** Principal Secretary Department of Agriculture, Govt of MP	Member
9	**Mrs Suraj Damor** Secretary Department of Health Govt of MP	Member
10	**Shri Akhilesh Kekre** UNDP- India MP Office	Special Invitee
11	**Shri Ajatshatru Shrivastava** Executive Director, EPCO	Member Convener

In the beginning Principal Secretary UD&E Department and DG EPCO welcomed all and gave the background of the State Knowledge Management Centre on Climate Change. He said that the SKMCCC has been set up in EPCO as per the policy intent of the Vision Document -2018. He also submitted that a State Steering Committee has been constituted and this is the second meeting. It was submitted that Advisor Department of Science and Technology, GoI, and Director MoEFCC, GoI who were invited as special invitees have excused themselves from attending the meeting owing to their preoccupations.

With the permission of Chair a brief presentation on the agenda of the meeting was made by Executive Director EPCO. The agenda point wise decision and instructions are submitted as below.

Agenda point No 1
Compliance Report

The committee was appraised that action on all the instructions and decisions taken in the first SSC meeting has been complied with.

Appreciating the concept of Hub and Spoke model for SKMCCC Chief Secretary asked about the status of constitution and frequency of meeting of the Divisional level Climate Change Committees. It was submitted that as per the instruction of SSC and as advised by the GAD, the UD&ED had issued orders regarding the formation of these committees. Since UNDP could engage only three Community based organizations as Climate Change Pulse Centres respectively in Chambal, Indore and Sagar Division hence the activities could only be initiated in these three division.

Since the UNDP project has ended on 31st Dec, 2014, therefore the contract with CCPC has also ended. However UNDP has indicated that possibilities of continuing the support for engaging CCPC in all the Divisional Headquarters will be explored in the next phase of UNDP–Swiss Development Corporation project on implementation of SAPCC, which is currently being designed.

Agenda point 2
Review of the Progress and Achievement of SKMCCC

The SSC was appraised about the Hub and Spoke Structure of the SKMCCC and the three level review mechanisms and details of ongoing, completed and pipeline projects.

2.1 DST Project for Support SKMCCC

ED EPCO informed that MP SKMCCC is first State centre receiving support from National Mission for Strategic Knowledge on Climate Change (NMSKCC). This is a 5 year project started in March, 2013 with a core grant of Rs. 500.00 lakhs for the 5 year project period. The DST support is for Human resources Technical activities Demonstration projects. We have received a total of Rs. 90.00 lakhs in May 2013. The request for release of next trench of grants is being sent to DST GoI.

It was informed that Workshops with Departmental Climate Change Working Groups (CCWGs) and govt. officials are being organized at regular intervals (Workshop with DCCWG of WRD on 21, June 2014, Forest Department on 30, Aug 2014, National Conference on Climate Change on 6-7 Sept 2014 and workshop on Climate Change & Agriculture on 08, Jan 2015) Besides this workshop with IAG on 09, Dec 2014 with IIFM was also organised

The SSC was appraised that one study has been commissioned to IIFM on "Study of Indigenous Knowledge (IK) in Agricultural Practices" and the second study to IIT-GN on Strategic knowledge generation on climate change.

2.2 SPMG Project Phase-II, Output-IV

It was informed that Strengthening Performance Management in Governance (SPMG), is a DFID supported Project coordinated by Finance Department, GoMP. As part of this project Output -4, dealing with Improvement of Institutional capacity to facilitate climate change and environmental sustainability is being looked after by UD&E Department, The project duration is up to March 2016.

The DFID has selected Development Alternatives (DA) as Technical Support Unit It was also informed that .as part of the SPMG project 5 year perspective plan of SKMCCC with HR & Financial resources will be made. Besides this development of knowledge products, Formulation of project on "Climate Change Adaptation", Training and Capacity Building modules will be prepared and Exposure visits will be organized.

The Chair enquired about the content and features of the Web GIS based Climate Information System and Drought Monitoring Tool-kit. He instructed that these are important information tool and hence it should be designed in such a way that their long term utility is ensured.

2.3 GoMP-UNDP Project Phase-II

The SSC was informed that UNDP project phase –II has ended in December 2014. As part of the project Portal launched & SAPCC released in Sept 2014. We have received support for infrastructural and human resources.

2.4 DFID Scoping Studies on SAPCC of Six States

DFID- India had approached EPCO to undertake 2 studies:-Asses the institutional arrangement and the capacities of the key stakeholders to and knowledge and data gap deliver SAPCCs and develop a strategy to address gaps. These two scoping studies are part of the Climate Change Innovation Programme (CCIP) supported by MoEFCC. Studies have since been completed and submitted to DFID

2.5 World Bank support for SAPCC

It was submitted that MP is one of the two states in the country chosen by World Bank to support SAPCC implementation. A Bank's Mission visited Bhopal on 13 Nov 2014 and again on 22-23 Jan 2015 and expressed intentions to support Climate Change Adaptation project which could be in the form of Grant and TA. A letter from GoMP to Country Director, World Bank conveying our willingness and further actions for collaboration has already been sent.

2.6 UNDP-SDC Project

After Successful completion of EPCO-UNDP Project Phase-1 & Phase-2 UNDP and SDC and expressed willingness to continue support, the next phase focuses on implementation of MP SAPCC Thematic focus is on climate change and water resources Project is in design phase consultation with WRD. Till the next phase commences, UNDP has agreed in principle to continue its HR support for professionals engaged in PMU of SKMCCC.

2.7 MoEF-GIZ CCA-RAI Project

Climate Change Adaptation in Rural Areas of India (CCA-RAI) Phase-I, an Indo-German Development project completed in Dec 2014. MP was one of the four states which have completed all the components. CCA-RAI project phase II– is under planning stage The State Govt. has expressed interest to be a partner and Indications are that MP would be one of the partner state

2.8 Support from MoEF under CCAP

MoEFCC sanctioned a project worth Rs 10 lakh for implementation of research & technical activities of MP SAPCC. The grant is for Human Resources and Technical activities. One Technical Expert to be engaged at par with and on the existing DST project norms

2.9 Training & Capacity Building Activities

It was submitted that a Climate Change Appreciation Course has been designed and conducted at RCVP Academy of Administration. Besides CCAC technical and financial support to 5 ATMA districts of MP has been given for training & capacity building of field functionaries of ATMA. Workshops with DCCWGs, govt. officials planned at regular intervals.

The Chair enquired about the course content and delivery of the CCAC and instructed that more such courses should be organized. He also directed that Department should nominate officers to attend these trainings.

Activity details of the SKMCCC were also presented and SSC approved the activity plan. Appreciating the idea about launching a Certificate Course on Climate Change (C4), Chair asked to give details of the course design. It was submitted that the certificate course is aimed at mid-career professionals, research scholars, NGOs and media and drawn from across sectors and disciplines. The course content duration and process of admissions etc is being worked out in consultation with IIFM, Bhopal. Soon the course will be launched. The SSC approved the proposal. The SSC lauded the efforts and expressed its satisfaction over the progress made by the SKMCCC.

Agenda point No 3
Other Issues with the permission of Chair

3.1 Additional Chief Secretary, Department of Rural Development said that there is need and possibilities of building climate change concerns in the rural development sector. She suggested that SKMCCC should develop a primer and training module on Climate change for the newly elected panchayat representatives.

3.2 Additional Chief Secretary Department of New and Renewable Energy said that the drought monitoring tool kit should be able to give necessary inputs to the concerning department well in advance to help decide the policy intervention.

3.3 Agriculture Production Commissioner suggested that SKMCCC should take up cluster of villages to make them model Climate Smart Villages where all the concepts and ideas can be showcased.

3.4 Principal Secretary Water Resource Department suggested documenting success stories of concerning departments. This will help in ascertaining and evaluating our activities.

3.5 Principal Secretary, Agriculture appraised the chair about the initiatives of the department with regard to National Mission on Sustainable Agriculture.

3.6 Principal Secretary, UD&E Department submitted that State Knowledge Centre is set up with the purpose of creating, collating and disseminating state specific information and knowledge on climate change. He assured that services of SKMCCC are available for knowledge related assistance to all the departments.

3.7 Meeting ended with Executive Director EPCO expressing vote of thanks to the Chair and all the members of the State Steering Committee.

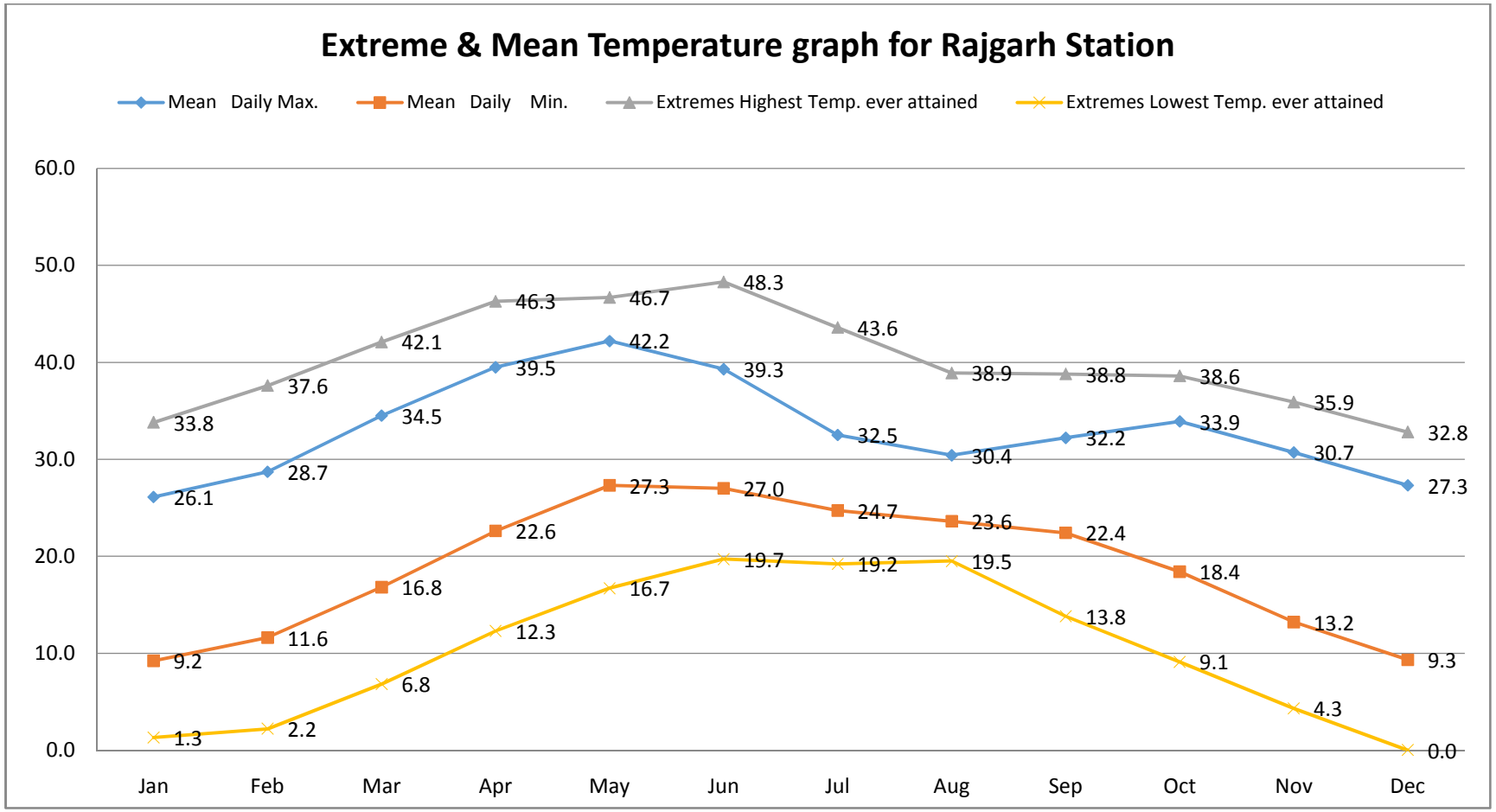
Climate profile of Rajgarh Weather Station:

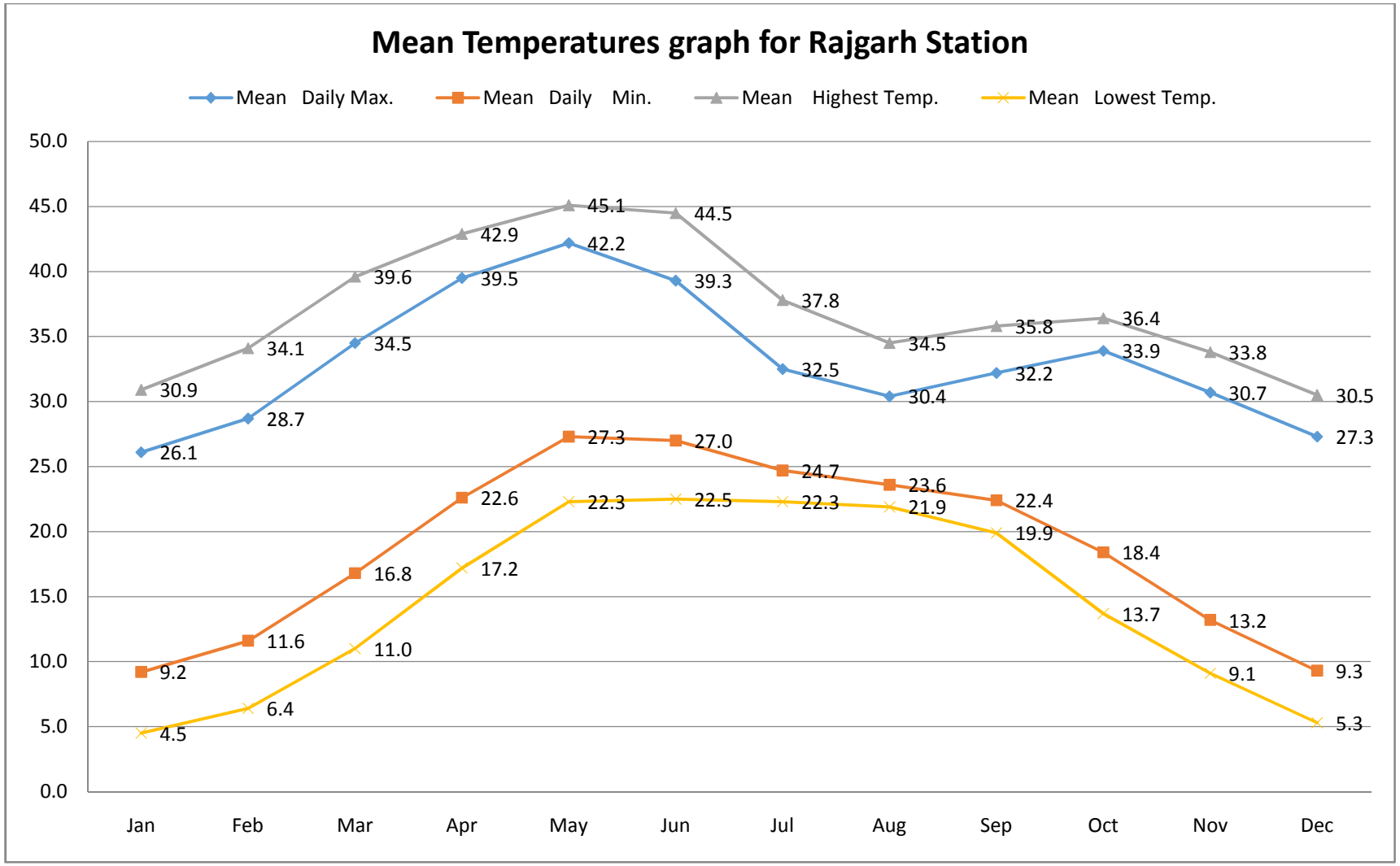
The Rajgarh weather station was established in 1955. It is located in the compound of civil hospital and falls in the Agro Climatic Zone of Vindhyan Plateau in western Madhya Pradesh. The data available is up to year 2000. The climate profile of the region is shown in the table below.

Rajgarh Weather Station Climate Profile																	
Months	Temperature(in C)								Rainfall(in mm)								Humidity (in %)
	Mean				Extremes				Mean		Extremes						
	Daily Max.	Daily Min.	Highest Temp.	Lowest Temp.	Highest Temp. ever attained		Lowest Temp. ever attained		Monthly	No. of rainy days	Total Rainfall in wettest month(year)		Total Rainfall in driest month (year)		Heaviest Rainfall in 24 hours		
Jan	26.1	9.2	30.9	4.5	33.8	1990	1.3	1962	9.4	0.7	99.8	1982	0.0		63.6	1982	67
Feb	28.7	11.6	34.1	6.4	37.6	1966	2.2	1957	7.1	0.6	54.5	1979	0.0		36	1979	54
Mar	34.5	16.8	39.6	11.0	42.1	1991	6.8	1971	1.5	0.3	44.1	1957	0.0		19.3	1957	40
Apr	39.5	22.6	42.9	17.2	46.3	1958	12.3	1965	2	0.2	35.5	1983	0.0		33.2	1983	35
May	42.2	27.3	45.1	22.3	46.7	1994	16.7	1960	9	1	39.8	1956	0.0		27.4	1956	42
Jun	39.3	27.0	44.5	22.5	48.3	1994	19.7	2000	90.5	5.3	260.5	1990	2.9	1962	148	1990	63
Jul	32.5	24.7	37.8	22.3	43.6	1991	19.2	1999	266.5	11.6	770.7	1973	22.9	1997	192.9	1973	81
Aug	30.4	23.6	34.5	21.9	38.9	1972	19.5	1999	312.3	11.8	831.8	1969	9.5	1999	300.2	1960	87
Sep	32.2	22.4	35.8	19.9	38.8	1979	13.8	1972	103	5.4	557.9	1961	11.4	1998	149.2	1985	80
Oct	33.9	18.4	36.4	13.7	38.6	1986	9.1	1964	20.2	1.4	359.2	1985	0.0		257.5	1985	64
Nov	30.7	13.2	33.8	9.1	35.9	1994	4.3	1970	11.9	0.7	169.5	1969	0.0		144.1	1969	59
Dec	27.3	9.3	30.5	5.3	32.8	1963	0.0	1955	5.9	0.4	81.6	1967	0.0		60.3	1978	64

Temperature:

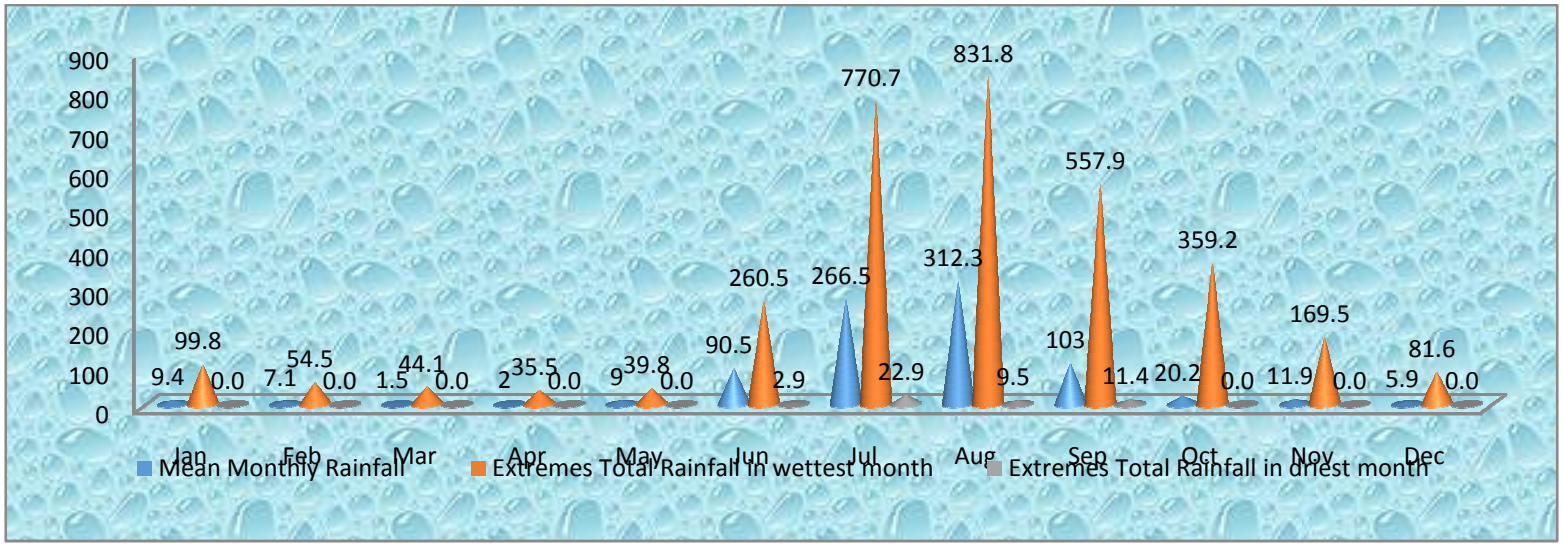
All the temperature variables remain generally low in winter and high in summer season. The highest temperature ever attained is 48.3 C in the month of June in year 1994, while lowest temperature ever attained is 0.0 C in December of year 1955.

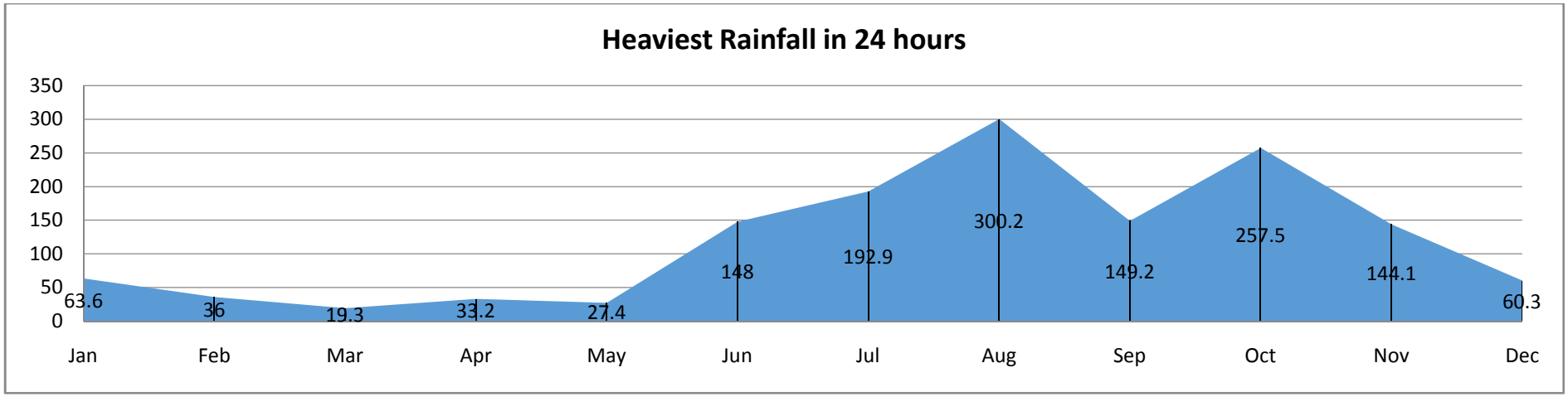



Mean Temperatures graph for Rajgarh Station
Mean Daily Max.
Mean Daily Min.
Mean Highest Temp.
Mean Lowest Temp.
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
30.9
34.1
39.6
42.9
45.1
44.5
37.8
34.5
35.8
36.4
33.8
30.5
26.1
28.7
34.5
39.5
42.2
39.3
32.5
30.4
32.2
33.9
30.7
27.3
9.2
11.6
16.8
22.6
27.3
27.0
24.7
23.6
22.4
18.4
13.2
9.3
4.5
6.4
11.0
17.2
22.3
22.5
22.3
21.9
19.9
13.7
9.1
5.3

Rainfall pattern of Rajgarh weather station:

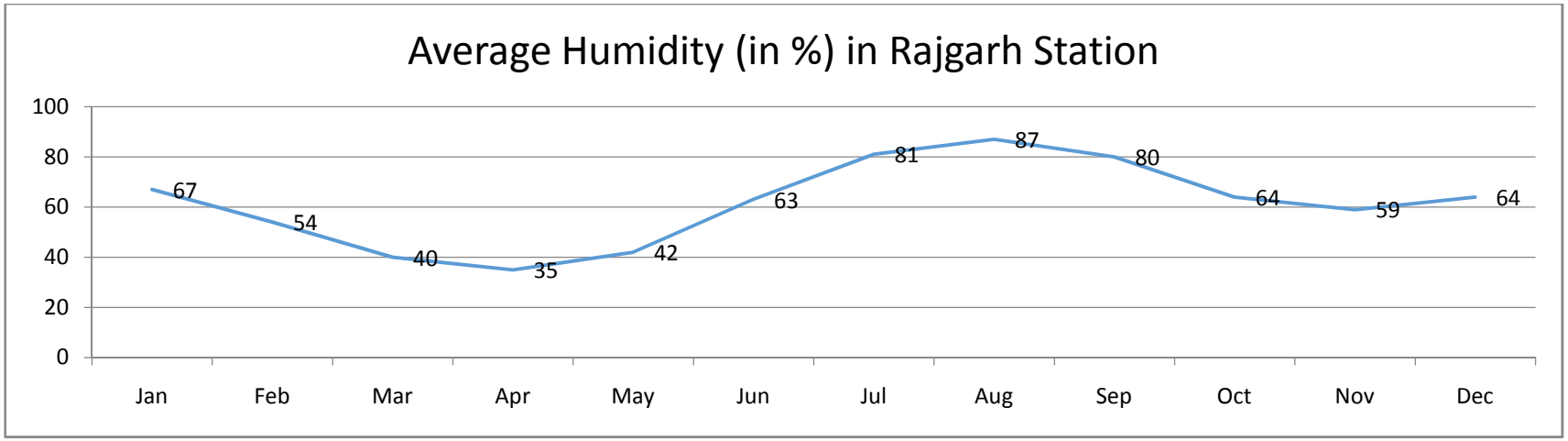
Rajgarh receives 90 percent of the precipitation in the four months i.e., June, July, August and September. The heaviest rainfall occurred in 24 hours is 300.2 mm in the month of August in 1960. On an average, there are 39.5 rainy days in a year in the region.





Humidity:

During the 30 year period humidity was found to be lowest for the month of April which was 35 %, while highest for the month of August which was 87 %.



Climate extremes frequency in Rajgarh				
•	What is the major contingency the district is prone to?	Regular	Occasional	None
	Drought		√	
	Flood			√
	Cyclone			√
	Hailstorm		√	
	Heatwave		√	
	Coldwave		√	
	Frost		√	
	Seawaterintrusion			√
	Pestsanddiseaseoutbreak(specify)Girdlebeetel,semilooperinsoybeanandgrampod borerinchickpea		√	

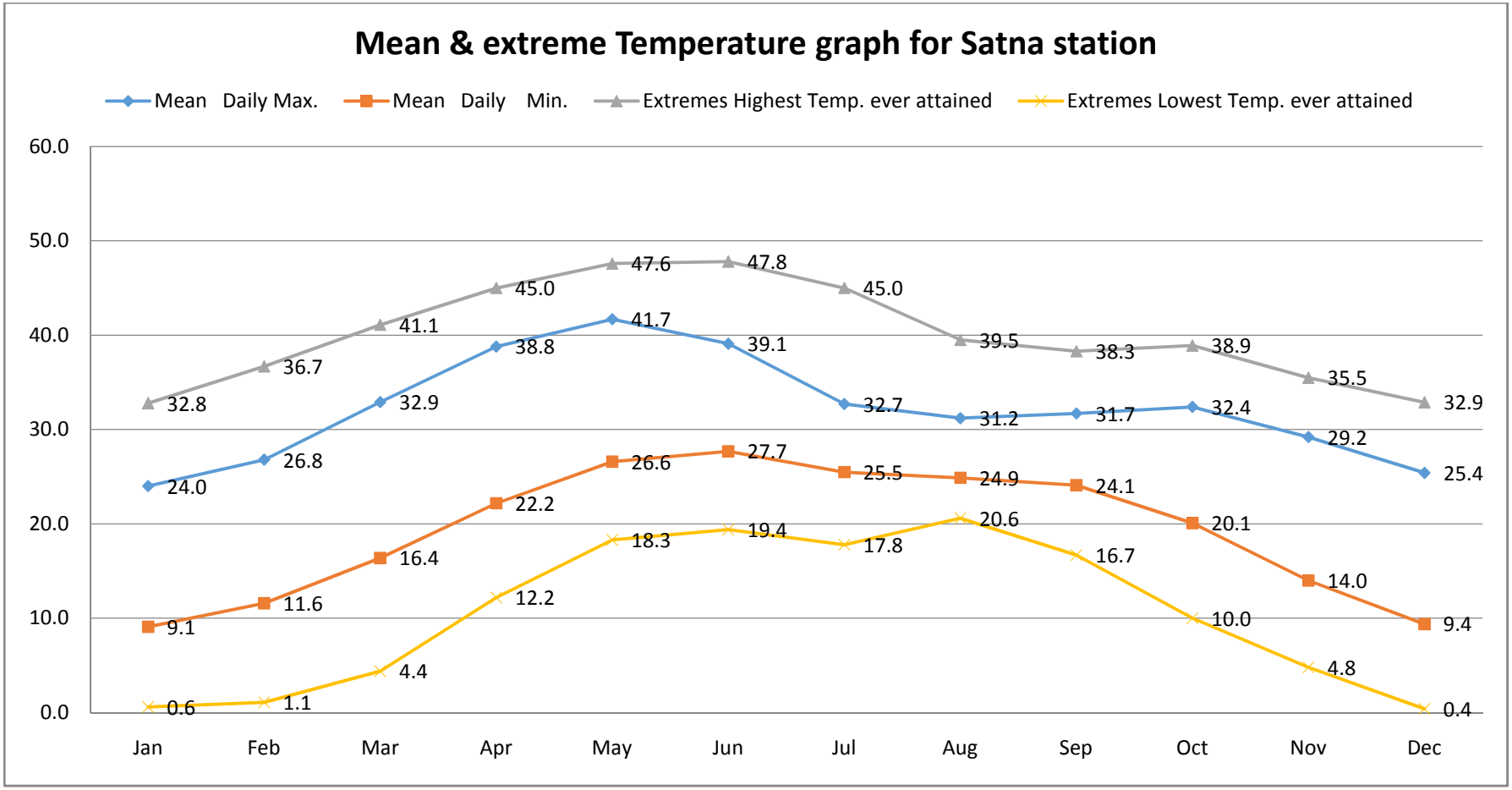
Climate profile of Satna Weather Station:

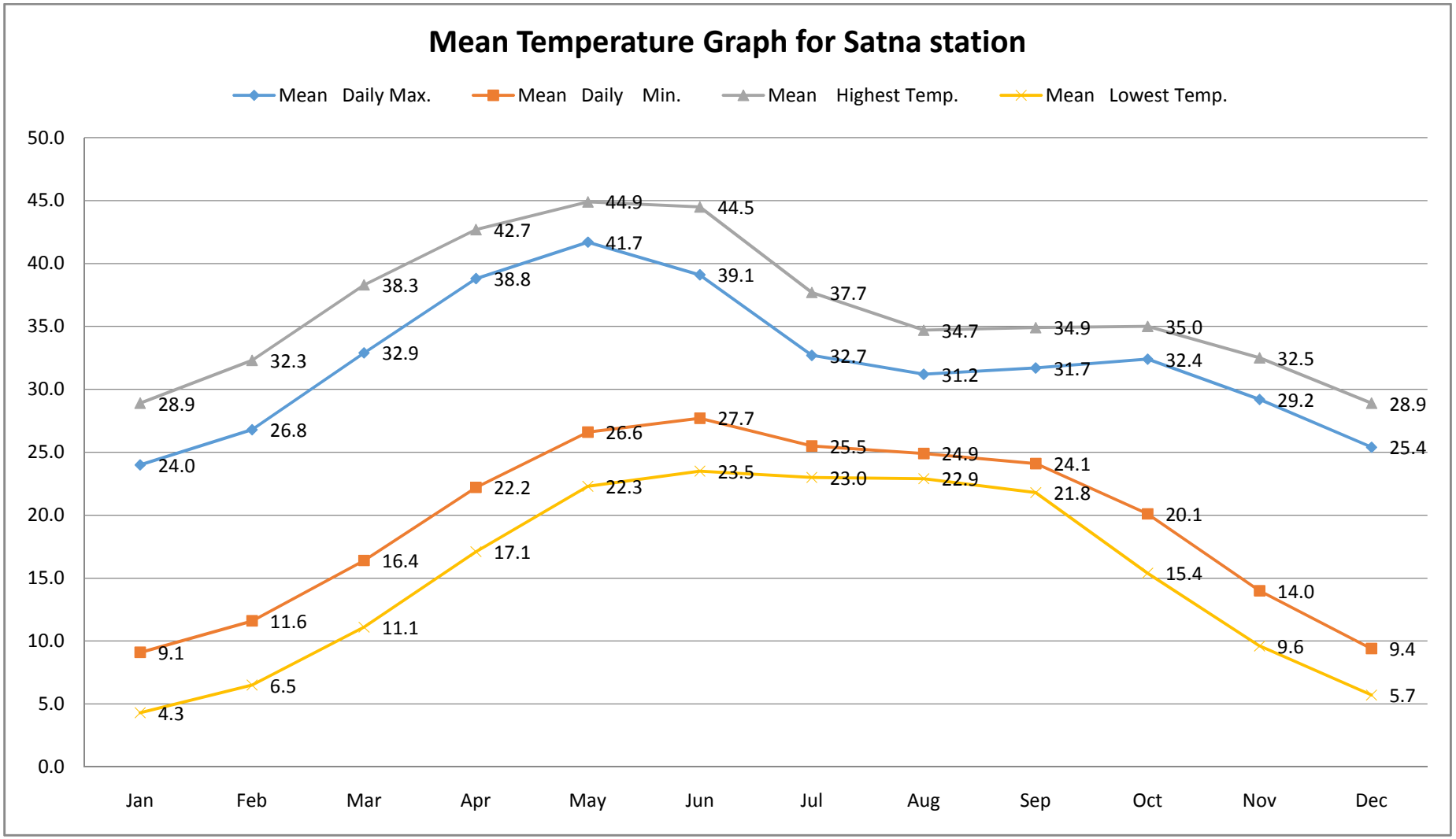
Satna weather station was established in 1954. It is a flat area with a few hills at some distance from the station. It falls in the Agro Climatic Zone of *Kymore Plateau* in North Eastern Madhya Pradesh. The data available is up to year 2000. The climate profile of the region is shown in the table below.

Satna Weather Station Climate Profile																	
Months	Temperature(in C)								Rainfall(in mm)								Humidity (in %)
	Mean				Extremes				Mean		Extremes						
	Daily Max.	Daily Min.	Highest Temp.	Lowest Temp.	Highest Temp. ever attained		Lowest Temp. ever attained		Monthly	No. of rainy days	Total Rainfall in wettest month(year)		Total Rainfall in driest month (year)		Heaviest Rainfall in 24 hours		
Jan	24.0	9.1	28.9	4.3	32.8	1965	0.6	1933	22.5	1.8	188.5	1955	0.0		81.3	1955	73
Feb	26.8	11.6	32.3	6.5	36.7	1966	1.1	1905	23.6	1.8	144.0	1907	0.0		49.3	1936	65
Mar	32.9	16.4	38.3	11.1	41.1	1945	4.4	1949	11.1	1.1	103.4	1944	0.0		43.9	1893	47
Apr	38.8	22.2	42.7	17.1	45.0	1999	12.2	1918	6.6	0.9	71.9	1933	0.0		52.8	1946	32
May	41.7	26.6	44.9	22.3	47.6	1994	18.3	1933	12.8	1.2	90.9	1933	0.0		33.5	1914	34
Jun	39.1	27.7	44.5	23.5	47.8	1954	19.4	1929	135.6	6.6	779.0	1882	7.4	1900	562.6	1882	56
Jul	32.7	25.5	37.7	23.0	45.0	1931	17.8	1929	329.7	14	731.1	1971	71.4	1911	216.2	1971	80
Aug	31.2	24.9	34.7	22.9	39.5	1987	20.6	1990	351.5	14.6	909.6	1919	64.3	1906	299.7	1919	86
Sep	31.7	24.1	34.9	21.8	38.3	1979	16.7	1912	198.1	9	620.5	1993	14.0	1885	269.4	1978	81
Oct	32.4	20.1	35.0	15.4	38.9	1966	10.0	1890	32.3	2.2	334.8	1894	0.0		152.4	1882	69
Nov	29.2	14.0	32.5	9.6	35.5	1957	4.8	1970	9.8	0.6	175.3	1948	0.0		84.6	1956	64
Dec	25.4	9.4	28.9	5.7	32.9	1963	0.4	1961	8.4	0.7	116.1	1885	0.0		47.7	1929	72

Temperature:

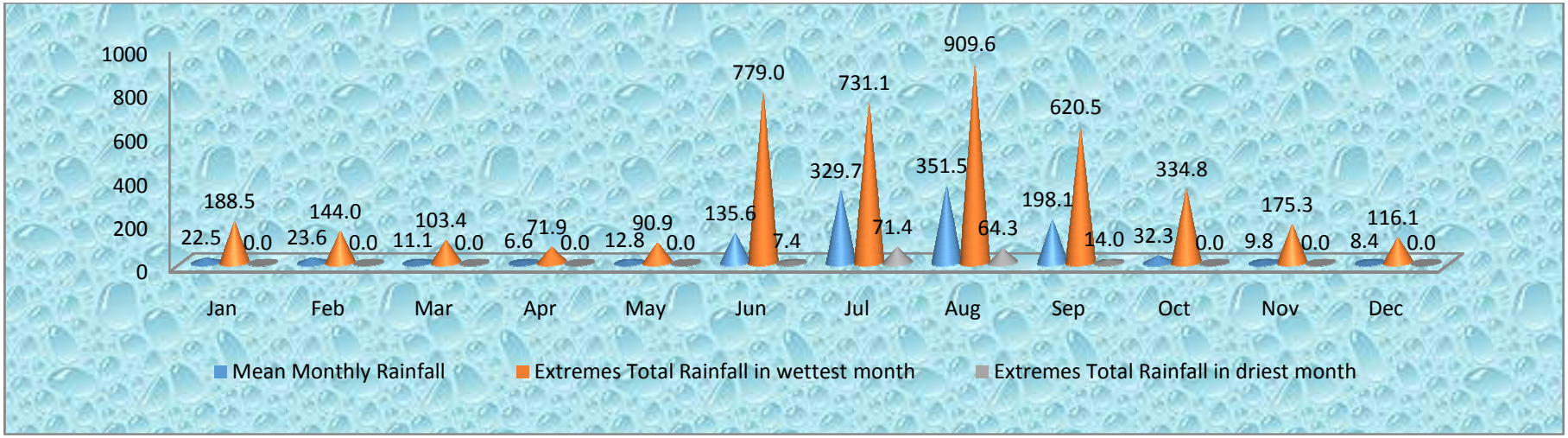
All the temperature variables remain generally low in winter and high in summer season. The highest temperature ever attained is 47.8 C in the month of June in year 1954, while lowest temperature ever attained is 0.4 C in December in 1961.

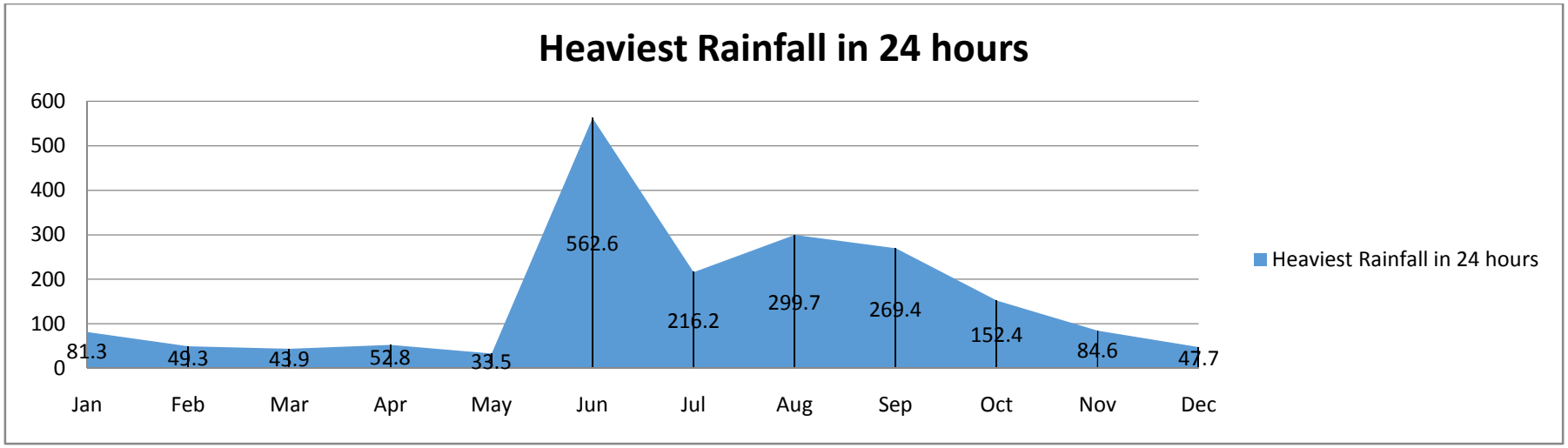



Mean Temperature Graph for Satna station
Mean Daily Max.
Mean Daily Min.
Mean Highest Temp.
Mean Lowest Temp.
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
24.0
26.8
32.9
38.8
41.7
39.1
32.7
31.2
31.7
32.4
29.2
25.4
28.9
32.3
38.3
42.7
44.9
44.5
37.7
34.7
34.9
35.0
32.5
28.9
9.1
11.6
16.4
22.2
26.6
27.7
25.5
24.9
24.1
20.1
14.0
9.4
4.3
6.5
11.1
17.1
22.3
23.5
23.0
22.9
21.8
15.4
9.6
5.7

Rainfall pattern of Satna weather station:

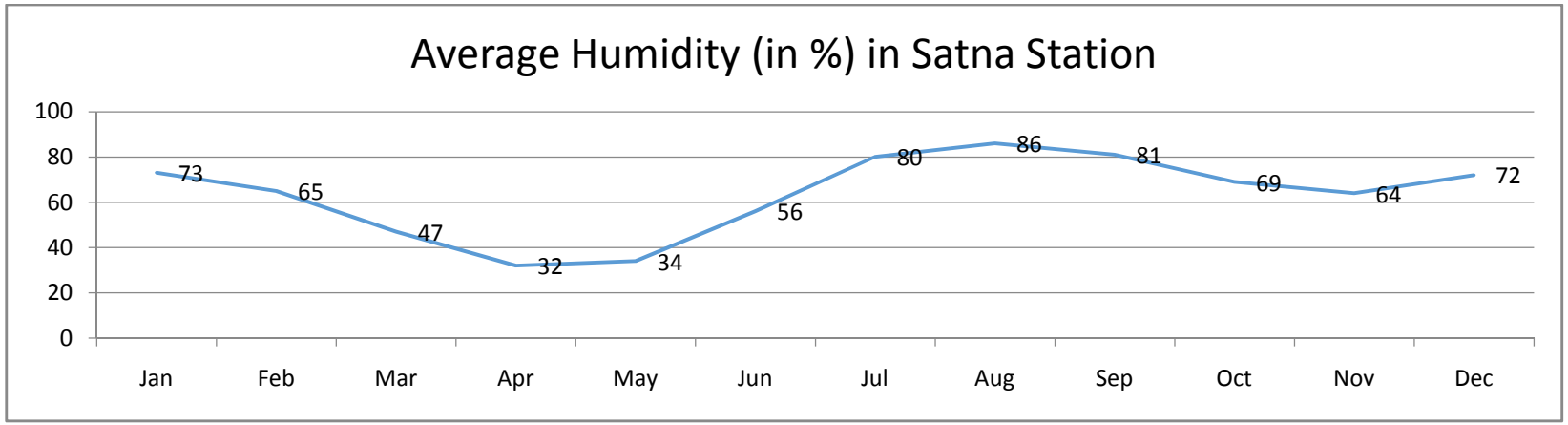
Satna receives 90 % of the precipitation in the four months i.e., June, July, August and September. The heaviest rainfall occurred in 24 hours is 562.6 mm in the month of June in 182. On an average, there are 54.4 rainy days in a year in Satna region.




Heaviest Rainfall in 24 hours
600
500
400
300
200
100
0
81.3
49.3
43.9
52.8
33.5
562.6
216.2
299.7
269.4
152.4
84.6
47.7
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Heaviest Rainfall in 24 hours

Humidity:

During the 30 year period humidity was found to be lowest for the month of April which was 32 %, while highest for the month of August which was 86%.



Climate Extremes frequency in Satna				
	What is the major contingency the district is prone to?	Regular	Occasional	None
	Drought		√	
	Flood			√
	Cyclone			√
	Hail storm			√
	Heat wave		√	
	Cold wave		√	
	Frost		√	
	Sea water intrusion			√
	Pests and disease outbreak Tobacco Caterpillar in Soybean Gram pod barer in Gram Paddy cut worm in Rice		√	

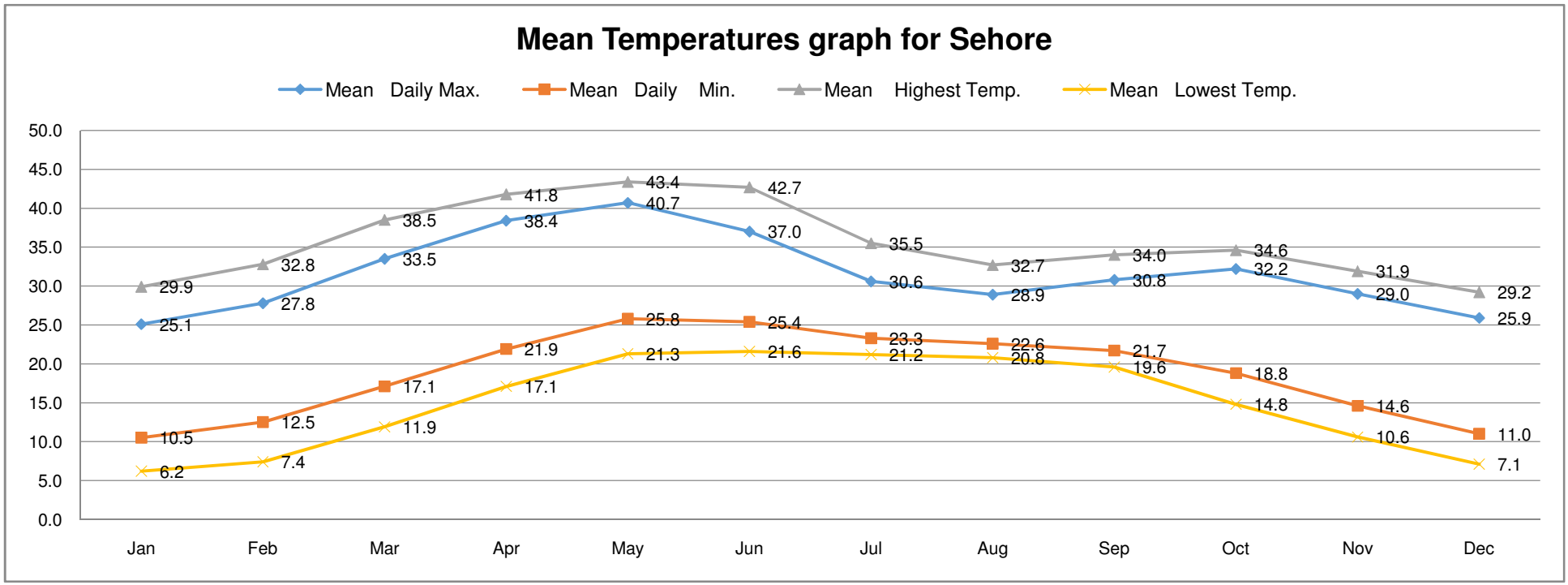
Climate profile of Sehore district:

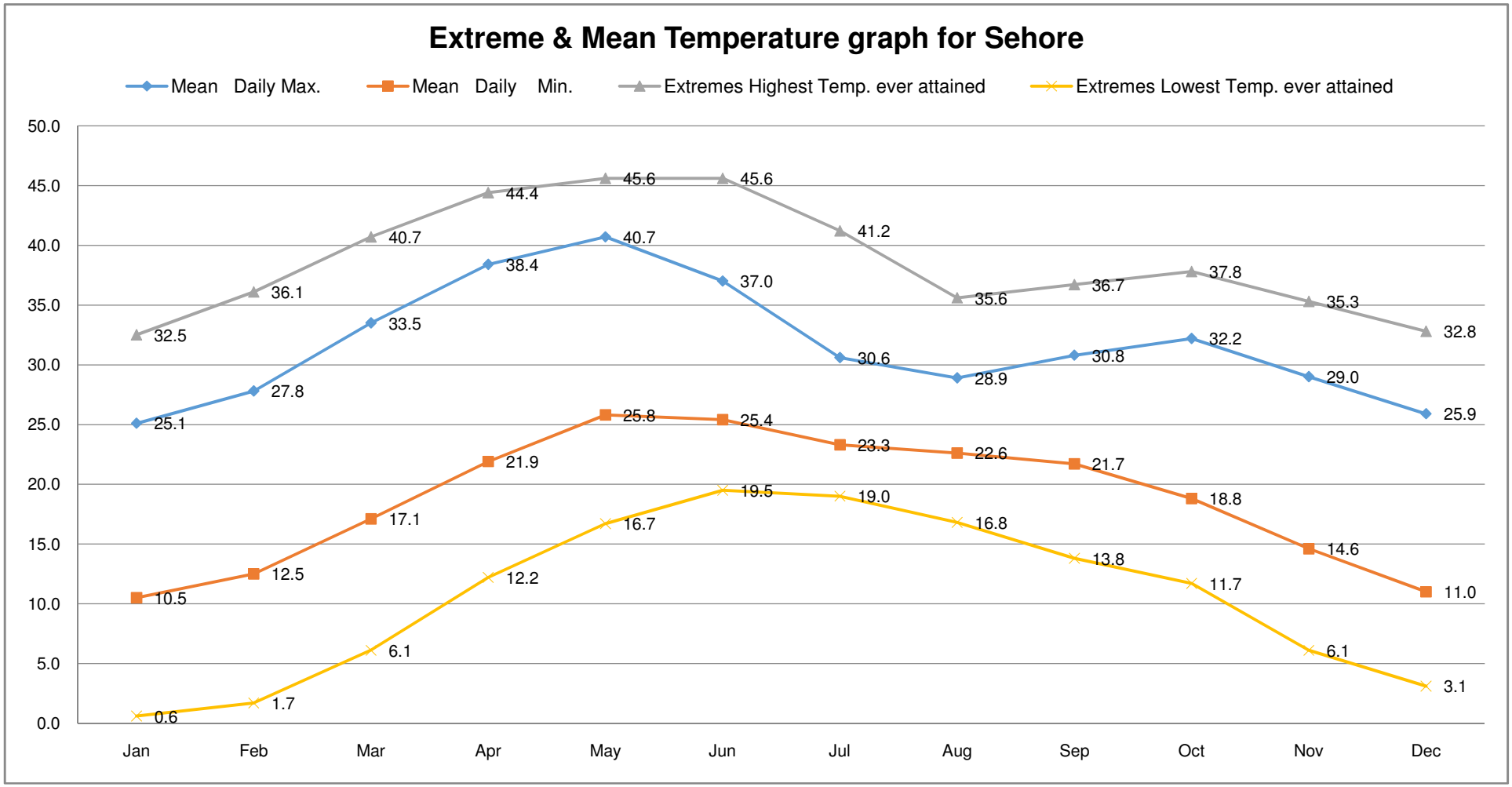
The climate profile of Sehore district is explained in the table below. It is located in the Vindhyan Plateau agro-climatic zone. The data available for Sehore district was from year 2000 after the establishment of meteorological station at Bhopal.
Sehore is situated in the central part of the state. The climate comprises of four seasons namely winter, summer, monsoon and post- monsoon.

Sehore district Climate Profile (1971-2000)																	
	Temperature(in C)								Rainfall(in mm)								
	Mean	Mean	Mean	Mean	Extremes	Extremes	Extremes	Extremes	Mean		Extremes	Extremes	Extremes	Extremes	Extremes	Extremes	
Month	Daily Max	Daily Min	Highest Temp	Lowest Temp	Highest Temp. ever attained		Lowest Temp. ever attained		Monthly Rainfall	No. of rainy days	Total Rainfall in wettest month	year	Total Rainfall in driest month	year	Heaviest Rainfall in 24 hours	year	Humidity (in %)
Jan	25.1	10.5	29.9	6.2	32.5	1992	0.6	1935	12.7	1.2	91.2	1948	0.0		34.3	1948	61
Feb	27.8	12.5	32.8	7.4	36.1	1953	1.7	1950	12.2	1.3	54.8	1986	0.0		36	1986	52
Mar	33.5	17.1	38.5	11.9	40.7	1996	6.1	1979	8.1	0.6	80.8	1957	0.0		36.8	1998	36
Apr	38.4	21.9	41.8	17.1	44.4	1996	12.2	1935	6.4	0.6	40.7	1994	0.0		20.6	1971	29
May	40.7	25.8	43.4	21.3	45.6	1947	16.7	1975	10.9	1.1	78.7	1956	0.0		72.6	1956	37
Jun	37.0	25.4	42.7	21.6	45.6	1995	19.5	1957	147.7	7.5	393.2	1938	13.2	1962	155	1986	63
Jul	30.6	23.3	35.5	21.2	41.2	1966	19.0	1959	371.6	14.4	1031.4	1986	112.0	1972	276	1973	84
Aug	28.9	22.6	32.7	20.8	35.6	1987	16.8	1977	402.6	14.4	767.0	1973	68.8	1949	284	1973	88
Sep	30.8	21.7	34.0	19.6	36.7	1974	13.8	1972	181	8.5	767.7	1961	12.5	1979	233	1947	79
Oct	32.2	18.8	34.6	14.8	37.8	1951	11.7	1971	36.8	2.3	188.2	1955	0.0		124	1955	59
Nov	29.0	14.6	31.9	10.6	35.3	1977	6.1	1941	11.9	0.9	134.1	1936	0.0		76.4	1969	53
Dec	25.9	11.0	29.2	7.1	32.8	1941	3.1	1966	16.7	1.1	137.2	1997	0.0		66.3	1967	59

Temperature:

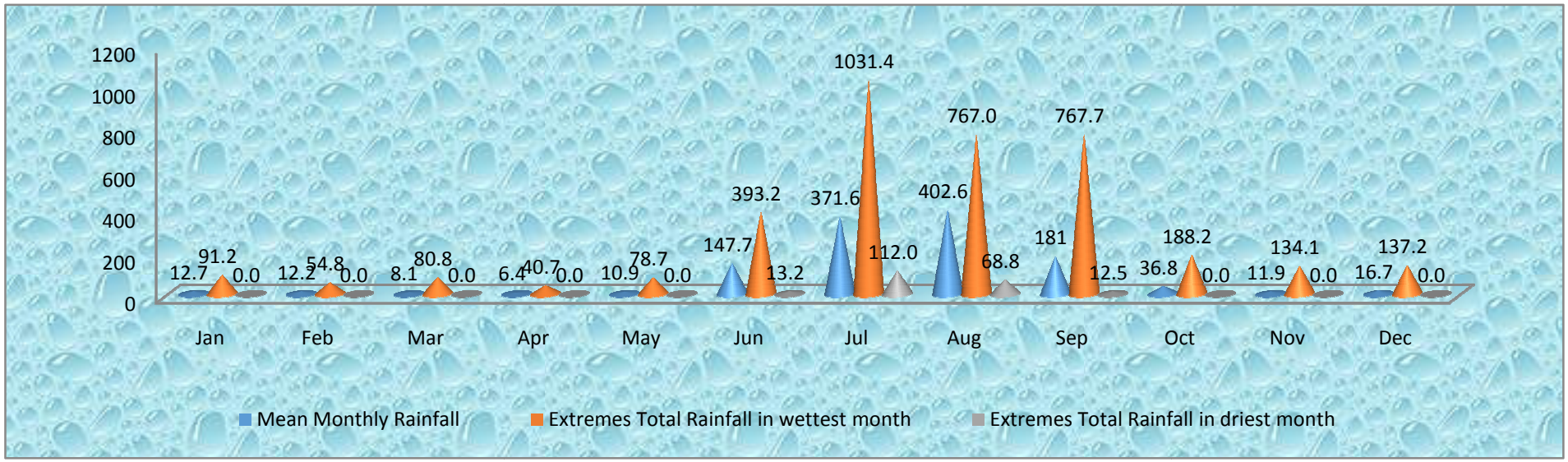
All the temperature variables remain generally low in winter and high in summer season. The highest temperature ever attained is 45.6 C in the month June in year 1995, while lowest temperature ever attained is 0.6 C in January in 1935. The temperature start rising from January end and reach at its highest in the month of May. With the onset of monsoon season the temperature starts falling gradually. During the winter season, the temperature falls sharply due to the effect of cold wave.




Extreme & Mean Temperature graph for Sehore
Mean Daily Max.
Mean Daily Min.
Extremes Highest Temp. ever attained
Extremes Lowest Temp. ever attained
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
32.5
36.1
40.7
44.4
45.6
45.6
41.2
35.6
36.7
37.8
35.3
32.8
25.1
27.8
33.5
38.4
40.7
37.0
30.6
28.9
30.8
32.2
29.0
25.9
10.5
12.5
17.1
21.9
25.8
25.4
23.3
22.6
21.7
18.8
14.6
11.0
0.6
1.7
6.1
12.2
16.7
19.5
19.0
16.8
13.8
11.7
6.1
3.1

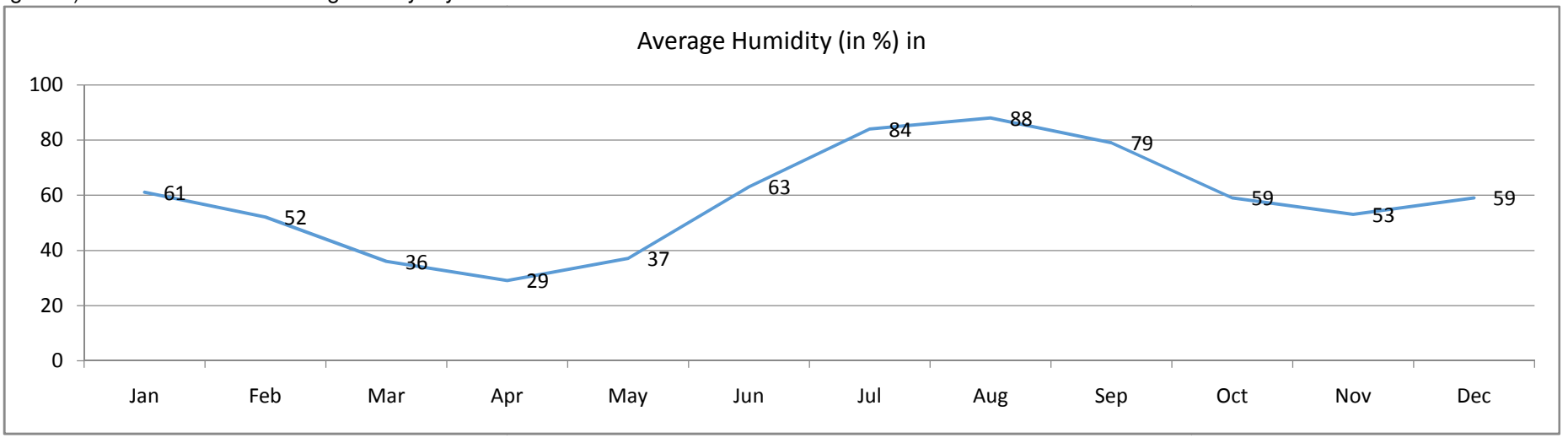
Rainfall pattern of Sehore district:

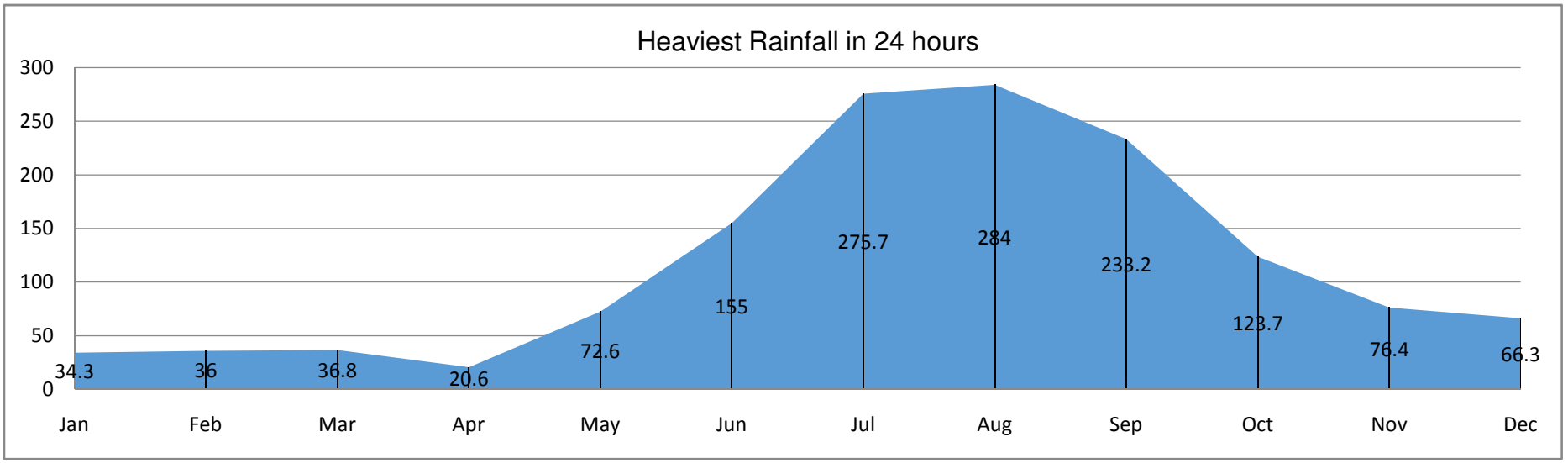
Sehore receives 90 percent of the precipitation in the four months i.e., June, July, August and September (Figure 3). The heaviest rainfall occurred in 24 hours is 1031.4 mm in the month of July in 1986 (Figure 4). On an average, there are 53.7 rainy days in a year in Sehore region.



Humidity:

During the 30 year period humidity was found to be lowest for the month of April which was 29 %, while highest for the month of August which was 88 % (Figure 5). The summer season is generally dry while monsoon is humid.





Climate Extremes in Sehore district from contingency plan of district:

	What is the major contingency the district is prone to?	Occasional
	Drought	September
	Flood	
	Cyclone	
	Hailstorm	
	Heatwave	
	Coldwave	
	Frost	January
	Seawaterintrusion	
	Pestsanddiseaseoutbreak(specify)Girdlebeetel,semilooperinsoybeanandgrampodborerinchickpea	

Annexure-IV

Field visit and finding of FGDs held at Project sites

Visits were made at district offices and in the villages identified for implementation of the project. The description is as follows:

Satna

The district officials helped us in identifying the most vulnerable patch of the district. CEO ZP Satna suggested that Maihar block may be taken as project implementation area. CEO JP, Maihar provided us the list of cluster of villages which is the vulnerable portion of Maihar block. An FGD was organized with the villagers & farmers along with the govt. officials. The vulnerabilities of the project villages may be understood as per the excerpts of the discussions as follows:-

- Ground water table upto 200 ft.
- No canals surrounding, 1 under construction since last 2 years, irrigation depends on tubewells
- Small & marginal land holding (1 acre to 4 acres)
- No support irrigation from Bargi dam
- Cement factories nearby the villages as source of pollution
- High migration rate due to unemployment
- Declared **Drought** in the year 2015
- High tribal population around the zone
- Unavailability of Foundation Seeds and good quality seeds
- Good soil type but nutrients reducing due to crop residue burning
- High dependency on Horticulture crops which are water demanding more than Agriculture crops
- Using fertilizers instead of organic manure (no vermi composting, etc)
- No sprinkle, drip irrigation facilties
- No CSOs/NGOs working in zone
- Electricity availability of 6-10 hours
- Local breeds of cows and buffaloes results in less milk production
- No gobar gas / bio gas plants nearby
- No sensitization regarding climate change

Sehore

The district officials like Collector, Sehore and CEO ZP, Sehore suggested us that Budhni block of Sehore district may be a vulnerable portion of the district in the times to come. CEO JP

Budhni suggested us the 20 villages in a cluster which is the vulnerable portion of Budhni block. An FGD was carried out in few villages with the farmer communities along with the govt. officials. The vulnerabilities of the project villages may be understood as per the following excerpts of the discussions:-

- Not enough understanding about climate smart practices
- No water recharging facilities and techniques available in any of the villages
- No gobar gas / bio gas production
- High use of pesticides and fertilizers
- Cropping pattern shifted from Soybean- Wheat to Paddy –Wheat which is water intensive
- No ponds in the zone
- Abundance of facilities of drip irrigation
- Labour are not available
- Soil erosion due to heavy flow of river Narmada and undulating topography
- Mostly small and marginal farmers with low adaptive capacity
- Non-availability of Foundation seeds
- High crop residue burning
- Local breeds of cows and buffaloes results in less milk production
- Fisheries sector may be strengthened as high potential of growth in river Narmada

Rajgarh

Climate Related Problems:

1) **Erratic Rainfall**: In case of project villages the rainfall pattern is changing in terms of lowering in number of rainy days but the annual rainfall is static, the topography of the project villages is undulating which cause water runoff and soil erosion result in the problem of moisture conservation.

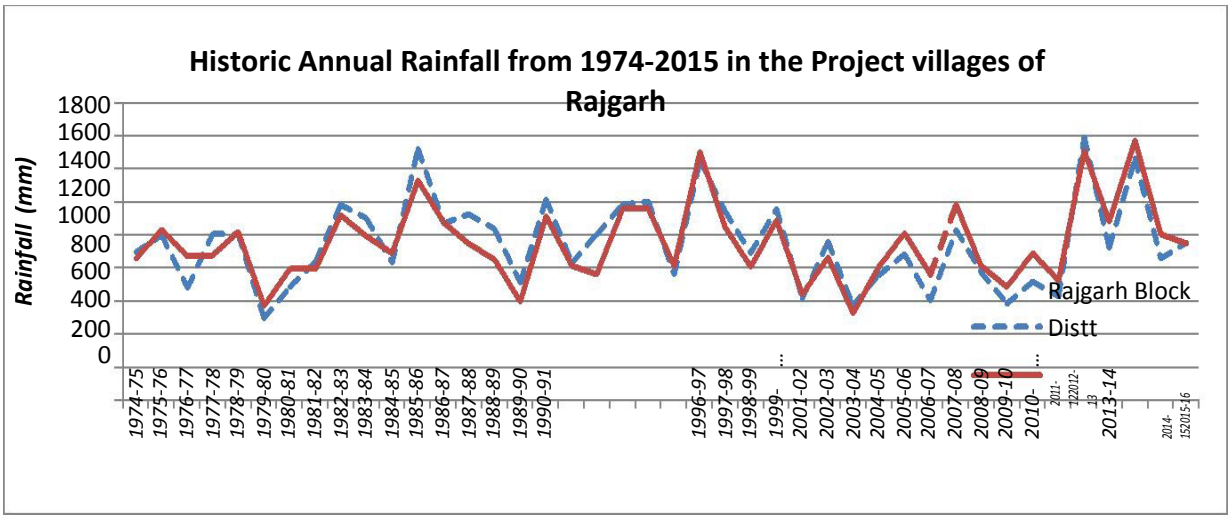
2) **Delayed monsoon**: According to FGD with farmers ofthe project villages we came to know that the monsoon delayed by one week which affects the legume crops (Soybean, Moong, Urd) in germination stage leads to low productivity.

3) **Early withdrawal of monsoon with dry spell**: The crops which have long maturity period (Pigeon pea, sorghum) and moisture sensitive (Soybean, Maize and Urd) are mostly affected by early withdrawal of the monsoon as they have very much sensitive to its critical stages to water requirements.

Other Problems:

1) **Undulating land with shallow soil**: The project villages come under hilly area having wavy shape, full of ups and downs with shallow soil and low water holding capacity (40-50mm).
2) **Nutrient index of Soil:** the soils of the project area are low in carbon and Nitrogen with value 0.4to 0.5 % and less than 280-300 kg ha^{-1} respectively.

2) **Scarcity of Water:** heavy rainfall with high speed winds in a short span, leads to water runoff resulting in insufficient groundwater recharge.



Graph: Climatic data of project villages of Rajgarh Districts

Types of Crops in project villages:

Season	Crops
Kharif	Paddy, Jowar, Maize, Pigeon Pea, Moong, Urd, Soybean, Til
Rabi	Wheat, Gram, Lentil Flaxseed, Coriander

Farmer's perceptions:

In the project villages of Devjhiri a focus group discussion were conducted to assess farmers perception on climate change, total 34 farmers present in the discussion, most of the farmers said that in the recent years the rainfall patterns shifted they said that early withdrawal of monsoon is major problem in the area, resulting crop production was affected. Due to shallow depth and light soils frequent irrigation to rabi crops are required which increases the total water requirement says the farmer.

Annexure-V

Responses to the comments raised by NABARD

1. **The criteria for selection of villages shall be indicated keeping in view of climatic, socio-economic and demographical concerned. With regard to beneficiary selection, the criteria to be followed during implementation may be firmed up.**

   A comprehensive Vulnerability Assessment of Madhya Pradesh towards Climate Change has been carried out district-wise to identify the relative vulnerabilities of districts. The projections have been made for mid-century and end-century based on baseline scenario. To arrive at the composite vulnerability index, drilling down exercise has been carried out based on social, economic, climate, water, agriculture, forest, health and environment vulnerabilities incorporating appropriate indicators for each. The three districts included in the pilot project proposal, namely, Sehore, Rajgarh and Satna have varying vulnerabilities according to individual indices.

   Sehore: The composite vulnerability of Sehore district is **high** in all the three scenarios. Social indicators show a high vulnerability in all the three scenarios. Economic, Climate, Water and Environment vulnerability will be increasing in coming decades as compared to baseline scenario. Health vulnerability is projected to remain in very high category for all the three scenarios. The district has been selected based on the current status as well as future projections as outlined in the Vulnerability Assessment report and the villages are selected based on interviews with top district authorities as well as villagers concerned. *The consultations with villagers in this regard have been recorded and enclosed as Annexure-IV*.

   Further, the villages selected in this district were traditionally Soybean/ wheat/ Gram growing villages, however due to market pressure and concurrent losses in soybean they have shifted to paddy. Paddy growing villages have high water, energy and nutrient consumption. This increases the pressure on already stressed and vulnerable resources. The project aims to address these concerns

through appropriate interventions like nutrient management, water conservation techniques and energy smart techniques.

Rajgarh: The composite vulnerability of Rajgarh district is **high** in the baseline scenario and is projected to increase to very high vulnerability in the mid-century and end-century scenarios, which calls for taking necessary and timely adaptation interventions. Social, Agriculture, Forest and Environment indicators show a very high vulnerability in all the three scenarios. Economic vulnerability is high in all the three scenarios. Water vulnerability, in particular, is projected to increase from low to high category in mid and end centuries. The district has been selected based on the current status as well as future projections as outlined in the Vulnerability Assessment report and the villages are selected based on interviews with district authorities and field level officials as well as villagers concerned*The consultations with villagers in this regard have been recorded and enclosed as Annexure-IV*.

Adding to this, the villages selected in this district have undulating topography with very thin layer of top soil. This necessitates to frequent requirement of irrigation to crops. In crop growing season during dry spell, a loss of productivity of crops will be visible leading to concerns of food security and income of farmers. The project aims to reduce these concerns through adoption of appropriate water conservation and soil rejuvenation techniques, and farmers' income can be ensured through financial literacy drives, which forms a part of the project.

Satna: The composite vulnerability of Satna district is **high** in the baseline scenario and is projected to increase to very high vulnerability in the mid-century and end-century scenarios, making it necessary for interventions. Agriculture, Forest and Environment indicators show a very high vulnerability in all the three scenarios. Climate vulnerability, in particular, is projected as very high vulnerability category in mid and end centuries. The district has been selected based on the current status as well as future projections as outlined in the Vulnerability Assessment report and the villages are selected based on interviews with top district authorities as well as villagers concerned. *The*

consultations with villagers in this regard have been recorded and enclosed as Annexure-IV.

Moreover, the selected villages have challenges of water availability and infrastructure, energy scarcity and human health related issues. Increasing area under mono-cropping is leading to destruction of traditional local crops. Besides, the area is highly sensitive to climate extremes like heat waves and hailstorms. Agriculture is the only source of livelihood of major population of the area. The villages also house tribal population who have a low adaptive capacity due to social and economic conditions prevalent in rural areas. This project aims to increase their adaptive capacity, diversify livelihood options and minimize the climatic risk. The project also aims to sensitize, train and build capacities of the farmers in these villages.

2. **The vulnerability assessment of the village /clusters may be attempted based on the past or existing instances /records of proxy indicators like supply of water through tankers, crop failure compensation provided, primary consultation with concerned farmer group etc.**

   A study on Vulnerability assessment of Madhya Pradesh for Climate Change has been carried out at the district level for all the districts of the state. The indicators related to cropping pattern, water availability, etc. have been used in evaluating the composite vulnerability index of the districts. The data which is required to have such an assessment for villages is not readily available at the village level which restricts efforts directed at making projections for baseline as well as long term scenarios. To select villages for the study, district-level vulnerabilities have been utilized and primary consultations with farmer groups have been carried out. The district administrative authorities have also been consulted to validate and give thrust to the entire process.

Annex – VI

Quotations

SYMBOL OF QUALITY

RUNGTA IRRIGATION LIMITED

(AN ISO : 9001 CERTIFIED COMPANY)

BRANCH OFFICE :

D-103, Near Vijaya Nursing Home, Gautam Nagar, Bhopal - 462 023(M.P.)
Tel. No. : 0755 - 2550960, 4203711
E-mail : bhopal@rungtairrigation.in, rungtabhopal123@rediffmail.com
Web address : www.rungtairrigation.in

REGD. & HEAD OFFICE :

101, Pragati Tower, 26, Rajendra Place, New Delhi - 110008
Phones : 011-45090900, 30905291,
Fax : 91-11-45090931 Telex : 31-277283 RIL-IN, grams : RILSPRINK

Estimate for 75mm HDPE Sprinkler Irrigation System

To,
The Executive Director ,
Environmental Planning and Co-ordination Organisation
E-5 , Paryavaran Parisar ,
Arera Colony , Bhopal (M.P.)

Area : 0.50 Acre **Crop : Inter Cereal Crops**

S.No.	Description	Qty.	Rate / Unit	Amount
1	75mmx2.5Kg/cm2 x 6m HDPE Quick Coupled Pipe IS:14151	15 Nos.	725.00	10875.00
2	75mm HDPE S.L.C Connector	3 Mtr.	380.00	1140.00
3	75mm HDPE Bend	1 Nos.	380.00	380.00
4	75mm HDPE P.C.N	1 Nos.	305.00	305.00
5	75mm x 75 mm HDPE Side Tee	1 Nos.	395.00	395.00
6	75mm HDPE End Plug	2 Nos.	130.00	260.00
7	¾" x 2.5 Ft. G.I. Riser Pipe	3 Nos.	138.00	414.00
8	Sprinkler RIL 20- IS – 12232	3 Nos.	437.00	1311.00
			SubTotal	15080.00
			R/O	(+)0.00
	Grand Total			15080.00

Rs. In words : Fifteen Thousands Eighty Only

For **RUNGTA IRRIGATION LTD.**

RUNGTA IRRIGATION LIMITED BHOPAL

(AUTHORISED SIGNATORY)

SYMBOL OF QUALITY

RUNGTA IRRIGATION LIMITED

(AN ISO : 9001 CERTIFIED COMPANY)

BRANCH OFFICE :

D-103, Near Vijaya Nursing Home, Gautam Nagar, Bhopal - 462 023(M.P.)
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Web address : www.rungtairrigation.in

REGD. & HEAD OFFICE :

101, Pragati Tower, 26, Rajendra Place, New Delhi - 110008
Phones : 011-45090900, 30905291,
Fax : 91-11-45090931 Telex : 31-277283 RIL-IN, grams : RILSPRINK

Estimate for 63mm HDPE Sprinkler Irrigation System

To,
The Executive Director ,
Environmental Planning and Co-ordination Organisation
E-5 , Paryavaran Parisar ,
Arera Colony , Bhopal (M.P.)

Area : 0.50 Acre **Crop : Inter Cereal Crops**

S.No.	Description	Qty.	Rate / Unit	Amount
1	63mmx3.2Kg/cm2 x 6m HDPE Quick Coupled Pipe IS:14151	15 Nos.	603.00	9045.00
2	63mm HDPE S.L.C Connector	3 Mtr.	310.00	930.00
3	63mm HDPE Bend	1 Nos.	258.00	258.00
4	63mm HDPE P.C.N	1 Nos.	270.00	270.00
5	63mm x 63 mm HDPE Side Tee	1 Nos.	322.00	322.00
6	63mm HDPE End Plug	2 Nos.	103.00	206.00
7	¾" x 2.5 Ft. G.I. Riser Pipe	3 Nos.	138.00	414.00
8	Sprinkler RIL 20- IS – 12232	3 Nos.	437.00	1311.00
			SubTotal	12756.00
			R/O	(+)0.00
	Grand Total			12756.00

Rs. In words : Twelve Thousands Seven Hundreds Fifty Six Only

For **RUNGTA IRRIGATION LTD.**

RUNGTA IRRIGATION LIMITED BHOPAL

(AUTHORISED SIGNATORY)

SYMBOL OF QUALITY

RUNGTA IRRIGATION LIMITED

(AN ISO : 9001 CERTIFIED COMPANY)

BRANCH OFFICE :

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REGD. & HEAD OFFICE :

101, Pragati Tower, 26, Rajendra Place, New Delhi - 110008
Phones : 011-45090900, 30905291,
Fax : 91-11-45090931 Telex : 31-277283 RIL-IN, grams : RILSPRINK

REF: BPL/AO/2016-17/40 **Dtd. 03.05.2016**

To,
The Executive Director ,
Environmental Planning and Co-ordination Organisation ,
E-5 , Paryavaran Parisar , Arera Colony ,
BHOPAL (M.P.)

Sub: Offer for supply and installation of 63mm /75mm Quick Coupled HDPE Sprinkler Irrigation System.

Dear Sir,

We the **RUNGTA'S** are the Pioneer manufacturer of HDPE Sprinkler Irrigation System and Drip Irrigation System and these products are marketed by us nationwide in Govt. Sectors as well as in Private Sectors.

In reference to the mail of Mr. Ram Ratan Simaiya and had discussions with him , we are submitting herewith our most competent and economical offer with all terms and conditions for the supply and installation of 63mm / 75mm Quick Coupled HDPE Sprinkler system for your valuable farmers.

We hope the enclosed offer shall be in-line with your requirement and we are expecting a favourable response from your end.

Thanking you .

Yours Faithfully,
for **RUNGTA IRRIGATION LTD.**

RUNGTA IRRIGATION LIMITED BHOPAL

(Authorised Signatory)

Encl.a.a.

c. **Farmer shall provide us necessary electricity and water for necessary testing of the system.**

d. **Excavation and back filling of trenches upto 1.0 to 1.5 Ft. will be done by farmer as per our Technical expert's advice and design of the system.**

e. **Entire materials shall be kept in the custody of farmer and he shall issue the same as per our mechanic's requirement.**

f. **In case of any outlets for flood irrigation through the main lines of the Drip System , extra requirement of fitting shall be there , which shall be borne by the farmer . If he needs besides our design shall be provided by him.**

g. **Pump fitting and other Electric work do not come in our scope of work handled.**

h. **Cutting of roads and safety measure to protect the pipes inside the roads, farmers have to provide larger diameter GI Pipe/any other protective material.**

i. **To cross any Nala / trenches /Channel, farmers have to provide necessary support/arrangement as per our Expert`s advice , which shall be on farmer cost only.**

For RUNGTA IRRIGATION LIMITED

RUNGTA IRRIGATION LIMITED BHOPAL

(Authorized Signatory)

TERMS & CONDITIONS

1. **Price:** The rate quoted herein are Ex Depot at Bhopal.

2. **Sales Tax:** The rates quoted herein are inclusive of VAT and other levies.

3. **Payment :** We require 90% payment against delivery of materials and balance 10% after complete installation of the system.

4. **Warrantee :**

   a. **On Pipe :** 3 years when it is used in Drip system and buried In to the ground.

   b. **On Lateral :** Our lateral are totally resistant to weathering Phenomena and have guarantee for 3 years towards any kind of Brittleness and cracking due to intense sun light.

   c. **Installation Charges:** Installation of the Drip system shall be done by our experienced and trained Mechanic. It is inclusive in the estimate.

   d. **Maintenance of the System :** We shall provide 1 year maintenance of the system. If any component of the system is having any manufacturing defect shall be replaced. After that ,maintenance charges shall be charged.

5. **Scope of work :**

   a. Installation charges shall include only for laying, joining of PVC Pipes only. For assistance in laying of PVC Pipe and laterals in case of Drip fitting , farmer shall provide us a labourer on his cost.

   b. Any kind of civil and structural work needed at the site to enhance the durability of the system shall be borne by farmer.

Contd.. 2

RUNGTA IRRIGATION LIMITED BHOPAL

15	Minimum Pressure required at end of the Sub Main	:	10 to 15 Mtr.
16	Proposed Capacity Of Pump		
	Horse Power	:	2 HP (Electric) or 3HP (Diesel)
	Head	:	38 Mtr.
	Discharge	:	1.38 LPS

For RUNGTA IRROGATION LTD.

RUNGTA IRRIGATION LIMITED BHOPAL

(Authorised signatory)

Technical Details of the System

1	Area	:	0.500 Acre
2	Crop	:	Guava/ Orange / Aonla/ Papaya
3	Spacing Guava / Orange/Aonla/Papaya	: :	 Row to Row - 4.5 Mtr. Plant to Plant - 4.5 Mtr.
4	Soil	:	Medium
5	No. of Plants Guava / Orange/Aonla/Papaya	: :	 100 Nos.
6	Peak Water Requirement Guava / Orange/Aonla/Papaya	: :	 50/50/50/20 Ltrs. Per day / plant
7	No. of Dripper per plant and Discharge	:	1 Nos. of 8 LPH
8	Type of drippers	:	Non pressure compensating (Openable)
9	Level of Field	:	Assumed Plain
10	Diameter of Lateral	:	12mm, Class -2 (ISI)
11	Sub Main Line Size	:	63mm Dia. x 4 Kgf / Cm2
12	Main Line Size	:	63mm Dia. x 4 Kgf/Cm2
13	Total Discharge required for Plantation area	:	1.38 LPS
14	Minimum Pressure required at start of Sub Main	:	15 to 20 Mtr.

SYMBOL OF QUALITY

RUNGTA IRRIGATION LIMITED

(AN ISO : 9001 CERTIFIED COMPANY)

BRANCH OFFICE :

32, Zone-1, (Residential), M.P. Nagar, Bhopal - 462 011 (M.P.)
Tel. No. : 0755 - 2550960, 4203711
E-mail : bhopal@rungtairrigation.in
Web address : www.rungtairrigation.in

REGD. & HEAD OFFICE :

101, Pragati Tower, 26, Rajendra Place, New Delhi - 110008
Phones : 011-45090900, 30905291, 55402193, 25727984,
Fax : 91-11-45090931 Telex : 31-277283 RIL-IN, grams : RILSPRINK

Estimate for Drip Irrigation System

To,
The Executive Director ,
Environmental Planning and Co-ordination Organisation
E-5 , Paryavaran Parisar ,
Arera Colony , Bhopal (M.P.)

Area : 0.50 Acre **Crop : Orchard plants** **Spacing : 4.5m x 4.5m**

S.No.	Description	Qty.	Rate / Unit	Amount
1	63mmx4Kg/cm2 PVC Pipe IS:4985	72 Mtr.	65.00	4680.00
2	12mm LLDPE Lateral ISI marked	500 Mtr.	7.00	3500.00
3	4LPH Drippers	100 Nos.	3.50	350.00
4	Screen Filter 10 m3/hr	1 Nos.	2600.00	2600.00
5	50mm CI Ball Valve	2 Nos.	625.00	1250.00
6	Flush Valve PVC 63mm	1 Nos.	115.00	115.00
7	Accessories items	05% of above materials		624.75
8	Installation and Fitting Charges			655.99
			SubTotal	13775.74
			R/O	(+)0.25
	Grand Total			13776.00

Rs. In words : Thirteen Thousands Seven Hundred Seventy Six Only

For **RUNGTA IRRIGATION LTD.**

RUNGTA IRRIGATION LIMITED BHOPAL

(AUTHORISED SIGNATORY)

SYMBOL OF QUALITY

RUNGTA IRRIGATION LIMITED

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101, Pragati Tower, 26, Rajendra Place, New Delhi - 110008
Phones : 011-45090900, 30905291,
Fax : 91-11-45090931 Telex : 31-277283 RIL-IN, grams : RILSPRINK

REF: BPL/AO/2016-17/39 **Dtd. 03.05.2016**

To,
The Executive Director ,
Environmental Planning and Co-ordination Organisation ,
E-5 , Paryavaran Parisar , Arera Colony ,
BHOPAL (M.P.)

Sub: Offer for supply and installation of Drip Irrigation System.

Dear Sir,

We the **RUNGTA'S** are the Pioneer manufacturer of Drip Irrigation System and these products are marketed by us nationwide in Govt. Sectors as well as in Private Sectors.

In reference to the mail of Mr. Ram Ratan Simaiya and had discussions with him , we are submitting herewith our most competent and economical offer with all terms and conditions for the supply and installation of Drip Irrigation System in the orchard fields of your selected valuable farmers.

We hope the enclosed offer shall be in-line with your requirement and we are expecting a favourable response from your end.

Thanking you .

Yours Faithfully,
for **RUNGTA IRRIGATION LTD.**

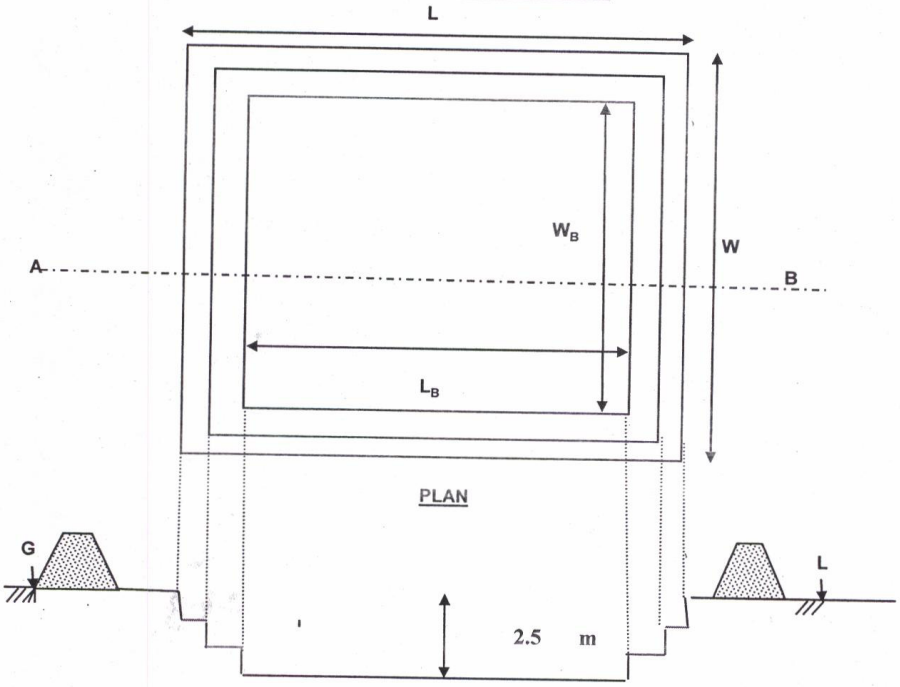
RUNGTA IRRIGATION LIMITED BHOPAL

(Authorised Signatory)

Encl.a.a.

Foundation for Ecological Security
Watershed Development Fund-HUVF-NABARD
Name of Village-Katangseoni
Name of Activity:- Farm Pond

Design of Farm Pond



SECTION AT A-B

Length of pond (L)	=	10
Width of pond (W)	=	10
Depth of pond (D)	=	2.5
Width of step (W_S)	=	0.4
Depth of step (D_S)	=	0.3
No. of Steps/Depth (n)	=	9
Length of pond at the bottom (L_B)	=	3.6
Width of pond at the bottom (W_B)	=	3.6

Foundation for Ecological Security
Watershed Development Fund-HUVF-NABARD
Name of Activity:-Farm Pond
Name of Village-Katangseoni

Design Perameters

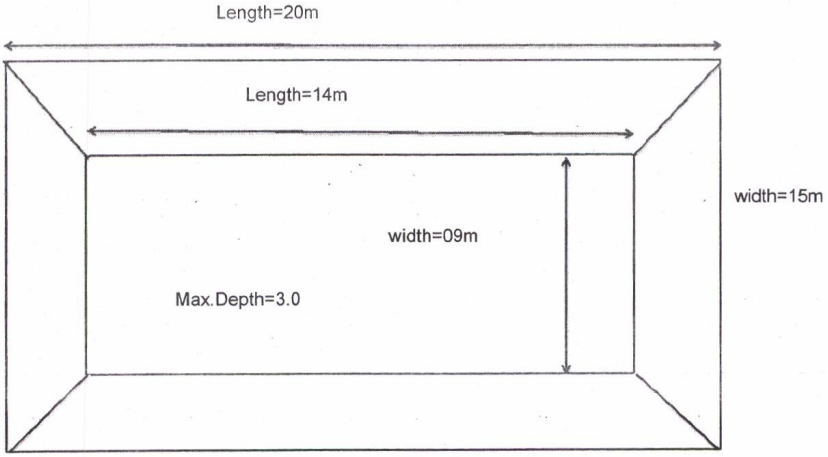
Lengh of Farm Pond	=	**10**	Meter
Width of Farm Pond	=	**10**	Meter
Depth of Farm Pond	=	**2.5**	Meter
Width of Farm Pond Steps	=	**0.4**	Meter
Depth of Farm Pond Steps	=	**0.3**	Meter
No. of Steps/Depth (n)	=	**9**	No
Length of Pond at the bottom (LB)	=	**3.6**	Meter
Width of Pond at the bottom (WB)	=	**3.6**	Meter

SN	CSR	Perticulars	Length of Pond (m)	Width of Pond (m)	Depth of Pond (m)	Cumulative Depth of Pond (m)	Quantity (m3)	Soil type	Rate (Rs./m 3)	Amount (Rs.)
1	301 (b & c)	Earth work excavation	10	10	0.3	0.3	30.00	Dense or Hard soil		
2			9.2	9.2	0.3	0.6	25.39			
3			8.4	8.4	0.3	0.9	21.17			
4			7.6	7.6	0.3	1.2	17.33			
5			6.8	6.8	0.3	1.2	13.87			
6			6	6	0.3	1.5	10.80			
			Total				**118.56**		69.90	**8287.34**
7			5.2	5.3	0.3	1.8	8.27	Hard Moorum		
8			4.4	4.4	0.3	2.1	5.81			
9			3.6	3.6	0.4	2.5	5.18			
			Total				**19.26**		92.60	**1783.48**
10	322	Extra for every additional lift of 1.5 m					**19.26**		11.10	**213.79**
11	1807 and 1818 (c)	Provision for inlet and outlet	10	2.5	Sqm	25.00			118.00	**2950**
									TOTAL COST	**13235**

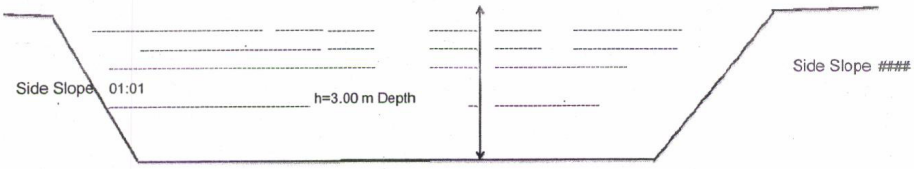
Drawing for Farm Pond Constructuon

Work Name:-Farm Pond
Gram Panchayat:-
District- Damoh
Water Storage Capacity:- 966 Cumt.

Village:-
Block:- Hatta
Budget Head:- WDF (NABARD) Watershed Work
Irrigated Area:- 1.40 Ha



Plan



Cross Section

Fig.- Farm Pond (20mx15m)

Detail Estimation and Costing

Work Name:-Farm Pond
Gram Panchayat:-
District- Damoh
Farmer Name:-

Village:-
Block-Hatta
Budget Head:- WDF (NABARD) Watershed Work
Khasra No:- (Private Land)

S. No.	Particular Item of Work	Nos.	Length	width	Depth/ Height	Total Quantity	Unit	Rate	Amount
1	Site clearance, cutting grass, raking into heaps and removing off the premises (grass to become the property of the contractor) (Item No. 101)	1.00	20.00	15.00	-	300.00	Sqmt.	2.10	630.00
2	Earth work in rough excavation, filling excavated earth into depressions on banking as directed, top surface to be levelled and neatly dressed with 1:1 Side Slope with Item No. (0304 b,c)								
	(A+4B+C)*D/6		20.00	15.00	3.0	966.00	cumt		
	a) in Hard Soil (60% Quantity)			966.00	60%	579.60	cumt	91.90	53265.24
	b) in Hard Murrum (40% Quantity)			966.00	40%	386.40	cumt	103.20	39876.48
3	Extra for every additional lift of 1.5m or part there of Item No.322(a)								
	(a) Loose or soft soil /Dense or hard soil					244.13	cumt	7.60	1855.35
4	Stone Pitching for Safe Water Entry on upword stream Side Slope with								
A	22cm thick dry stone picked up boulder pitching i/c picking of boulder with individual size of 22cm depth. (Item No.1274)	1.00	12.00	4.30		51.60	Sqmt	169.20	8730.72
		1.00	12.00	4.30	0.22	11.35	cumt		
B	Inlet Construction of rock toe in earthen embankments including laying and hand packing, dressing, wedging and finishing over surface with								
	a) Boulder for (Item No.2310 (a)								
	1. Inlet Stone Bund	1.00	5.00	1.20	0.60	3.60	cumt	438.80	1579.68
	2. Outlet Stone Bund	1.00	5.00	1.20	0.60	3.60	cumt	438.80	1579.68
5	Collection of pitching stones size 20 to 25cm and not less then 0.021cum (without dressing) as per Item No-1813(a)					18.55	cumt	302.00	5602.70
6	Transportation of Boulder and rubble Pitching Stone from Nearest Stone Mines (atleast 6 km Distance) as per Item No 1902(j), 1903(a), 1904(c)					18.55	cumt	227.01	4211.49
7	Sign Board at Work Place	1				1.00	No	L.S.	2000.00
								Total	**119331.34**
8	Add Contingency Charge (2%)								**2386.63**
									121717.97
							Says	1.22	Lac

NITROGEN PARAMETERS SINCE 2002

MANUFACTURERS & SUPPLIERS OF LEAF COLOR CHART (LCC) CERTIFIED & APPROVED BY
INTERNATIONAL RICE RESEARCH INSTITUTE (IRRI) CENTRAL RICE RESEARCH INSTITUTE (CRRI) DIRECTORATE OF RICE RESEARCH (DRR)
PUNJAB AGRICULTURAL UNIVERSITY (PAU) TAMILNADU AGRICULTURAL UNIVERSITY (TNAU) KERALA AGRICULTURAL UNIVERSITY (KAU)

Mailing Address: NITROGEN PARAMETERS P.B.No.8707 ADAMBAKKAM CHENNAI 600 088 INDIA. Courier and Shipping Address:
NITROGEN PARAMETERS A 32 III FLOOR AVARAM BLOCK SHANTHI NIKETAN #1 CITY LINK ROAD ADAMBAKKAM CHENNAI 600 088 INDIA
E-MAIL: business@nitrogenparameters.com WEBSITE: www.nitrogenparameters.com
TEL: +91 44 64614580 / 22442305 MOBILE: +91 98842 22269 FAX: +91 44 22440696
TIN 33940988635 CST 1017558 31.01.11 IEC 0405011164

Proforma Invoice

Consignee:	PI No.004 16-17	Date:
		29.04.2016
Ram Ratan Simaiya Subject Expert (Agriculture) SKMCCC, Environmental Planning & Coordination Organization, Bhopal-462 016 (M.P.)	Buyers Order No. & Date:	
Bank Details for RTGS/ NEFT/ WIRE TRANSFER:	Delivery & Payment Terms:	
A/c Holder: NITROGEN PARAMETERS A/c No.: 32834860449. Account Type:Current Account SWIFT Code: SBININBB475. MICR Code:600002173 IFSC Code: SBIN0012745. Branch Code:12745 Bank: State Bank of India / Branch: Maduvinkarai Branch (12745),No.16,Secretatriat Colony,Main Road,Adambakkam, Chennai-600 088, India.	1. Payment by DD / Cheque/RTGS/NEFT Favouring Nitrogen Parameters payable- at Chennai 2. Delivery within 20 days from the date of receipt of Purchase Order 3. This quote is valid only for 30 days from today.	

Marks & Nos.	No. & Kind of Packages	Description of Goods	Quantity in Pieces	Unit Price in INR	Amount in INR
Carton no.	Carton(s)	CRRI 5 Panel LCC Rice	1	110.00	110.00
		PAU 6 Panel LCC Maize	1	100.00	100.00
		PAU 6 Panel LCC Wheat	1	100.00	100.00
	Cartons (s)	Grand Total			

Amount Chargeable in words

Terms & Conditions:

- ✓ Above price is all inclusive
- ✓ No deductions allowed from the total amount on pretext of bank charges.
- ✓ Subject to Chennai Jurisdiction only

Declaration:

We declare that this proforma invoice shows the actual price of the goods described and that all particulars are true and correct.

For
NITROGEN PARAMETERS

BENNY THOMAS
Managing Partner

ICAR-INDIAN INSTITUTE OF SOIL SCIENCE

Berasia Road, Nabibagh, Bhopal-462038 (MP)

web:www.iiss.nic.in

Mridaparikshak

A Mini Lab for Estimation of Soil Health and Fertilizer Recommendation and Preparation of Soil Health Card

ICAR-Indian Institute of Soil Science, Bhopal, an institute under the Natural Resource Management (NRM) Division of the Indian Council of Agricultural Research (ICAR) has developed a mini laboratory *'Mridaparikshak'* (applied for patent and trade mark in India) that can estimate 10 important soil parameters *viz.*, pH, EC, organic carbon, available nitrogen, phosphorus, potassium, sulphur, zinc, iron and boron.

This is a digital mobile quantitative soil test minilab to provide soil testing service at farmers' doorstep. It is compatible with soil health card. *'Mridaparikshak'* comes with smart soil-pro, an instrument for determining soil parameters and displaying of fertilizer nutrient recommendations. In addition, this minilab is supplied with sieves, electronic weighing balance, shaker, hot plate, etc. Further, the results of *'Mridaparikshak'* can be disseminated quickly to farmers *via* SMS. The soil test reports can also be saved in the minilab. It can be operated by young educated farmers/rural youth (12th Pass) with a short training. The quantity of chemical solutions provided along with *'Mridaparikshak'* is for analyzing 100 samples and the solutions can be subsequently refilled.

The price of *'Mridaparikshak'* for sale in India is fixed at Rs.72,000/- (local taxes extra) and the price of 'Refilling' for 100 samples is fixed at Rs.13,500/- (local taxes extra). The license for manufacturing and marketing of *'Mridaparikshak'* is with M/s Nagarjuna Agro Chemicals Pvt. Ltd., Hyderabad. You may place your order for *'Mridaparikshak'* directly to M/s Nagarjuna Agro Chemicals Pvt. Ltd., Hyderabad, with information to the Director, ICAR-IISS, Bhopal.

For all Correspondence

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