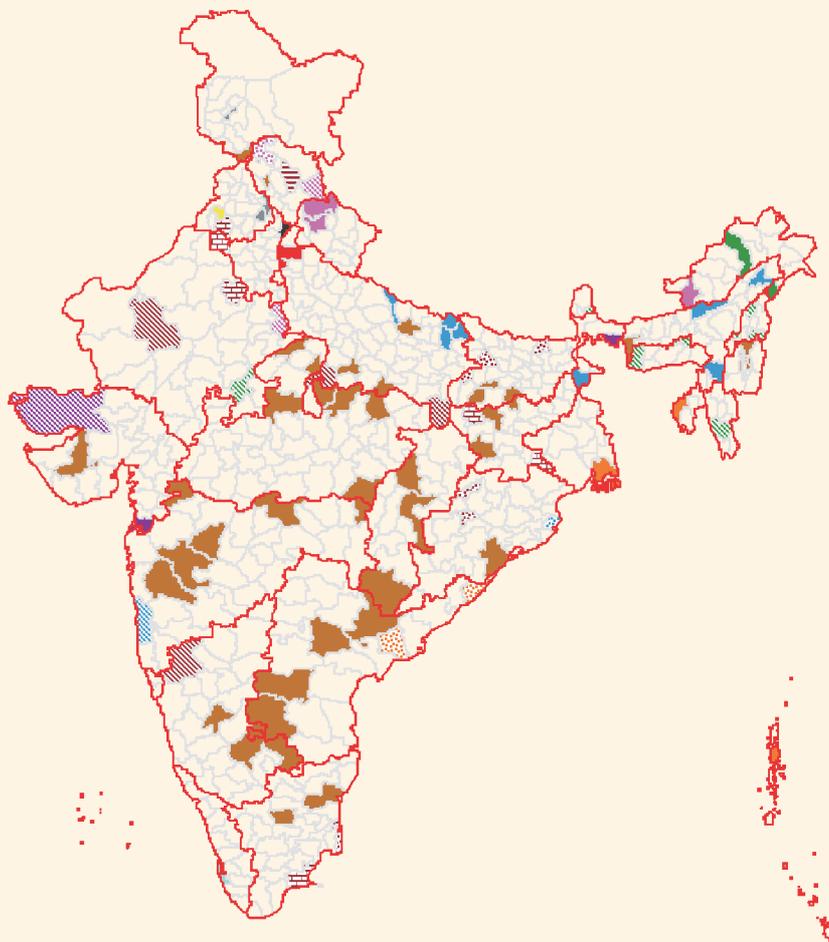


DEMONSTRATION OF CLIMATE RESILIENT TECHNOLOGIES ON FARMERS' FIELDS

Action Plan for 100 Vulnerable Districts



B. Venkateswarlu, Shalander Kumar, Sreenath Dixit
Ch. Srinivasa Rao, K.D.Kokate and A.K.Singh



National Initiative on Climate Resilient Agriculture
Central Research Institute for Dryland Agriculture

Santoshnagar, Saidabad, Hyderabad – 500 059, A.P., India

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ACKNOWLEDGEMENT

A compilation of technological options in the form of action plan for 100 districts vulnerable to climate variability under NICRA is a result of several consultations, discussions and revisions. This publication offers a wide range of options from the available basket of technologies that are believed to help alleviate the effect of climate variability on agriculture. Selection and compilation of such climate resilient options is based on the hypothesis that currently available resource conservation and management technologies can help address climate variability to a large extent. This hypothesis was tested through several rounds of discussions and consultations across eight Zonal Project Directorates located in the country. These discussions were held in presence of Programme Coordinators of respective KVKs that are selected to implement the Technology Demonstration Component of NICRA, representatives of the state agricultural university/ ICAR Institutes located in the region and select farmers. Besides, several scientists of CRIDA participated and gave their inputs. The process was lengthy and arduous, nevertheless very educative and participatory. Thus, a bottom-up approach was followed to arrive at a compilation like this. The authors of this compilation express their sincere gratitude to all the Zonal Project Directors - Drs A.M. Narula (Zone-I), A.K.Singh (Zone-II), A.K.Gogoi (Zone-III), A.K.Singh (Zone-IV), N. Sudhakar (Zone-V), Y.V.Singh (Zone-VI), U.S. Gautam (Zone-VII) and S. Prabhukumar (Zone-VIII). Thanks are also due to the many Directors of Extension of respective SAUs located in these Zones who brought regional perspective to the interventions. The contributions of the Programme Coordinators of the 100 KVKs which are implementing this project were immensely valuable. Thanks are due to them as well. Finally, the authors are thankful to the Government of India for reposing its confidence on the team of agricultural scientists that has been vested with the responsibility of conceiving and implementing a project of this magnitude across the country, which is unique in many ways.

The interventions proposed to be implemented are by no means final. We wish to document how they work in the field, how farmers respond and what are the constraints in implementation. We plan to make these villages as learning sites so that any successful and farmer acceptable intervention can be horizontally diffused through district level line departments with the help of several ongoing schemes. More importantly, this programme in 100 districts would serve as a mega pilot to the upcoming National Mission on Sustainable Agriculture, under the Prime Minister's National Action Plan on Climate Change (NAPCC).

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Chapter-I

Background

The fourth assessment report of IPCC observed that warming of climate system is now unequivocal, as is now evident from observations of increase in global air and ocean temperatures, wide spread melting of snow and ice, and rising global sea level (IPCC, 2007). Climate change impacts on agriculture are being witnessed all over the world, but countries like India are more vulnerable in view of large population depending on agriculture, excessive pressure on natural resources and poor coping mechanisms. Several models predict that rising temperatures, increased climatic variability and extreme weather events could significantly impact food production in coming years. Climate change projections up to 2100 for India indicate an overall increase in temperature by 2- 4 °C with no substantial change in precipitation. However, different regions are expected to experience differential change in the amount of rainfall in the coming decades (Kavikumar, 2010). Besides, changed rainfall patterns, it is predicted that extreme events are likely to increase in the country resulting in more droughts and floods.

Within agriculture, the rainfed agriculture which constitutes nearly 58% of the net cultivated area will be most impacted for two reasons. First, rainfed agriculture is practiced on fragile, degraded and sloppy lands which are thirsty as well as hungry and prone to erosion. Second, the people dependent on rainfed agriculture are also less endowed in terms of financial, physical, human and social capital limiting their capacity to adapt to the changing climate. Climate variability impacts food security at the household level particularly small and marginal farmers and wage labourers. For example heat wave during February-March in North India caused an estimated loss of 6 million tonnes of wheat in 2002-03. A sharp decline in production of rapeseed and in linseed was observed in Himachal Pradesh due to heat wave in March 2004. Pulse crops in large areas in Madhya Pradesh were damaged due to frost and cold in recent years (Venkateswarlu *et al*, 2011). Similarly, delayed onset of monsoon, mid season and terminal droughts, particularly in rainfed areas are causing huge losses to agriculture and livestock production affecting livelihood of the poor. Within the same season, the country is experiencing severe droughts and floods in the many regions posing serious problems to the farmers, agricultural scientists and extension staff. Fall in yield of staples and consequent shortage of food grains lead to price rise and inflation affecting the poor most. Therefore, it is of utmost importance to enhance the resilience of Indian Agriculture to climate change. Resilience is the ability of a system to absorb shocks and recover as quickly as possible to normal conditions when external environment improves.

Both application of improved technologies and new policies will contribute to the resilience.

The Indian farmers have evolved many coping and adaptation mechanisms over time, but these mechanisms are unable to cope with extreme weather events being witnessed in recent times. Changing rural social dynamics and institutional structures is also contributing to the failure in the traditional coping mechanisms. Hence, there is a strong need to use modern science along with indigenous wisdom of farmers to enhance climate resilience of Indian agriculture.

To cope with climate variability, the Indian Council of Agricultural Research has is the process of developing district level contingency plans for all the rural districts of country with CRIDA, Hyderabad as the nodal agency. So far 300 such plans have been completed. However in the long term, it is important to make our agriculture more climate resilient through location specific adaptation and mitigation strategies by using available technologies and building capacity of the stakeholders.

Demonstration of Climate Coping technologies

Besides undertaking research to develop location specific climate resilient agricultural technologies, there needs to make immediate efforts to disseminate and demonstrate the already available technologies on the farmers' field in more vulnerable regions. At the same time, there is also need to put in place innovative institutional mechanisms at the field level for successful technology adoption and up scaling. In order to deal with climate change in the right earnest, it has therefore been planned to organize extensive farmer participatory demonstrations of location specific climate resilient agricultural technologies/ package of practices developed by ICAR and SAUs as well as successful ITKs on farmers' fields in 100 most vulnerable districts (Figure 1) as part of National Initiative on Climate Resilient Agriculture (NICRA). Hence the technology demonstration component of NICRA envisages identifying climatic vulnerabilities to agriculture in the selected village in each of the 100 districts based on a scientific analysis of climate related problems, farmers' experiences and perceptions, and preparing and implementing, adaptation and mitigation strategies following a bottom-up approach. The focus of the programme is not only to demonstrate the climate resilient agriculture technologies but also to institutionalize mechanisms at the village level for continued adoption of such practice in sustainable manner. One village or a cluster of villages from each of the 100 selected districts was selected for this purpose by the respective Krishi Vigyan Kendra (KVK), in the district. To our knowledge, this is for the largest outreach involving farmers programme ever undertaken on climate change anywhere in the world.

Planning, coordination and monitoring of the programme at national level is the responsibility of CRIDA. Eight Zonal Project Directorates (ZPDs) are involved in coordinating the project in their respective zones. At districts level, the selected KVK is responsible for implementing the project at village level through farmer’s participatory approach. It was ensured that no duplication of efforts are in the selected village, similar schemes in operation. Further, under this programme, the interventions were focused only to address climate related constraints and not general agriculture development.

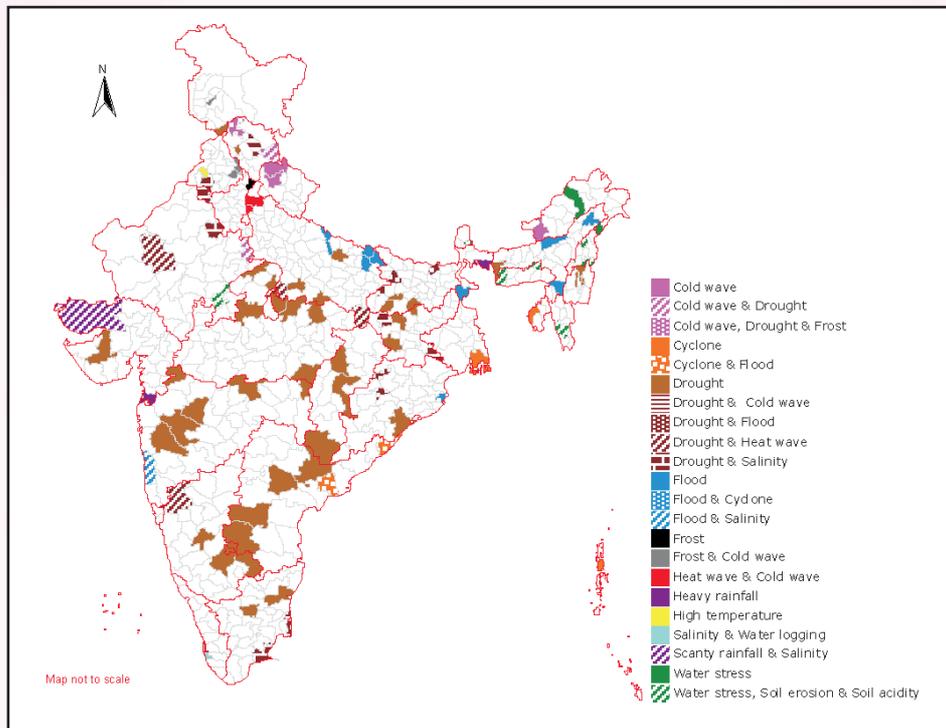


Figure 1: Selected 100 Districts for Climate Resilient Technology Demonstration

Intervention modules:

In order to address the climatic vulnerabilities of the selected villages different interventions were planned under the four modules. However the specific intervention under each module for a particular village was need based and decided based on climatic vulnerability and resource situation of that village. The four intervention modules planned are as given below:

Module I: Natural resources

This module consists of interventions related to in-situ moisture conservation, biomass mulching, residue incorporation instead of burning, brown and green manuring, water

harvesting and recycling for supplemental irrigation, improved drainage in flood prone areas, conservation tillage where appropriate, artificial ground water recharge and water saving irrigation methods.

Module II: Crop Production

This module consists of introducing drought/temperature tolerant varieties, advancement of planting dates of *Rabi* crops in areas with terminal heat stress, water saving paddy cultivation methods (SRI, aerobic, direct seeding), frost management in horticulture through fumigation, community nurseries in multiple dates for delayed monsoon, farm machinery custom hiring centers for timely completion of farm operations, location specific intercropping systems with high sustainable yield index.

Module III: Livestock and Fisheries

Use of community lands for fodder production during droughts/floods, augmentation of fodder production through improved planting material, improved fodder/feed storage methods, fodder enrichment, prophylaxis, improved shelters for reducing heat stress in livestock, management of fish ponds/tanks during water scarcity and excess water and promotion of livestock as such as a climate change adaptation strategy.

Module IV: Institutional Interventions

This module consist of institutional interventions either by strengthening the existing ones or initiating new ones relating to community seed bank, fodder bank, commodity groups, custom hiring centre, collective marketing group, introduction of weather index based insurance and climate literacy through a village weather station will be part of this module.

List of 100 districts and villages selected along with climatic vulnerability

Zone/KVK	District	Village	Climatic Vulnerability
Zone I			
Haryana	Yamunanagar	Radouri	Frost in winter
Haryana	Sirsa	Rupana	Drought / heat wave
Himachal Pradesh	Hamirpur	Man (Gram Panchyat having five revenue villages viz., Janglu, Kuthera, Tareti, Ghumarda and Man)	Drought
Himachal Pradesh	Chamba	Lagga, Padhruin and Osal	Cold wave / Drought / frost
Himachal Pradesh	Kullu	Chhoel-Gaddauri	Drought / cold wave
Himachal Pradesh	Kinnaur	Telangi	Cold wave / drought
Jammu& Kashmir	Kathua	Said- Sohal	Drought
Jammu& Kashmir	Phulwama	DRUBGAM	Frost/cold wave
Punjab	Ropar	Rasidpur	Frost/cold wave
Punjab	Fatehgarh Shaib	Badoshi Kalan	Frost/cold wave
Punjab	Faridkot	Pindi Blochan	High temperature
Punjab	Bathinda	Killi Nihal Singh	Drought/heat wave
Zone II			
A&N Islands	Port Blair	Pordmout, Badash Pahad	Cyclone
Bihar	Saran	Darihara, Panchayat: Dariyapur	Flood/Drought
Bihar	Supaul	Sadanapur, Panchayat: Jhilla Dumri	Drought/Flood
Bihar	Buxar	Chainith	Drought/Flood
Bihar	Nawadah	Shokhodeora	Drought
Bihar	Aurangabad	Harigaon	Drought
Bihar	Jehanabad	Sakrorha (Panchayat: Sahistabad)	Drought
Jharkhand	Koderma	Chopanadih, Raidih	Drought
Jharkhand	Palamau	Dulsulma (Panchayat: Dulsulma)	Drought/Heat wave

Zone/KVK	District	Village	Climatic Vulnerability
Jharkhand	East Singhbhum	Lowkeshra, Panchayat: Musabani	Drought/Heat wave
Jharkhand	Gumla	Vikas Bharti Bishaunpur	Drought/ Heat wave
Jharkhand	Chatra	Puraini	Drought/ Heat wave
West Bengal	Coochbehar	Khagribari (Patlakhawa Gram Panchayat)	Heavy rainfall
West Bengal	Malda	Pemai (Bhaluka Gram Panchyat)	Flood
West Bengal	South 24 Parganas	Bongheri,	Cyclonic storm
Zone III			
Arunachal Pradesh	Tirap	Sipini	Water stress
Arunachal Pradesh	West Kameng	Sangti	Cold stress
Arunachal Pradesh	West Siang	Dali, Chisi and Padi	Water stress
Assam	Sonitpur	Punioni-baghchong	Floods
Assam	Dibrugarh	Phutahola (Phutahola- Nagaon-Rajgarh)	Floods
Assam	Dhubri,	Udmari	Drought
Assam	Cachar	Salchapra	Floods
Manipur	Senapati	Hengbung	Drought
Manipur	Imphal East	Chingtha	Drought
Meghalaya	Umiam	Kyrdem	Drought
Meghalaya	West Garo Hills-Tura	Marapara, Sanangre and Rongbokgre	Drought
Mizoram	Lunglei	Hnahtial	Water Stress
Nagaland	Phek	Thipizumi	Drought
Nagaland	Dimapur	Dhansiripar	Drought
Nagaland	Mokokchung	Aliba	Drought
Sikkim	East Sikkim	Nandok	Soil erosion Water Stress
Tripura	West Tripura	North Pullnpur ADC	Cyclones

Zone/KVK	District	Village	Climatic Vulnerability
Zone IV			
Uttar Pradesh	Bahraich	Baundi	Flood
Uttar Pradesh	Gorakhpur	Jhangha	Flood
Uttar Pradesh	Maharajanj	Bishunpura	Flood
Uttar Pradesh	Gonda	Soauli Mahammadpur	Flood
Uttar Pradesh	Jhansi	Gandhinagar	Drought & Heat wave
Uttar Pradesh	Kushinagar	Seorahi	Flood
Uttar Pradesh	Sonbhadra-	Bisreghi	Drought heat wave
Uttar Pradesh	Baghpat	Shikhera	Ground water depletion
Uttar Pradesh	Muzaffarnagar	Sahdabbar	Ground water depletion
Uttar Pradesh	Chitrakoot	Bhuinhari	Drought & Heat Wave
Uttar Pradesh	Hamirpur	Saukhar	Drought & Heat Wave
Uttarakhand	Uttarkashi	Dunda	Cold wave, flood, hail storm
Uttarakhand	Tehri Garhwal	Dabri & Kalaith	Cold wave, hail storm
ZONE – V			
Andhra Pradesh	West Godavari	Veera Varsam	Cyclone
Andhra Pradesh	Srikakulam	Srisiwada	Floods
Andhra Pradesh	Anantapur	Chamaluru	Drought
Andhra Pradesh	Nalgonda	Nandyalagudem & Boring thandu, Atmakuru (S)	Drought, sodicity
Andhra Pradesh	Kurnool	Yagantipalli	Drought
Andhra Pradesh	Khammam	Nacharam	Drought heat stress
Maharashtra	Nandurbar	Umarani	Heat stress Drought
Maharashtra	Pune	Jalgaon KP	Drought
Maharashtra	Aurangabad	Shekta	Drought
Maharashtra	Amravati (Durgapur)	Takali	Central Plateau
Maharashtra	Ratnagiri	Haral	Floods
Maharashtra	Ahmednagar	Nirmalpimri	Drought
Maharashtra	Gondia	Katangtola & Chandinitola	Drought

Zone/KVK	District	Village	Climatic Vulnerability
ZONE – VI			
Gujarat	Valsad	Khuntli	Heavy and intensive rainfall over 1500 mm and up to 2200 mm per annum. Soil is deep black.
Gujarat	Rajkot	Magharvada	South west monsoonprevails which is often erratic. Soil is shallow.
Gujarat	Kutch	Mundra	Scanty rainfall. Soil is sandy and saline
Rajasthan	Jhunjhunu	Bharu	Drought, low and erratic rainfall, moving sand dunes, poor and impeded drainage and salinity and/or sodicity in soil.
Rajasthan	Bharatpur	Sitara	Rucurring flood andwater logging.
Rajasthan	Jodhpur	Chicharli	Drought, low rainfall, heat wave & wind erosion
Rajasthan	Kota	Chouma Kot	Flood prone area
ZONE – VII			
Chhattisgarh	Raipur	Musawadih, Simga, Raipur	Drought
Chhattisgarh	Bilaspur	Khargana (Grampanchayat: Ganiyari)	Drought
Chhattisgarh	Dantewada	Heeranar	Soil erosion Heavy rainfall
Madhya Pradesh	Satna	Bhargawan	Drought
Madhya Pradesh	Guna	Sarkho	Drought
Madhya Pradesh	Morena	Nidhan (Jouri Panchayat), Jekhani, (Morena Panchayat)	Drought
Madhya Pradesh	Datia	Sanora and Baroudi	Drought
Madhya Pradesh	Tikamgarh	Kanti	Drought
Madhya Pradesh	Chhatarpur	Chokhada	Drought
Madhya Pradesh	Balaghat	Koste	Drought
Orissa	Kendrapara	Krushnadaspur (Gram Panchayat: Singhagaon)	Flood and Cyclone

Zone/KVK	District	Village	Climatic Vulnerability
Orissa	Jharsugda	Bhoimunda (G.P. Loising)	Drought Flood
Orissa	Sonepur	Badamal (Grampanchayat: Chadheipank)	Drought Flood
Orissa	Ganjam	Chopara (Grampanchayat: Jagannath Prasad)	Drought
ZONE – VIII			
Tamilnadu	Villupuram	Kattusiviri Village	Drought
Tamilnadu	Namakkal	VADAVATHUR	Drought
Tamilnadu	Nagapattinam	Anaimangalam	Drought, Floods, cyclones
Tamilnadu	Ramanathapuram	Kalari	Drought, Salinity
Karnataka	Tumkur	D.Nagenahalli	Drought
Karnataka	Kolar	S. Raghuttahalli, Munganahalli Hobli	Drought
Karnataka	Davanagere	Siddanuru	Drought
Karnataka	Belgaum	Bilakundi Village	Drought, Heat wave
Kerala	Alleppey	Muttar	Salinity, water logging

Chapter-II

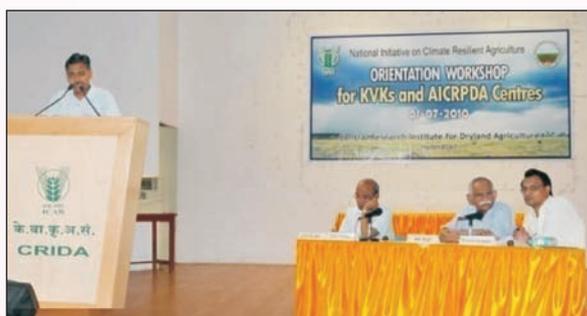
Process of finalizing village level action plans

Preparing need based technological and institutional modules for climate change adaptation and mitigation

To implement the technology demonstration component of NICRA in 100 districts and 23 AICRPDA centres, and finalizing location specific climate resilient interventions and their implementation adopting bottom up approach, a common process outline was developed to guide the KVKs which is described briefly.

Preparatory workshop

In order to sensitize the participating Krishi Vigyan Kendras (KVKs), an orientation workshop was organized for the Programme Coordinators of 100 selected KVKs, 8 Zonal Project Directorates (ZPDs) and 25 AICRPDA centers at CRIDA, Hyderabad, on 1st July, 2010 as the first activity of NICRA. The programme coordinators of all the 100 KVKs, 7 scientists representing zonal project directorates, 25 AICRPDA scientists and 45 scientists from CRIDA participated in the workshop. Dr. A.K.Singh, Deputy Director General (NRM), ICAR, Dr. K.D.Kokate, Deputy Director General (AE), ICAR and Dr. B.Venkateswarlu, Director, CRIDA guided the proceedings. The workshop's major objective was to finalize the process of implementation of the technology demonstration at village level in 100 districts and AICRPDA centers under NICRA.



During the workshop, presentations were made by CRIDA scientists on the outline of NICRA, process for finalizing technology package at village level through a live example of Rangareddy district of Andhra Pradesh and few case studies on institutional interventions. The participants were divided into 9 groups for the group work, one group representing KVKs each of the 8 ZPDs and 9th group represented AICRPDA centers. Each group deliberated on the above issues for their respective zones and finally made presentation in the plenary session on the probable stakeholders of the project, constraints and interventions addressing the climate variability and extreme weather events and scope of convergence with other schemes. The KVKs were suggested to identify a few flagship interventions which specifically address the vulnerability of agriculture and allied sectors to climatic variability in the selected village. This preliminary meeting helped the participating KVKs and ZPDs to understand the objectives and philosophy of the programme. A brief technical manual was framed and circulated.

As a part of the process, each KVK was asked to develop the action plans adopting the following steps:

An Inter-disciplinary Team from KVK consisting of specialists from plant breeding, natural resource management (NRM), agronomy, horticulture, plant protection, livestock, fisheries, agricultural economics, extension, home science was to be formed to select an appropriate village, identify its climatic vulnerabilities with regard to agriculture and finalize a climate resilient technology package. Composition of the team varied depending on the type of climate vulnerability faced by the selected village and availability of specialists in KVK. However, it was emphasized that the KVK team should also take inputs from the state line departments, zonal agricultural research stations of agricultural universities in finalizing the interventions and action plan.

Selection of Target Village: The village was selected based on vulnerability of agriculture to climatic variability. Highly vulnerable village may get priority in selection. Using secondary/ published data, the village which was relatively more vulnerable to climatic variability like prolonged drought, dry-spells, extreme rainfall events, hailstorms, extreme temperatures, cold and heat waves, frost, flood, sea water inundation, etc was to be selected. The village should it represent the dominant cropping system of the district. The proportion of rainfed area in the village should be more than the district average. A higher proportion of small and marginal farmers were another consideration. Majority of the families in the selected village should derive major portion of their family income from agriculture and allied activities. The climatic vulnerability of the village (frequency and intensity of droughts, floods, heat wave, cold wave, etc) should represent that of the district.

Climatic Characteristics of the Village: Once the village was selected, each KVK collected time series climatic/ weather data pertaining to the selected village or from the nearby weather station so as to understand the extent of vulnerability of the village's agriculture to climatic variability. The information was collected and analyzed related to the following:

Rainfall-annual as well as during Kharif season: Normal; trend in past 10 years (if any) increase/ decrease.

Number of rainy days (seasonal as well as annual): Overall average, decadal average (1971-80, 1981-90, 1991-2000, 2001-09).

Intensive rain-spells (above 60 mm per day): Decadal average (1971-80, 1981-90, 1991-2000, 2001-09).

Number of dry-spells in past 10 years: Exceeding 15days, exceeding 10 days in the Kharif season as well as in the whole year.

Length of growing season: Changes during past one decade

Number of floods severely/ completely damaging crops and livestock: Decade wise number for the past three decades

Other extreme events: Information on damage (No. of events decade wise for the past 3 decades) due to other weather extremities such as frost, heat and cold waves, hail storm, sea inundation of agricultural fields and consequent problems, information if any, on soil degradation due to extreme weather events.

The focus of analysis of climatic characteristics of the selected village was on those climatic factors which are constraining the agriculture operations.

Participatory Appraisal: The objective of the participatory appraisal of the village was to understand the farming systems, resource situation, constraints and climatic vulnerabilities and to identify opportunities of climate change adaptation and mitigation in the selected village. Every KVK had information on land use pattern, area, production and productivity of different agricultural and horticultural crops, livestock composition and production, fisheries, awareness level of farmers about climate change, ground water level and its use, income from agriculture and allied activities, of crop losses due to climatic events in the past one decade. This information was collected from the farmers and village key informants. The participatory appraisal was undertaken as follows:

Assessment of Natural Resource Status (*Source-PRA and FGD*): To understand as to why the agriculture in the selected village is vulnerable to climate change, it was planned to assess the status of natural resources, socio-economic, institutional and infrastructural status and major farming systems. The status of natural resources may cover type, quality, organic matter status and depth of soil and its suitability for different crops, access and level of use of manure (FYM & green) and fertilizers, scope for improving organic matter in soil, access to water- rainwater (if harvested), ground water (open wells and bore wells and whether level is declining) and canal water (timely availability and access); account of major changes in flora and fauna during past one decade and its causes. Such assessment was useful to plan interventions related NRM.

Major Farming Systems (*Source-PRA and FGD*): The information was collected on land use pattern, extent of irrigation, type of crops and varieties grown, yield levels, level of input use (fertilizers, manure, pesticides, weedicide, etc), seed replacement rate in major crops, level of mechanization for different farm activities, system of irrigation (flood, drip, sprinkler), access to farm machines (owned/ custom hiring), access to improved seed, livestock species reared and their yields, incidence of various diseases in the livestock and consequent mortality and changes in cropping/ farming systems during the past one decade. This analysis helped in planning appropriate climate resilient technological interventions for individual as well as group of farmers.

Socio-Economic Status and Institutional Arrangements (*Source-PRA and FGD*): The KVK were suggested to collect information on land holding structure, level of income, literacy and education, asset base of farmers, participation in social networks, proportion below poverty line, access to critical inputs to agriculture and marketing opportunity for farm output, access to market information and technical knowledge, level of awareness and skills of farmers, access to different govt. schemes, existing institutional arrangements like SHGs, commodity groups, user groups and their effectiveness, etc. Based on the social dynamics in the village, different institutional arrangements were planned to implement the project activities.

Constraint Analysis (*Source-PRA and FGD*): The multidisciplinary team of KVK analyzed the constraints related to climatic variability based on secondary weather data, resource situation, farming systems and agricultural yields in the past few years. The major constraints resulting from climatic variability includes; water scarcity, recurrent droughts (early, mid season, terminal), cold wave, heat wave, flood, pest and diseases of crop and livestock, fodder scarcity, poor access to appropriate seeds/planting material and critical inputs and farm machinery (access and cost). The constraints are analyzed

by the multidisciplinary team so that the actual constraints and points of intervention are identified for each village as illustrated below in Fig. 2 (*this is only an illustration, the constraint analysis was carried out separately for different situations/villages*):



Nacharam, Khammam: PRA in progress



Siddanur, Davangere: PRA in progress

Similar to the above example, key constraints and points were identified for cropping systems/ farming systems. Based on the analysis of climate characteristics, resources, farming systems and constraints, each KVK was asked to list out 5 most typical impacts of climatic variability on agriculture in the selected village, and the corresponding interventions.

Climate Resilient Technology Package Proposed by Each KVK:

Each KVK had to propose technological and institutional interventions for enhancing the resilience of farming systems to the climatic variability by involving the major stakeholders such as farmers, researcher, NGOs, officers of the line departments and extension specialists. The KVKs were encouraged to involve the innovative farmers, active SHG's, scientists from zonal /regional research stations of SAUs, ICAR institute. State line departments (Agriculture/Horticulture/ Groundwater / NREGS etc.), NGOs active in the area through brainstorming /FGDs to finalize the climate resilient interventions for the selected village.

Based on the detailed analysis of farming systems, resources, constraints, needs of the village, the climatic vulnerability (drought/floods/heat wave/frost/cyclone) and the available technology options from the concerned Regional/ Zonal Agricultural Research Stations of the SAU and ICAR institutes; time tested climate resilient farm practices adopted by innovative farmers, gaps and specific interventions related to each of the four modules *viz*; NRM, crop production, livestock and fishery and institutional were identified and formulated as an integrated package. It was planned to saturate the whole village with the identified interventions in order to demonstrate a discernable effect and document the constraints and lessons. Further the preference was given to the interventions targeted/ focused on the following:

- Interventions benefiting larger and resource poor group
- Interventions which give long-term and sustainable benefits
- Interventions that address resource conservation
- Interventions that promote/strengthen village level institutions

Coverage of the Program

Finally the whole village was to be saturated with the climate resilient technologies, however in the beginning the number of interventions of different types were decided as per the budget available, and vulnerability status and cooperation of the farmers. The interventions which require high investment like farm ponds were planned for few suitable locations in the village. The in-situ moisture conservation and improved agronomic practices, inter-cropping and new varieties were introduced on large number

of farms in the village. In selection of beneficiaries, small holders and women farmers were given priority. It was also ensured that the each village has control farm/plot/ animals for all the interventions in order to assess the impact of interventions in a short period. Every KVK was address to prepare the action plan with details of activities along with roles and responsibilities of stakeholders, period and budget for each intervention (Table 1).

Table 1 : Activity plan

Activity/ intervention module	No. units/ No. farmers covered	Area covered in ha	Duration of implem- entation	Stakeholders/ staff to be involved (indicate specific role of each)	Budget required/ allocated	Farmers contri- bution	Out puts	Measu- rable indicators of output
<i>Natural resources</i> 1. 2.								
<i>Crop production</i> 1. 2.								
<i>Livestock & Fishery</i> 1. 2.								
<i>Institutional/ capacity building</i> 1. 2.								

Table 2 : Activity schedule (February 2011 to March 2012)

Activity/ intervention	Months													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.														
2.														
3.														
<i>Crop production</i>														
1.														
2.														
3.														
<i>Livestock & Fishery</i>														
1.														
2.														
3.														
<i>Institutional/ capacity building</i>														
1.														
2.														

Common Interventions across Districts

Rainwater harvesting and its recycling /recharging of ground water

Water scarcity for agriculture is considered to be one of major manifestations of climate change. Hence the intervention on *rainwater harvesting and its recycling or utilization/recharging of ground water* was given highest priority taken up in most of the selected districts particularly in rainfed regions. Rainwater harvesting and recycling through *farm pond* and restoration of old water harvesting structures in the village are useful in dryland / rainfed areas. Percolation ponds are be taken up for recharging of open wells and bore wells. Recharging of groundwater through injection well or other customized structures are useful in irrigated as well as the areas where ground water is saline. Micro irrigation systems along with high water budgeting would enhance the systems resilience in dry land areas.

Fodder augmentation and animal prophylaxis

Fodder augmentation is another common intervention to be implemented in most of the districts. Besides use of community lands for fodder production, conservation of surplus fodder during rainy season (monsoon grasses) as silage or hay is being attempted. One or two women SHG’s or user groups are being encouraged to undertake fodder conservation activity. Prophylaxis and feeding of mineral mixture to animals reduce

their vulnerability during stress periods like droughts and floods. While implementing such interventions, capacity building of local village person has also been planned.

Seed Production and Seed bank

Village level seed production through farmer groups particularly for newly introduced varieties in those villages/ districts was planned in all the 100 districts. However timely supply of improved seed of major crops is a challenge. However the willingness and capacity building the farmers would be crucial, for the success of this intervention. No of models of seed banks are available in the country from the crop experiences of state departments and NGOs. The idea is to try these models in NICRA and identify best suitable model for each situation.

Improving access to Farm machinery

Large areas in rainfed regions remain fallow or planted late due to poor access to farm machinery. Hence, improved access to farm machinery for sowing, harvesting etc. would be an important component of adaptation strategy to deal with climatic variability. Therefore community managed custom hiring center was planned for in every selected village. The type and quantity of machines have been decided based on actual needs. For this purpose, amount of Rs. 6.25 lakhs has been allocated for each village.

Automatic weather station at KVK and mini-weather observatory in the village

An automatic weather station is installed in each of 100 districts which in the KVK premises / experimental farms which is linked to the central server installed at CRIDA, Hyderabad. The main purpose of this AWS is relate data on crop yields in experimental famers each year along with all important weather parameters. This is used for (i) refining / fine tuning the agro advisories issued by IMD / SAU to the district considering the actual field conditions and (ii) use data for weather based crop insurance scheme (WBCCIS) the cropping pattern soil type and the further a mini manual weather



Automatic Weather Station in Davangere



Automatic Weather Station in KVK farm in Kurnool

observatory has been established in each village in which measures rainfall, wind direction, etc. The weather data collected from this observatory is used primarily to generate awareness among villages on how weather parameters are measured how they impact crops and livestock diseases. A volunteer in the village is trained to record data every day operations can be or cannot be done given the day’s weather and IMD forecast for the next day disseminated by KVK to the volunteer through mobile SMS. The KVK and contractual staff are trained to use the weather data for the benefit of villagers as explained above.

Finalizing Village Specific Climate Resilient Technology Package:

By following the bottom up approach as per the alone process guidelines, each of the 100 KVKs under all 8 zonal project directorates, prepared and submitted the action plans to the project coordinating unit at CRIDA, Hyderabad and their respective Zonal Project Director. To finalize these action plans, eight zonal workshops were organized jointly with the respective Zonal Project Director in different zones (Table 3). These 8 workshops across the country were completed within one month during February to March, 2011.

Table 3: Details of Zonal Workshops

Name of the zone	No. of participating KVKs	Date of the workshop	Venue
Zone – VIII	9	9 th February, 2011	Zonal Project Directorate, Bangalore
Zone - V	13	14 th and 15 th February, 2011	CRIDA, Hyderabad
Zone - VI	7	19 th Feb 2011	MPUAT, Udaipur
Zone - II	15	21 st and 22 nd February, 2011	Zonal Project Directorate, Kolkata
Zone - VII	14	3 rd and 4 th March, 2011	IGKV, Raipur
Zone - III	17	7 th and 8 th March, 2011	AAU, Gowahati
Zone - IV	13	10 th and 11 th March, 2011	Zonal Project Directorate, Kanpur
Zone - I	12	14 th and 15 th March, 2011	Zonal Project Directorate, Ludhiana

During these workshops, the objectives, approach, intervention modules, institutional mechanisms and expected outputs and outcomes of the project were discussed. It was particularly emphasized that identified interventions should address the climatic vulnerability of the agriculture and livelihood of the selected village. The focus of interventions should be not only be to enhance the productivity but also resilience and sustainability of the production systems. It was also stressed that the selected village must represent the dominant farming system, climatic vulnerabilities and adverse weather situations of the selected district.

A team of scientists from CRIDA, Hyderabad including Director, CRIDA and Coordinator, NICRA-Comp-II participated in all the workshops. The workshops were attended by respective zonal project Directors, Director of Extension of concerned agricultural university, chief scientists of AICRPDA centers falling in the zone, scientists from nearby ICAR institutes, and programme coordinators and Subject Matter Specialists (SMSs) from NICRA- KVKs of the zone. The NICRA-action plans for each of the 100 selected districts developed based on village-PRA were critically reviewed by the group to focus them on addressing the climatic vulnerabilities only rather than as a general extension programme. The major advantage of these workshops was the availability of local wisdom and experience of local SAU / ICAR staff who provided substantial inputs to make the action plan highly relevant to each district. Every KVK was suggested to take up 4-5 major flagship interventions on large scale to create an impact. All the NICRA-KVKs submitted the revised action plans after the respective zonal workshop, which were approved. Besides the action plans, the list of implements to be used for farm machinery custom hiring centers in all the 100 districts was also approved during the zonal workshops. The key interventions related to all the four modules viz; NRM, crop production, livestock and fishery and institutional, finalized through bottom up approach in respect of each of the 100 selected districts have are given in the following chapter.

NICRA Action Plan Workshops Organized in Different Zones



Action plan workshop for Zone I
at ZPD, Ludhiana



Action plan workshop for Zone II
at ZPD, Kolkata



Action plan workshop for Zone IV
at ZPD, Kanpur



Action plan workshop for Zone V
at KVK, Baramathi



Action plan workshop for Zone VI
at MPUAT, Udaipur



Action plan workshop for Zone VIII
at ZPD, Bangalore

Chapter-III

District Wise Key Interventions

Zone I

District	Modules	Climatic Vulnerabilities	Key Interventions
Haryana			
Sirsa	NRM	<ul style="list-style-type: none"> • Saline ground water • Water scarcity/ drought 	<ul style="list-style-type: none"> • Bio-drainage through <i>Eucalyptus</i> plantation • In-situ moisture conservation through tillage operations and mulching • Renovation of defunct structures for rainwater harvesting and recycling • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Introduction of drought tolerant crops: desi cotton and drip irrigation in desi and Bt cotton • Promotion of drought tolerant crop guar • Nursery of Bt cotton for gap filling • Supplemental irrigation with canal water mixing with tube well water • Need based contingency crops • Appropriate inter-cropping systems
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay • Management of CPRs through community
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements 	<ul style="list-style-type: none"> • Seed bank/ production of seeds through farmer groups: guar, desi-cotton • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
<p>Yamuna Nagar</p>	NRM	<ul style="list-style-type: none"> • Water scarcity • Deteriorating soil health 	<ul style="list-style-type: none"> • Laser land leveling • Renovation of defunct water harvesting structures • Irrigation through underground pipe lines • Integrated nutrient management under climate variability in rice and sugarcane • Soil test based nutrient application • Tank silt application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases • Burning of paddy stalks 	<ul style="list-style-type: none"> • Replacing paddy with less water requiring crop like turmeric • Inter cropping wheat/ onion/ garlic/ sarson + sugarcane • Alternate cropping with poplar + turmeric, poplar+wheat + sugarcane etc; • Economically viable cropping systems paddy - wheat - summer mung, paddy - potato - onion etc; • Direct seeding in paddy • Zero till seeding of wheat • Micro irrigation systems in vegetables • Low cost poly house cultivation of vegetable crops • Low tunnel raising of vegetable nursery • Adapted varieties and timely surveillance for pest and disease management in rice (sheath blight and stem rot neck blast), wheat (powdery mildew and yellow & brown rust, aphids) • Control of shoot and top borers in sugarcane • IPM in rice and sugarcane

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay • Promotion of fodder production through improved varieties
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of summer mung and wheat through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building for mushroom production as livelihood source
Himachal Pradesh			
Chamba	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health • Frost 	<ul style="list-style-type: none"> • Rainwater harvesting through farm ponds • Channelizing and utilizing water from perennial springs and streams • Plastic mulching in vegetables • Vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Frost • Water scarcity/ drought 	<ul style="list-style-type: none"> • Improved adapted varieties of maize, rajmash, wheat etc; • Low cost poly-house for vegetable and flower cultivation • Micro irrigation system - sprinkler and low cost drip

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production rajmash and wheat through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Hamirpur	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Trenches cum bunds in orchards • Ridges and furrows in vegetable cultivation • Use of organic mulches • Renovation of defunct water harvesting structures • Rainwater harvesting in poly-lined farm ponds • Lifting water from perennial streams • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor yields 	<ul style="list-style-type: none"> • Inter-cropping - maize + toria/ mash/ soybean + wheat/ gobhi sarson/ gram, tomato + bean + cauliflower, arhar + wheat etc; • Drought tolerant crops like cowpea (Himachal lobia 1), arhar (Sarita) anola, ber • Adapted varieties of blackgram (UG 218/ Him mash 1), gobhi sarson (Neelam/ Sheetal), toria (bhawani), french bean (Arka komal, Falguni,

District	Modules	Climatic Vulnerabilities	Key Interventions
			<p>Contender), soybean (Harit soya, Palam soya, Shivalik), maize (KH 101, KH 9452, Mitra, PMZ 47), wheat (VL 616), barley (VL829)</p> <ul style="list-style-type: none"> • Micro irrigation systems - sprinkler and low cost drip
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay, urimol blocks • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank for pulses (arhar, blackgram & gram) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on mushroom cultivation
Kinnaur	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture and soil conservation • Stone mulching in apple • Small RCC Structures for storing rainwater • Vermi - composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Community nursery and integrated nutrient management in apple • Plantation of spur type apple in community and culturable waste land on large scale • IPM in apple • Adapted improved varieties of field crops

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage hay making: conservation of monsoon grasses • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of rajmash through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Kullu	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through trenching, biomass mulching • Renovation of defunct rainwater harvesting structures • Recharging with percolation ponds • Rain/ roof water harvesting and recycling • Drainage in affected sites • FYM, green manuring and vermi - composting • Crop rotation • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Drought 	<ul style="list-style-type: none"> • Inter-cropping with tomato + bean - cauliflower - peas, maize + soybean - radish - wheat, maize + mash - garlic • Contingency crops like barley, dual purpose crops like okra, chilly etc; • Adapted drought tolerant crops like soybean, maize, wheat, blackgram, gobhi sarson, persimon etc;

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Micro irrigation in pomegranate and vegetables • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of high yielding cattle breeds and dual purpose birds • Fodder conservation – cultivated and monsoon grasses • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of self pollinated crops as well as composites of maize through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro - irrigation systems and farm machinery • Promotion and capacity building on bee keeping, mushroom cultivation etc;
Jammu & Kashmir			
Kathua	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Soil health 	<ul style="list-style-type: none"> • Biomass mulching and contour ploughing • Renovation of defunct community water harvesting structures • Rainwater harvesting and recycling through farm ponds • Integrated soil management • Green manuring and vermi - composting • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Appropriate cropping systems: maize – toria – wheat, maize – toria + gobhi sarson • Adapted varieties for water stress conditions blackgram (mash 114), french bean (Pusa Parvati), gram (GNG 469), gobhi sarson (DGS 1), toria (RSPT 2), maize (KH 517, Double decalb), wheat (PBW 175, Raj 3077), okra (Varsha uphar) • Change in sowing/ planting dates in <i>Rabi</i> wheat, gram, pulses etc; • Introduction of elephant foot yam • Zero till seeding of pulses in <i>Rabi</i> season • Micro – irrigation system
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock (urimol bricks) • Promoting stress tolerant high yielding breeds of live stock, fishery and back yard poultry (Vanraja) • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses on bunds/ waste land
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage of introduced adapted varieties through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on oyster mushroom (Dhingri) cultivation

District	Modules	Climatic Vulnerabilities	Key Interventions
Pulwama	NRM	<ul style="list-style-type: none"> • Water scarcity in upper tract • Flood in lower tract 	<ul style="list-style-type: none"> • In-situ moisture conservation • Rainwater harvesting & recycling • Proper drainage in the lower tract • Integrated ponds for fish and common carp culture • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Flood in lower tract • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Drought tolerant varieties and crops • Micro irrigation system - sprinkler and low cost drip • Inter-cropping system with apple + field pea/ mung/ rajmash, maize + rajmash • Low cost poly house for raising paddy nursery • Flood adapted crops and varieties • Promotion of scab resistant apple varieties (Akbar, Firdous, Lal ambari, Shireen) and late bloomers of almond (Makhdoom, Parbat, Shalimar, Waris)
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Conservation of monsoon grasses and fodders through silage and hay making • Promotion of backyard poultry for laying purpose • Growing improved varieties of fodder grasses (Shalimar oat, Sabzar, Berseem) • Prophylaxis and mitigation of mineral deficiencies in livestock
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of paddy varieties through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Punjab			
Bathinda	NRM	<ul style="list-style-type: none"> • Depleting ground water • Deteriorating soil health • Salinity • Burning of paddy stalks 	<ul style="list-style-type: none"> • Renovation of defunct rainwater harvesting structures for recharging • Tank silt application • Green manuring with <i>Dhaincha</i> • Application of gypsum • Soil test based nutrient application • Bio – mulching with paddy straw
	Crop production	<ul style="list-style-type: none"> • Terminal heat stress • Depleting ground water • Burning of cotton seedlings due to heat wave • Imbalanced use of fertilizers • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Advancement in sowing dates and zero till seeding of wheat with the help of turbo seeder • Alternate cropping with paddy - wheat - summer mung, turmeric - late sown wheat • Introduction of mung (crop harvested) and desi-cotton (low water requirement) • Replacing long duration paddy with basmati • Direct seeding and use of tensio meters in paddy for efficient irrigation • Cotton nursery for gap filling • Judicious use of nitrogen by using leaf color chart in paddy and nutrient management in cotton (KNO₃) • Management of mealy bug and <i>Spodoptera</i> caterpillar in cotton • Control of foot rot in basmati (Pusa 1121) • Supplemental irrigation with canal water mixed with tube well water • Micro irrigation in kinnow
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage making • Production and supply of seedlings of fodder trees/ grasses • Improving the shed condition

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of summer mung, wheat, paddy through farmer groups • Seed fumigation with Aluminium phosphide & storage in metal bins • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Faridkot	NRM	<ul style="list-style-type: none"> • Terminal heat stress • Deteriorating soil health 	<ul style="list-style-type: none"> • Bio-drainage through <i>Eucalyptus</i> plantation • Bio - mulching with paddy straw • Land leveling with laser leveler • renovation of defunct rainwater harvesting structures • FYM making in the pits • Green manuring with <i>Dhaincha</i>, <i>Cowpea</i> etc; • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Terminal heat stress in wheat • Depletion of ground water • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Planting trees like bamboo, poplar, <i>Eucalyptus</i>, ber (Umran), guava (Sardar), lemon (Baramasi) • Advancement of date of sowing and zero-till seeding of wheat • Sowing mung (SML 668) after wheat • Tensio meter in paddy for efficient irrigation • Use of leaf color charts in paddy to save nitrogen • Low cost poly house for cultivation of vegetables • Introduction of improved varieties of crops like basmati rice (Pusa 1121), Bt cotton hybrids (MRC 7017, 7031, 6301, 6304, RCH 308), wheat (PBW 621)

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Micro irrigation systems - low cost sprinkler and drip
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Introduction of quality bull for breed improvement • Improving the shed condition • Fodder conservation through silage making • Production and supply of cowpea (CL 367) fodder maize (J 1006) • Fortification of crop residues as feed by addition of urea, jaggery and mineral mixtures
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Fatehgarh Sahib	NRM	<ul style="list-style-type: none"> • Terminal heat stress in wheat • Burning paddy stalks • Depletion of ground water • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through bio - mulching • Residue incorporation in soil with turbo seeders • De-silting of ponds • Green manuring with <i>Sesbania</i> • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Terminal heat stress • Depletion of ground water • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Advancement of sowing dates and zero till sowing of wheat seed treated with <i>Pseudomonas</i> • Crop diversification by growing fruit trees like bael (<i>Aegle marmelosa</i>), jamun (<i>Syzygium cumini</i>), jack (<i>Artocarpus heterophyllus</i>), harda (<i>Terminalia chebula</i>), amla (<i>Emblica officinalis</i>)

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Tensio meter in paddy for efficient irrigation • Judicious use of nitrogen by using leaf color chart in paddy • Micro irrigation systems - micro sprinklers • Low cost poly house for cultivation of flower crops • Zero till sowing of summer mung (with <i>Rhizobium</i> culture) after harvesting of wheat • Need based spot treatment of insecticides for controlling aphids in wheat
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity • Methane emission and poor hygiene 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage making • Production and supply seedlings of fodder trees/ grasses • Establishment of biogas unit: reduction of methane emissions, alternate source of fuel energy, by product - slurry a good source of organic matter for the crops • Use of solar cookers
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of mung, wheat and berseem through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Training on mushroom cultivation
Ropar	NRM	<ul style="list-style-type: none"> • Depletion of ground water • Poor soil health 	<ul style="list-style-type: none"> • Reduced tillage • Incorporation of paddy residue into the soil • Soil test based nutrient application • Renovation of defunct rainwater harvesting structures

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Terminal heat stress • Water scarcity • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Advancement in date of sowing and zero till seeding of wheat • Intercropping - wheat + gobhi - sarson • Direct seeding of paddy and using Tensio meter for efficient irrigation • Economically viable cropping systems - paddy - wheat -summer mung, maize - potato - onion/ sunflower • Agri - horticulture system - fruit tree plantation, intercropping in orchards • Micro irrigation system in kinnow and capsicum • Protected cultivation of chilly nursery, growing capsicum • Integrated nutrient management under climate variability in rice and potato • Adapted varieties of wheat, rice & maize • Seed treatment in basmati rice (PUSA 1121) and potato against foot rot and late blight respectively
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage making • Production and supply of seedlings fodder/ forage trees
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of mung, mash, wheat through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Training on mushroom production and marketing

Zone II

District	Modules	Climatic Vulnerabilities	Key Interventions
Andaman Nicobar Islands			
Port Blair	NRM	<ul style="list-style-type: none"> • Floods/ cyclone • Water scarcity in <i>Rabi</i> season • Poor soil health 	<ul style="list-style-type: none"> • Improved drainage, construction of bunds, low cost sluice gates, raised beds, broad beds and furrows • Farm ponds for rainwater harvesting and recycling • Construction of small check dams in convergence • Integrated ponds for fish and prawn culture in brackish Tsunami affected paddy fields • Crop residue incorporation, FYM, green and brown manuring in rice and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Incursion of sea water due to cyclone • Excess moisture post floods • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Promotion of salt tolerant paddy with mechanical transplantation • Tissue culture banana on ridges in flood affected areas and hilly plains • In flood prone areas cultivation of sugarcane and vegetables in both dry and wet season • Cultivation of vegetables, papaya, banana, pineapple around the pond embankment during wet season • Post flood cultivation of leafy vegetables, radish, swamp cabbage, swamp taro, cauliflower, knol khol, French bean, capsicum, groundnut, flowers, oil seeds, pulses, tuber crops • Early maturing pulses and oil seeds in rice fallows • Integrated pest management in cereals, pulses, and vegetables • Micro irrigation system-low cost drips • Pond based IFS (fish, prawn, vegetables, fodder, fruit crops, poultry, duck, pig)

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of poultry, duckery, goatery, piggery as livelihood sources • Integrated brackish water and fresh water aquaculture • Promotion of fodder cultivation
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice, pulses and oil seeds through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Bihar			
Aurangabad	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Mulching in vegetables and orchards • Renovation of defunct rainwater harvesting structures • Rainwater harvesting through farm ponds and recycling • Compositing and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification and direct seeding of paddy in uplands • Paddy nursery in multiple dates with life saving irrigation • Use of 20 days old dapog seedling in paddy • Sowing of short duration varieties of paddy (Rajshree, Rajendra, Sweta), mung (Samrat, Pusa Vishal), til (Krishna, Pragati)

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Zero till seeding of wheat • Promotion of <i>Rabi</i> pulses • Promotion of fruit crops like mango, litchi, papaya, guava, banana, lemon
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Production and supply of seedlings of fodders oats, sorghum, napier
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Buxar	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through sub soiling, bunding, broad bed furrows, mulching etc; • Renovation of defunct community rainwater harvesting structures • Rainwater harvesting in farm ponds (30 X 30 X 3.5 m) for recycling • Recharging of open wells • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Inter-cropping systems • Short duration rice cultivars (Naveen and Shahbhagi) • Mung, cucurbits, okra, lentil, chickpea, onion for diversification and as contingent crops

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Sprinkler system for onion
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation in silo pits and through hay making • Production and supply of seedlings of fodder trees/ grasses Promotion of fodder cultivation
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, lentil, chickpea, mung through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Jehanabad	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Increased application of organic matter • Vermi-composting • Introduction & multiplication of <i>Azolla</i> in existing pond • Summer green manuring crops like <i>Dhaincha</i>, <i>Sesbania</i>, <i>Crotalaria</i> etc; • Brown manuring in direct seeded rice • Introduction of dry land fruit crops like amla, ber, wood apple • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Water logging in lowlands • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of rice intensification with short duration varieties (Prabhat, Turanta, Dhanlaxmi) in case of delayed rains/ scanty rain conditions • Paddy varieties Swarna sub I, Rajendra in water logged lowlands • Zero till sowing of wheat (HD 2733, PBW 343) in drought conditions and late sown varieties (PBW 343, HD 1744) in water logged areas • Inclusion of mung, redgram, sunflower, maize, vegetables etc; in rice wheat cropping system • Adopting the cropping patterns - rice - wheat/ lentil/ gram - mung, rice/ urd - wheat/ mustard - millets/ maize, rice - wheat - maize/ sunflower • Early potato, spinach, radish to be promoted before wheat • Growing summer vegetables like cucurbits, bottle gourd, water melon, ladies finger, mung (Samrat), maize (Shaktiman), sunflower (Moden) • Introduction of elephant foot yam • Micro-irrigation systems in <i>Rabi</i> crops
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of backyard poultry, goatery and piggery • Fodder conservation through silage and hay making • Production and supply of seedlings of fodder trees/ grasses like M.P. Charri, napier and fodder jowar
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery 	<ul style="list-style-type: none"> • Seed bank/ seed production of wheat, lentil (Arun, PL 406), mustard (Pusa bold, Suphlam), gram (P 256), potato, onion, maize, fodder crops through farmer groups

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Nawadah	NRM	<ul style="list-style-type: none"> • Water scarcity/drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through conservation furrows, farm bunding, bio – mulching etc; • Renovation of defunct community water harvesting structures in the village • Rainwater harvesting and recycling through farm pond • Incorporation of crop residues and green manuring • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Delayed onset of monsoon • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Community nursery raising in multiple dates & System of Rice Intensification • Brown manuring in direct seeded rice • Zero till sowing of wheat, lentil • Inter - cropping - gram + coriander • Drought tolerant crops - gram (KWR 108, Awarodhi), pigeon pea (ICPL 88039, Narendra 1), paddy (Sahbhagi PR 115, Susk Samrat) • Promotion of drought tolerant crops <i>Sesamum</i> (Krishna), urd (Type 9) • Inter cropping system: maize + potato, gram + coriander • Flower cultivation • Orchard development: bael, ber, lemon, mango • Micro-irrigation systems in vegetables, wheat, chickpea

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Better adapted high yielding breeds goat (Black Bengal), poultry (Divyan red/ Naked neck) • Fodder production with improved varieties • Augmentation of production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, wheat, lentil, gram, pigeon pea through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Group marketing of vegetables
Saran	NRM	<ul style="list-style-type: none"> • Flood • Moisture stress in <i>Rabi</i> • Poor soil health 	<ul style="list-style-type: none"> • Improving traditional drainage system • In-situ moisture conservation through land leveling, raised bed and furrows, bio mulching • Renovation of community rainwater harvesting structures • Vermi-composting • Green manuring with <i>Sesbania</i>, <i>Crotalaria</i> • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Water scarcity in <i>Rabi</i> • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • System of Rice Intensification (Swarna sub1) with brown manuring before onset of monsoon • Gap filling in paddy during floods through dapog method • Zero till sowing of wheat with late sown varieties

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Introduction of maize + redgram, rice - maize + potato - greengram, rice - wheat - greengram/ blackgram/ sesame, rice - potato - greengram, maize - potato - greengram/ blackgram, rice - rape seed and mustard - greengram, sesame - wheat - greengram • Gap filling, life saving irrigation, spray of Potassic fertilizer with adjuvant and Urea 1% spray in paddy • Short duration, early varieties of rice, wheat, pulses, oilseeds • Vegetables (spinach, radish, early potato and cauliflower) before wheat where flood recedes early • Promotion of banana, guava, litchi & mango • Use of leaf color chart to optimize nitrogen use • Seed/ seedling treatment with pesticides/ fungicides and need based spraying with adjuvant against BLB, blast & leaf spot (<i>Helminthosporium</i>)
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of duckery, fishery, goatry and poultry • Fencing of fish ponds with net during floods • Fodder conservation through hay making • Production and supply of seedlings of fodder trees/ grasses like para grass and elephant grass, aquatic weeds etc;
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm machinery 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy (Swarna sub 1) and late sown wheat varieties through farmer groups • Community managed farm machinery custom hiring centre

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> Poor access to live stock services Losses due to highly uncertain weather Poor income levels 	<ul style="list-style-type: none"> Training 2-3 rural youth as livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining farm machinery Promotion and capacity building on bee keeping, mushroom culture, paddy-fish-duck culture and singhara (<i>MiRabilis jalapa</i>), makhana and lotus
Supaul	NRM	<ul style="list-style-type: none"> Flood in lowlands Poor soil health 	<ul style="list-style-type: none"> Improving traditional drainage system Vermi-composting Green manuring with <i>Sesbania</i>, <i>Crotalaria</i> etc; Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Flood Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> Direct dry seeding of rice (Swarna sub1, Rajshree, Jal priya, Jal nidhi and Jal lahari) before onset of monsoon Guava plantation in flood-prone areas Zero till boro and summer paddy with brown manuring Mechanical transplanting of pigeon pea and groundnut on raised beds Short duration crop like spinach, radish, early potato, cabbage, cauliflower, onion and garlic etc; before wheat Short duration summer mung (SML 668, Malviya 16) after harvesting of wheat Cultivation of cucurbits like bottle gourd, sponge gourd, muskmelon, watermelon, okra, cowpea etc in summer IFS with paddy - fish - duck system
	Livestock & fisheries	<ul style="list-style-type: none"> Mortality and morbidity losses due to biotic and abiotic stresses Fodder scarcity 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiencies in livestock Promotion of duckery, fishery, goatry and poultry Fodder conservation through silage and hay making Production and supply of seedlings of fodder trees / grasses like para grass

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> Poor access to improved seeds Poor access to farm machinery Poor access to live stock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Seed bank/ seed production of rice, wheat (HD2733, PBW 343), lentil (NL 1, PL 406), mustard (Rajendra, Suphlam, RAUTS 17), berseem (Vardan), groundnut through farmer groups Community managed farm machinery custom hiring centre Training 2-3 rural youth as livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining farm machinery Promotion and capacity building on bee keeping, mushroom culture, paddy-fish-duck culture
Jharkhand			
Chatra	NRM	<ul style="list-style-type: none"> Water scarcity/ drought Poor soil health 	<ul style="list-style-type: none"> Rainwater harvesting through farm ponds lined with locally available material Renovation of defunct community rainwater harvesting structures Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Water scarcity Early season drought Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> Drought tolerant short duration upland paddy (Anjali, Vandana) with brown manuring Adapted variety of mustard (Swini) Introduction of new adapted crops sweet potato, kulthi, ragi, linseed, niger, <i>Sesamum</i> Earthing up in maize and redgram Nursery in multiple dates (15 day interval) Inter-cropping: blackgram + redgram Micro-irrigation system in vegetables and wheat
	Livestock & fisheries	<ul style="list-style-type: none"> Mortality and morbidity losses due to 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiencies in livestock

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Introducing better adapting high yielding breeds of livestock of pig (T & D), poultry (Divyan red), goat (male buck of Beetal x Black Bengal) • Fodder conservation • Production and supply of seedlings of fodder Dinanath grass and seeds of fodder crops
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, ragi, horsegram through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
East Singhbhum	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through ridges and furrows, summer ploughing and mulching (okra and brinjal) • Rainwater harvesting with 5% of the field area under farm pond • Renovation of defunct rainwater harvesting structures • Ditch (4 X 3 X 2 m) with plastic lining in guava and papaya orchards • Green manuring and vermi-composting • Soil test based nutrient application • Upland soil reclamation using lime and basic slag
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Community nursery raising in multiple dates and direct sowing of rice (Anjali, Dhan 109) with brown manuring in uplands

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification (IR 64) in medium land • Zero till sowing of wheat in lowland • Seed treatment in paddy and pulses • Use of BGA in paddy, paira cropping of linseed in lowland rice • Sowing of short duration crops like pigeon pea, toria, spinach, cauliflower, cabbage, brinjal, horsegram and niger • Nursery raising of brinjal, tomato and cauliflower in raised beds • Inter cropping: upland paddy + pigeon pea (4:1) • Low cost poly house for cultivation of coriander, capsicum and spinach • Cash crops: turmeric + ginger • Plantations like guava and cashew in fallow upland • Promotion of IFS
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of piggery and backyard poultry • Fodder conservation through silage and hay making • Production and supply of seedlings of fodder trees/ grasses/ fodder crops
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, pigeon pea, horsegram, niger, linseed through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery • Training on water management in <i>Kharif</i> and <i>Rabi</i> crops

District	Modules	Climatic Vulnerabilities	Key Interventions
Gumla	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation, embankment filling etc; • Renovation of defunct water harvesting structures and pipe lines for efficient disposal of irrigation water • Recharging with percolation ponds • Construction of earthen check dam • Composting and green manuring with <i>Dhaincha</i> • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought in <i>Kharif</i> • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Inter cropping like maize + redgram, maize + groundnut, redgram + groundnut, redgram + jowar • System of Rice Intensification and raising community nursery in different dates • Zero till seeding in wheat with integrated fertilizer & water management • Lentil and linseed as paira crops with weed fertilizer management • Mulching in potato & vegetable cultivation • Early sowing of contingency crops like toria, potato, pea • Demonstration on adapted crops: ragi and maize (HQPM) • Liming in maize • Introduction of new crop castor in dry land
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fish stocking in perennial ponds • Backyard poultry (Vanraja, Gram Priya), piggery, goatary, fish cum duck farming for livelihood making • Promotion of fodder cultivation

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of oilseeds, pulses and rice through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery • Promotion and capacity building on bee keeping and mushroom cultivation and agricultural technologies
Koderma	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting through farm ponds, ground water recharging and renovation of small check dams • In-situ moisture conservation with broad bed and furrows, conservation furrow, skip furrows and contour tillage • Pit composting and vermi-composting • Production of <i>Azolla</i> • On-farm production of organic matter on farm bunds and CPRs • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Delayed onset of monsoon • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Paddy nursery in multiple dates • Short duration rice with System of Rice Intensification • Zero till sowing of wheat • Intercropping systems - maize + redgram • Micro irrigation systems in vegetables and <i>Rabi</i> crops
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of fodder production and conservation • Production and supply of seedlings of fodder trees/ grasses • Urea molasses mineral blocks and bailing and stacking of conserved fodder

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy and redgram through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Palamu	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through organic mulching, conservation furrow etc; • Rainwater harvesting with 5% of field area under farm pond • Renovation of defunct community ponds • Percolation ponds for recharging ground water • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Promotion of adapted improved varieties of paddy, pigeon pea, maize, linseed, summer mung • Introduction of new crops sorghum, niger • Appropriate inter cropping system: upland til + pigeon pea, maize + pigeon pea • Introduction of lac cultivation • Micro-irrigation systems - in vegetables and <i>Rabi</i> crops
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Production and supply of seedlings of fodder trees/ grasses

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production for major crops through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
West Bengal			
Cooch Behar	NRM	<ul style="list-style-type: none"> • Heavy rain fall • Poor soil health 	<ul style="list-style-type: none"> • Broad bed and furrow and organic mulching in vegetable crops • De-silting of existing pond and poly lining • Green leaf manuring • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification and balanced fertilization with short/ medium duration rice tolerant to moisture stress and IPM • Zero till sowing in wheat with ICM • Banana bunch cover with poly mulches • Promotion of short duration pulses like blackgram utilizing post monsoon residual moisture with ICM • Crop diversification through maize with balanced nutrient management • Adoption of Integrated Disease Management in potato
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder cultivation in fallow lands • Integrated farming system model (goat - poultry - duck - crop production)

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice, wheat, maize through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Mass awareness campaign on climate change adaptation and mitigation
Malda	NRM	<ul style="list-style-type: none"> • Flood • Poor soil health 	<ul style="list-style-type: none"> • Organic mulching in vegetables • Development of a community pond • Renovation of existing farm ponds • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Crop loss during flood • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Effective utilization of residual moisture through appropriate short duration crops • Zero till sowing of wheat and maize • Intercropping - maize + winter vegetables, sugarcane + vegetables, parwal + bitter gourd • Cultivation of blackgram, lentil, wheat, maize, oilseed crops like mustard after removal of flood water • Winter and summer vegetable seedling production • Growing of fruit/ vegetables like papaya, lime, drumstick, leafy vegetables • Cultivation of remunerative crops like elephant foot yam and turmeric in relatively upland • IPM in <i>Rabi</i> cereals
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of fodder production • Promotion of aquaculture

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Fodder scarcity 	
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of blackgram, wheat, elephant foot yam, turmeric, leguminous grass through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery
South 24 Parganas	NRM	<ul style="list-style-type: none"> • Flood/ cyclone • Water stress in <i>Rabi</i> season • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting structures (customized farm pond for cyclone affected situation) • Renovation of defunct water harvesting structure • De-silting of water bodies • Rainwater harvesting in excavated ponds for 2nd crop cultivation with mixed fish-cum-duck farming • Compost pits, green manuring and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood/ cyclone • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Deep water, salt tolerant improved varieties of paddy • Construction of land embankment around deep water paddy fields for paddy-cum-fish culture and horticulture on embankment • Introduction of adapted crops like sweet potato, sunflower, beet, leafy vegetables • Management of plant nursery • Nutritional gardening for farmers family • Micro irrigation systems for <i>Rabi</i> and summer vegetables

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of back yard poultry with dual purpose birds, goatary (Black Bengal), fish cum duck culture • Fodder conservation through hay making • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy through farmers groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on bee keeping, mushroom culture, breeding and culture of ornamental fish

Zone III

District	Modules	Climatic Vulnerabilities	Key Interventions
Arunachal Pradesh			
Tirap	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Biomass mulching • Rainwater harvesting in jalkund • Green manuring with leguminous crop and vermi-composting
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Erratic rainfall 	<ul style="list-style-type: none"> • Acidic soil management by liming • Soil test based nutrient application • Dapog nursery (mat nursery) • Intercropping ahu rice + greengram/ blackgram, potato + pea, rice + pea • Intercropping in horticultural gardens with potato + pea, turmeric, ginger • Poly house for nursery raising • Sequential cropping with ahu rice (Ilonggiri), soybean (JS 2), maize (QPM), greengram (Pant U 19), toria (TS 46) • Relay cropping • Advancement in dates of sowing of ahu rice, maize and toria
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Grading up of pigs by introducing males of hampshire with local breed • Integrated fish farming and backyard poultry for livelihood making • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services 	<ul style="list-style-type: none"> • Seed bank/ production of seed of paddy, late sali rice through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Training on cultivation of <i>Colacassia</i> and <i>Tapioca</i>
West Kameng	NRM	<ul style="list-style-type: none"> • Water scarcity/drought • Poor soil health 	<ul style="list-style-type: none"> • Mulching for soil and moisture conservation • Construction of rainwater harvesting structures • Renovation of defunct water harvesting structures • Promotion of <i>Azolla</i> cultivation as feed for fish and as supplementary organic manure • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/drought • Wind problem • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Cultivation of apple using drip irrigation in the selected sites • Low cost poly houses for raising nurseries and growing vegetables (tomatoes, cabbage, brinjal, cauliflower and broccoli) • Planting trees as wind breaks • Integrated pest management
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fish cum <i>Azolla</i> culture in water harvesting structures • Production and supply of seedlings of fodder oats and napier grass
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services 	<ul style="list-style-type: none"> • Seed bank/ production of seeds of napier grass, oat and maize through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
West Siang	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Soil and moisture conservation through organic mulching • Farm pond at higher level for dual purpose: irrigation for the field crops and fish rearing • Renovation of defunct rainwater harvesting structure • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health • Low returns • Losses due to pests and disease 	<ul style="list-style-type: none"> • Drought tolerant varieties of rice like Bali and Yamuk for jhum and Kimin for WRC (Local varieties) • System of Rice Intensification with the popular local varieties and RCM-10 by sowing the seeds in the 2nd week of June and transplanting in the 3rd week of June • Conservation tillage for growing maize (HQPM 1), rape seed (TS 46), pea (Azad pea 1) and potato (Kufri Kanchan) after rice • Low cost poly houses for raising nurseries and growing vegetable like tomato, capsicum and cucumber • Rejuvenation of declined Khasi mandarin orchards: by making half moon terrace for application of 30 kg FYM + 650 g Urea + 1220 g SSP + 450 g MOP/tree/year, lime @ 3 kg/tree in alternate year + IPM • IPM in field, vegetable, fruit crops
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity • Low yield 	<ul style="list-style-type: none"> • Prophylaxis of livestock • Introduction of improved breeds of pigs (Large Black & Hampshire) • Fisheries in farm ponds with Rohu, Mrigal, grass carp and common carp • Mitigation of mineral deficiencies in livestock • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i>

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, rape seed and pea through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Assam			
Cachar	NRM	<ul style="list-style-type: none"> • Poor soil health • Poor management of rainwater • Flooding of fish ponds 	<ul style="list-style-type: none"> • Bio-mulching in potato • Rainwater harvesting structure • Green manuring and composting • Farm ponds for fisheries • Net fencing of fish ponds during floods • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Soil health 	<ul style="list-style-type: none"> • Flood tolerant varieties - deep water paddy, early short duration ahu rice (Disang), late sali rice (Luit/ Disang) in post flood situation, other contingency crops like boro rice, blackgram, potato, rajmah, toria, brinjal • Introduction of new crops: <i>Sesamum</i>, Assam lemon, black pepper • Inter - cropping systems with potato + pumpkin + rajmash • Low cost poly-house for raising early vegetable seedlings
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis of livestock • Introducing better adapted high yielding breeds of livestock, goat, ducks, poultry etc; • Integrated fish farming and composite culture of carp with scientific management • Post monsoon composite culture of carps • Mitigation of mineral deficiencies in livestock

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of deep water paddy, late sali rice through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Training on mushroom cultivation • Capacity building for group marketing of high value crops
Dhubri	NRM	<ul style="list-style-type: none"> • Moisture stress during <i>Rabi</i> and summer • Poor soils and erosion 	<ul style="list-style-type: none"> • Rainwater harvesting & recycling through farm ponds • In-situ moisture and soil conservation • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Water scarcity in post flood period • Losses due to pests and disease 	<ul style="list-style-type: none"> • Promotion of short duration sali variety (Luit/ Kolong) during pre and post flood situation • Submergence tolerant sali rice varieties (Jal Shree/Jal Kuwari) in flash flood situations • Promotion of System of Rice Intensification in rice (Kanaklata) during summer season • IPM in rice and vegetables
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Management of fish pond during flood by bunding and net fencing • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i>

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice (Kanaklata, Jal Shree, Luit) and toria (TS 36) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Dibrugarh	NRM	<ul style="list-style-type: none"> • Moisture stress during <i>Rabi</i> and summer • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting in jalkund with polythene lining in areas experiencing terminal drought affecting the <i>Rabi</i> vegetables • Green manuring and vermi-composting • Introduction & multiplication of <i>Azolla</i> in existing pond & incorporation in rice field • Soil test based major and micronutrient supplements to fruit and vegetable crops
	Crop production	<ul style="list-style-type: none"> • Flood • Water scarcity during pre and post flood • Losses due to pests and disease 	<ul style="list-style-type: none"> • Submergence tolerant sali rice varieties for flash flood situation (Jal Shree, Jal Kunwari, Swarna sub 1) • Late sali varieties in post flood situation (Luit & Kolong), improved boro rice varieties (Padmanath, Kanaklata) • System of Rice Intensification in summer (Kanakalata) • Pea as relay crop in sali rice cropping system • Introduction of blackgram (T 97), toria (TS 46), tomato, brinjal (Pusa purple long), pointed gourd, chilly local cultivars • Banana (Mulbhog, Dwarf Cavendish) cultivation in upland bari system • IPM&IDM demonstration for winter rice & major vegetables

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Mass trapping & mating disruption of melon fruit fly/ oriental fruit fly in cucurbits, brinjal fruit & shoot borer, yellow stem borer in rice using pheromone trap
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Grading up of existing breed of pig through improved male (HS or Ghungru) • Raising of carp fry to fingerlings • Production and supply of seedlings of fodder trees/ grasses (napier/ para/ guinea) and <i>Azolla</i>
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice (Luit & Jal Shree 17), toria (TS46), blackgram (T 919), potato (HPS7/67), bao rice (Padmanath) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Demonstration on important methods of Agri/ Vety/ Fishery/ Seri/ Apiculture • Promotion of bee colonies under toria cropping system
Sonitpur	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • Organic mulches for efficient soil moisture conservation by using rice husk/ straw, water hyacinth and other crop residues • Rainwater harvesting & recycling using farm pond with poly sheet lining/ cementing • Vermi-composting • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Flood • Water scarcity in pre and post flood • Poor soil health 	<ul style="list-style-type: none"> • Submergence tolerant rice (Jal Shree) for flash flood situation • Promotion of short duration winter rice (Luit, Kolong) during post flood & drought like situations • System of Rice Intensification in summer rice (Swarnabh) • Inter cropping with sesame + <i>Kharif</i> pulses, ginger/ turmeric + arhar • Promotion of short duration late sown, rainfed wheat (DBW 14/ HDR 77), Maize (HQPM 1), Olitorius jute (Tarun), <i>Kharif</i> blackgram (USJD 113/ KU 301), <i>Rabi</i> oilseeds and toria (TS 38), summer tomato (Avinash) and brinjal hybrids after winter rice • Banana (Amrit sagar) cultivation for nutritional security in upland bari system • IPM in winter and summer rice, brinjal, ginger • Micro irrigation systems - sprinkler and drip
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity • Loss of fish during flood 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Raising carp fry to fingerling and management of fish pond during flood by bunding and net fencing • Production and supply of seedlings of fodder trees/ grasses hybrid napier, lucern, para, guinea
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice (Jal Shree, Luit, Swarnabh), toria (TS 38) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery Training on apiculture, raising of carp, management of fish pond during flood
Imphal East	NRM	<ul style="list-style-type: none"> Water scarcity in <i>Rabi</i> season Poor soil health 	<ul style="list-style-type: none"> In situ moisture conservation through biomass mulching Channelizing and utilizing water from perennial springs Rainwater harvesting & recycling (farm pond and jalkund) Renovation of existing community pond Vermi-composting Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Flash flood Water scarcity in <i>Rabi</i> season Low temperature stress 	<ul style="list-style-type: none"> Promotion of flood tolerant local paddy (Taothabi, Akutphou) Low cost poly house for vegetable nursery raising Apiculture in mustard fields Mushroom production
	Livestock & fisheries	<ul style="list-style-type: none"> Mortality and morbidity losses due to biotic and abiotic stresses Fodder scarcity 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiencies in livestock Introduction of improved breeds of ducks (Khaki Kampbel, Vigova super M) poultry (Vanraja), piggery etc; Production and supply of seedlings of fodder trees/ grasses Promoting fish culture for livelihood Ring bund and disease management in fish ponds
	Institutional	<ul style="list-style-type: none"> Poor access to improved seeds Poor access to farm implements Poor access to live- stock services 	<ul style="list-style-type: none"> Seed bank/ seed production through farmer groups Community managed farm machinery custom hiring centre Training 2-3 rural youth as livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Seed storage in bins made up of bamboo of one quintal capacity developed by ICAR
Sylvan	NRM	<ul style="list-style-type: none"> • Floods • Water stress during <i>Rabi</i> season • Poor soil health 	<ul style="list-style-type: none"> • Making proper drainage channels • Biomass mulching and recharging of ground water • Rainwater harvesting and recycling through farm ponds • In-situ & ex-situ green manuring • Composting with farm waste, poultry litters, cattle & pig drops, house hold waste, weeds and plant litters, paddy husk, saw dust etc; • Vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Floods • Water scarcity during pre and post flood • Poor soil health • Losses due to pests and diseases • Low temperature stress 	<ul style="list-style-type: none"> • Promotion of adapted flood tolerant crops and varieties rice (Tampha Phou, CAUR 1, RCM 10), maize (HQPM 1, Ganga 1), mustard (M 27, TS 36), rice bean (MNPL 1 &2), blackgram (T 9) & greengram (ML 353) • Promotion of low cost poly house for vegetable production • Micro irrigation systems • Promotion of IPM & INM
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity • Low income 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of backyard poultry (Vanraja), duckery, piggery, fisheries • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i>

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of rice, mustard, rice bean, blackgram and greengram through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Meghalaya			
West Garo Hills	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through locally available bio mulches • Rainwater harvesting in the jalkund • Vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification (Ranjit) and cultivation of irrigated boro rice • Promoting rice maize based cropping system • Cultivation of off-season vegetables under low cost poly houses • Cultivation of mustard, turmeric, ginger, banana and areca-nut • Rejuvenation of cashew-nut plantations • Micro irrigation system-sprinkler, drip • Organic management of insect pest and diseases
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Production and supply of seedlings of fodder trees/ grasses

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on bee-keeping, mushroom cultivation and agro processing and value addition
Ri-bhoi	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through bunds prepared across the slope, mulching • Small farm pond (jalkund) at the top of the hill • Composting and vermi-composting • Soil test based nutrient application and lime in maize
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Frost 	<ul style="list-style-type: none"> • Production of lowland adapted rice (Shahsarang) • Inter-cropping of summer groundnut + leafy vegetables (coriander, fenugreek, spinach) • Introduction of short duration early cauliflower variety for mitigating adverse affects of drought • Low cost poly house for cultivation of crops during severe winter • Promotion of ginger on raised bunds across the slopes • Liming in maize
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Composite fish culture practices • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i>

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery and implements • Training on post harvest management and value addition of carambola, ginger and tomato
Mizoram			
Lunglei	NRM	<ul style="list-style-type: none"> • Water scarcity during <i>Rabi</i> season • Poor soil health 	<ul style="list-style-type: none"> • Polythene mulching in vegetables • Rainwater harvesting structure (farm pond) • Percolation pond for recharging ground water • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity during <i>Rabi</i> season • Poor soil health 	<ul style="list-style-type: none"> • Introduction of adapted high yielding varieties of new crop • Appropriate inter-cropping systems • Micro-irrigation systems - sprinkler, drip
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis of livestock • Mitigation of mineral deficiencies in livestock • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i>
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements 	<ul style="list-style-type: none"> • Seed bank/ seed production of seeds through farmers groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> Poor access to live- stock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Nagaland			
Dimapur	NRM	<ul style="list-style-type: none"> Water scarcity Poor soil health 	<ul style="list-style-type: none"> In-situ moisture conservation by making bunds, half moon bunds and terracing and mulching Renovation of defunct rainwater harvesting structures Rainwater harvesting structure (farm pond/ jalkund) and percolation ponds Channelizing water from nearby perennial streams to water harvesting pond Vermi-composting Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Water scarcity Frost 	<ul style="list-style-type: none"> System of Rice Intensification for aerobic rice after harvesting of maize Maize (HQPM 1) cultivation intercropped with legumes <i>Azolla</i> production to improve paddy yield Low cost nursery structures Assam lemon orchard Micro-irrigation systems
	Livestock	<ul style="list-style-type: none"> Mortality and morbidity losses due to biotic and abiotic stresses Fodder scarcity 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiencies in livestock Production and supply of seedlings of fodder grasses like napier, hybrid napier, para grass, congo - signal guinea, broom grass etc;
	Institutional	<ul style="list-style-type: none"> Low seed replacement rate & poor access to improved seeds 	<ul style="list-style-type: none"> Seed bank/ seed production of paddy and maize through farmer groups Community managed farm machinery custom hiring centre

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotio and capacity building on apiary, bee rearing and oyster mushroom culture
Mokokchung	NRM	<ul style="list-style-type: none"> • Flood • Water scarcity during <i>Rabi</i> and summer seasons • Poor soil health 	<ul style="list-style-type: none"> • Embankments using wire for protection of crop/ land/ irrigation channels against soil erosion due to flash flood • Improved drainage system for water logged areas • In-situ moisture conservation through contour bunding, half moon terracing, mulching with paddy straw, dry grass, crop residue etc. • Rainwater harvesting tank with lining • Soil carbon improvement strategies by incorporation of legume crop residues, growing of green manuring crops and use of organic manures • Composting and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flash flood • Water scarcity during <i>Rabi</i> and summer seasons • Poor soil health • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification (Mehourou, MTU 7029) • Inter-cropping maize + legume crops • Promotion of toria (TS 36 & 38), <i>Tapioca</i> cultivation • Early planting of <i>Rabi</i> crops • Low cost poly house for nursery raising • Ring well for irrigation of winter vegetables and off-season cucumber
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Renovation of defunct fish ponds and promotion of improved fish species

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Fodder scarcity • Low fish yield 	<ul style="list-style-type: none"> • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i>
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Phek	NRM	<ul style="list-style-type: none"> • Floods • Water scarcity during pre and post flood • Poor soil health 	<ul style="list-style-type: none"> • Renovation of defunct main pond of 400 m² – excavation, construction of side wall, barbed wire fencing around the pond • Construction of a secondary concrete reserve tank near field • Construction of 12 nos. of LDPE lined water harvesting ponds • Channelizing water from main pond to secondary concrete reservoir • Vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Poor Soil health • Losses due to pests and diseases • Severe cold 	<ul style="list-style-type: none"> • Cultivation of short duration varieties of paddy (Lachit, Luit, Chilarai, Mulagabhoru, Kolong and Kanaklata) and field pea (Rachana), rapeseed (TS 36) • Low cost poly house for vegetable production • Supply of 2000 saplings of quality kiwi for developing a commercial community orchard • Micro irrigation system-sprinkler, drip

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity • Losses due to bad weather 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Construction of poultry cum fishery units • Provision of bukary to prevent cold stress • Improved/ cold tolerant housing for backyard poultry units (Vanraja and Gram Priya) • Provision of wooden creep boxes for pig (Ghungroo) breeding • Introduction of broiler rabbits with commercial cage housing system • Production and supply of seedlings of fodder trees/ grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Sikkim			
East Sikkim	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through terrace bunds, bio- mulching • Rainwater harvesting structure-jalkund • Adapting water-shed approach • Vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Frost 	<ul style="list-style-type: none"> • Inter cropping with legume crops • Low cost poly house for year round production of high value crops • Rejuvenation of old Sikkim mandarin orchard • Micro-irrigation systems

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of improved breeds of backyard poultry • Production and supply of seedlings of fodder trees (Barhar, Nebaro and Gogun) and grasses (Napier, guinea and broom grass)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of maize (Vivek, Sankul makka 11), mustard (Sikkim sarson 1), ginger (Bhaisey), chilly (Dalley chilly), tomato (All rounder), large cardamom (Sawaney) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on apiculture and mushroom culture
Tripura			
West Tripura	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • Water harvesting through farm ponds with HDPE lining • Community bund in between two hillocks • Vermi-composting and bio-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Poor soil health • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Popularization of high yielding adapted varieties of paddy (TRC 2005 1, Naveen, MTU 1010) • Low cost poly house for vegetable and nursery production. • Post harvest management of tomato, ginger, carambola, groundnut, pineapple • Promotion of INM and IPM

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of fishery, piggery and poultry • Production and supply of seedlings of fodder trees/ grasses like hybrid napier, guinea
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of boro rice (TRC 2005 1, Naveen), SCH maize, field pea (TPCR 8), TPS tuberlets (HPS 11/ 67) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on apiculture and mushroom culture

Zone IV

District	Modules	Climatic Vulnerabilities	Key Interventions
Uttar Pradesh			
Bahraich	NRM	<ul style="list-style-type: none"> Flood in <i>Kharif</i> Water scarcity in <i>Rabi</i> season Deteriorating soil health 	<ul style="list-style-type: none"> Improving the drainage system In-situ moisture conservation with bio-mulch Green manuring with <i>Sesbania</i> Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Floods Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> Flood tolerant rice (Swarna sub 1) Plantation of guava orchards in flood affected areas Zero till sowing of wheat (CBW 17) Pre flood cultivation of maize, mung Growing high remunerative crops toria (Goldi), lentil (NDL 1), okra (VRO 6)
	Livestock & fisheries	<ul style="list-style-type: none"> Mortality and morbidity losses due to biotic and abiotic stresses Fodder scarcity 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiencies in livestock Fodder conservation through silage and hay making Growing improved varieties of fodder grasses like M. P. Chari + cowpea, berseem + mustard, napier etc;
	Institutional	<ul style="list-style-type: none"> Low seed replacement rate & poor access to improved seeds Poor access to farm implements Poor access to live- stock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Seed bank/ seed production of rice (Swarna sub 1), wheat (CBW 17/ K 307) and lentil (NDL 1) through farmer groups Community managed farm machinery custom hiring centre Training 2-3 rural youth as livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Bhagpat	NRM	<ul style="list-style-type: none"> • Depletion of ground water • Deteriorating soil health 	<ul style="list-style-type: none"> • Renovation of village ponds for recharging • In-situ moisture conservation by making ridges, raised bed planting, bio-mulching etc; • Laser land leveling for efficient irrigation • Green manuring and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification and direct seeded rice • Timely transplanting of rice • Alternate cropping systems with less water requirement like arhar - wheat, sugarcane + urd/ mung/ cowpea - ratoon, fodder jowar - urd - wheat, sugarcane + onion - ratoon - wheat • Micro irrigation systems: rain gun in sugarcane • Channel sowing of cucurbit crops
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses like lobia, lucern
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of wheat through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Chittrakoot	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health drought 	<ul style="list-style-type: none"> • In-situ moisture conservation by making bunds, furrows, raised beds etc; • Rainwater harvesting and recycling through farm ponds • Customized structures for ground water recharging • Renovation of defunct rainwater harvesting structures • Green manuring (<i>Sesbania</i>) and vermi-composting • Use of bio fertilizers • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ frequent droughts • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Intercropping systems chickpea + mustard, chickpea + linseed • Direct seeded rice (Sugandha 3) • Use of drought tolerant and short duration varieties of oilseed and pulses • Plantation of orchard like anola, bael, ber, lemon etc; • Integrated farming systems with horti - fishery - poultry, horti - agri - dairy, agri - goatry - horti systems • Introduction of adapted <i>Kharif</i> crops <i>Sesamum</i> (TKG 306), mung (PDM 139), pigeonpea (ICPL 88039) okra (VRO 6), tomato (Rashmi), maize hybrids and <i>Rabi</i> crops chickpea (JG 16, KGD 1168), lentil (JL 3), mustard (Pusa Jai Kishan), linseed (Subhra), wheat (GW 273, HI 8498), pea (AP 3), field pea (KPMR 400) etc; • Micro irrigation systems
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of goatary, poultry as livelihood source • Fodder conservation through silage and hay making • Growing improved varieties of fodder like stylo, deenanath grass etc;

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Gonda	NRM	<ul style="list-style-type: none"> • Flood • Deteriorating soil health • Paddy stalk burning 	<ul style="list-style-type: none"> • Embankment of fields with proper drainage outlets and bunding the field, linking water flow to small channels and ultimately to river Ghaghara. • Construction of main channel and small check dam with outlet • Green manuring with <i>Sesbania</i> • Incorporation of paddy residue into the soil • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Flood tolerant rice (Swarna sub 1) • Plantation of guava orchards in flood affected areas • Zero till sowing of wheat • Inter cropping of blackgram + sugarcane • Better adapted crops like lentil (PL 4), mustard (NDR 8501), pigeonpea (NA 1), wheat (Unnat Halna, Naina, PBW 550) • Management of sugarcane ratoon crop • Establishment of community nursery for multipurpose trees (mango, bamboo, guava, sahjan, poplar, teak) • Integrated pest management in pigeonpea

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Growing improved varieties of fodder crops/ grasses • Promotion of fishery
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Gorakhpur	NRM	<ul style="list-style-type: none"> • Water scarcity during <i>Rabi</i> and summer seasons • Deteriorating soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation by making raised beds and furrows, bio-mulching, laser land leveling etc; • Vermi-composting and green manuring with <i>Sesbania</i>, <i>Crotalaria</i> etc; • Soil test based fertilization with integrated nutrient management
	Crop production	<ul style="list-style-type: none"> • Floods • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • Direct seeding of rice (Swarna sub 1, Jal Priya, Jal Nidhi and Jal Lahari) before onset of monsoon • Mechanical transplanting of rice • Zero till sowing of wheat • Cultivation of sugarcane in both autumn and spring in flood prone areas • Plantation of guava orchards in flood affected areas • Cultivation of short duration crops

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Before wheat: spinach, radish and early potato • During <i>Rabi</i> season: cabbage, cauliflower, potato onion and garlic and cucurbits • After wheat: spring maize + summer mung, bottle gourd, musk melon, water melon, okra, cowpea • Pigeonpea and groundnut on raised bed in rainfed upland area
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of goatary, piggery, poultry, fish & duckery • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses like para grass and elephant grass
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of rice (Swarna sub 1, Jal Priya, Jal Nidhi and Jal Lahari), wheat, lentil (NL 1, PL 406 and PL 4), mustard (NDR 8501), berseem (Vardan), groundnut through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on bee-keeping, mushroom cultivation
Hamirpur	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation by making trenches, ridges and furrows, bio-mulching etc; • Rainwater harvesting in poly lined farm ponds and recycling

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Percolation ponds/ customized structures for recharging the ground water • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Inter-cropping systems - maize + toria + wheat, maize + toria + gobhi sarson, maize/ mash-wheat/ gram, maize + soybean -wheat, tomato/ bean - cauliflower, arhar - wheat etc; • Drought tolerant varieties of arhar (Sarita), barley, blackgram (UG 218, Him mash 1), cowpea (Himachal lobia 1), french bean (Arka Komal, Falguni, Contender), gobhi sarson (Neelam/ Sheetal), toria (Bhawani), maize (Double decalb, KH 9452, Mitra, Pro agro 4642, PMZ 4), soybean (Harit soya, Palam soya, Shivalik), wheat (VL 616, VL 829) etc; • Plantation of orchards like anola, ber • Micro-irrigation systems-sprinkler and drip
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making and uromin bricks • Growing improved varieties of fodder grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of arhar, gram and urd through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on mushroom cultivation

District	Modules	Climatic Vulnerabilities	Key Interventions
Jhansi	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation by making contour trenches, ridges and furrows, raised beds, field bunding, repairing of outlets etc; • Rainwater harvesting and recycling through farm ponds, earthen embankments etc; • Green manuring with <i>Dhaincha</i>, <i>Sanai</i> etc; • Use of FYM and composting • Growing <i>Glyricidea</i> on farm bunds • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Plantation of guava orchards in flood affected areas • Intercropping of pigeonpea + sorghum/ blackgram/ greengram/ cowpea, chickpea + barley/ durum wheat/ mustard/ linseed/ lentil in black soils • Promoting drought/ stress tolerant/ short duration crops (sesame, bajra, jowar, maize and pigeonpea) • Short duration varieties of <i>Rabi</i> crops wheat (C 306, Lok 1, Sujata), gram and lentil with limited moisture • Micro irrigation system-submerged pitchers and skip furrows
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making: cultivated fodder as well as monsoon grasses • Growing improved varieties of fodder grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements 	<ul style="list-style-type: none"> • Seed bank/ seed production through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> Poor access to live- stock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Kushinagar	NRM	<ul style="list-style-type: none"> Flood Moisture stress in <i>Rabi</i> season Deteriorating soil health 	<ul style="list-style-type: none"> Raised bed and bio-mulching Renovation of farm ponds Leveling of field with laser land leveler Green manuring with <i>Sesbania</i> and vermi-composting Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Flood Delay in sowing of wheat due to flood 	<ul style="list-style-type: none"> Flood tolerant rice (Swarna sub 1, Raj Shree) Zero tillage sowing of late sown wheat (K-7903) Intercropping of sugarcane varieties (COSE 1424, 1434 and 96436) suitable for water logging with lentil, toria, garlic, coriander, onion, cowpea, mung (SML 668) Tissue culture banana (Grand Naine) Raising of seasonal vegetable nursery Promotion of paddy + fish culture
	Livestock & fisheries	<ul style="list-style-type: none"> Mortality and morbidity losses due to biotic and abiotic stresses Fodder scarcity 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiencies in livestock Promotion of paddy cum fish culture Fodder conservation through silage and hay making Growing improved varieties of fodder grasses like Sudan grass
	Institutional	<ul style="list-style-type: none"> Low seed replacement rate & poor access to improved seeds 	<ul style="list-style-type: none"> Seed bank/ seed production of wheat & urd through farmer groups Community managed farm machinery custom hiring centre Training 2-3 rural youth as livestock service providers for prophylaxis

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Maharajganj	NRM	<ul style="list-style-type: none"> • Flood • Moisture stress in <i>Rabi</i> season • Deteriorating soil health 	<ul style="list-style-type: none"> • Renovation of defunct rainwater harvesting structures and farm ponds • Plantation of teak + napier, guava • Green manuring with <i>Sesbania</i>, <i>Crotalaria</i> • Vermi-compost and vermin-wash • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Moisture stress in <i>Rabi</i> season • Delayed onset of monsoon 	<ul style="list-style-type: none"> • System of Rice Intensification and direct seeded rice in uplands • Flood tolerant varieties of rice (Swarna sub 1, Jal Priya) • Plantation of guava orchards in flood prone area • Raising community nurseries of paddy in 3 dates for delayed monsoon • Intercropping of sugarcane + lentil/ potato in both autumn and spring in flood prone areas • Pigeonpea and groundnut on raised bed in rainfed upland areas • Short duration <i>Rabi</i> crops like spinach, radish, early potato, cabbage, cauliflower, onion and garlic before wheat (post flood) • Zero till seeding of wheat • Summer mung (Malviya 16) as sole and intercrop with maize, cucurbits (bottle gourd, musk melon, water melon), okra, cowpea etc; after harvesting of wheat

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of goatary, back yard poultry, piggery, fishery, duckery etc; • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses like berseem (Vardan), para grass and elephant grass on bunds
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice (Swarna sub 1, Jal Priya, Jal Nidhi and Jal Lahari), wheat, lentil, mustard(NDR 8501), through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on bee Keeping, mushroom production etc;
Muzaffar Nagar	NRM	<ul style="list-style-type: none"> • Ground water depletion • Deteriorating soil health 	<ul style="list-style-type: none"> • Laser land leveling • Renovation of community ponds for recharging • Composting and vermi- composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Terminal heat stress in wheat • Excess use of nitrogen and increasing pH 	<ul style="list-style-type: none"> • System of Rice Intensification • Introduction of HYV of sugar cane (Co 1424, Co 1434 & Co 67250) with brown manuring • Intercropping system sugar cane + mustard • Zero till sowing of wheat • Introduction of heat tolerant varieties of wheat (DBW 16,17) • Promotion of urd (PU 31, 40), mung (Meha, Samrat)

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Crop diversification by cultivation of flowers and vegetables • Soil test based INM in sugarcane
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of poultry (Nirbheak & Shyama) • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses like berseem (BL 10, 42 & JBH 146), hybrid fodder jowar (HD 15, HC 136) etc;
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of wheat and urd through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Sonbhadra	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • High temperature stress • Poor soil health 	<ul style="list-style-type: none"> • In- situ moisture conservation by making contour bunds, terracing, trenching, bio mulching & stone mulching in orchards • Rainwater harvesting and recycling for supplemental irrigation • Renovation of defunct rainwater harvesting structures • Establishment of small check dams & other rainwater harvesting structures • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Delayed monsoon • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification with brown manuring and direct seeding of rice • Community nurseries for delayed monsoon • Advancement of sowing dates through zero till seeding and mulching in wheat • Sowing of pigeonpea on raised beds • Drought/ high temperature tolerant crops like paddy (NDR 97/ NDR 80), wheat (K 8027), maize (Kanchan/ PA 4212), jowar (CSH 9), bajra (Pusa 23), ashwagandha, satavar etc; • Promotion of perennial component: teak plantation on bunds and waste lands • Micro irrigation systems
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Introduction of quality bulls, improved breeds of goat & poultry • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses like berseem, guinea, napier, para, oat, sudan etc;
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of pigeonpea (NDA 1/ Bahar), gram (Avrodhi/ Pusa 256), paddy (NDR 97), lentil (NDL 1/ K 75) and <i>Sesamum</i> (Sekhar/ G 4) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building of bee keeping, mushroom cultivation, sericulture etc;

District	Modules	Climatic Vulnerabilities	Key Interventions
Uttara khand			
Tehri Garhwal	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Mulching in vegetables • Bunding and trenching of drainage lines on upper reaches of watershed • Rainwater harvesting recycling and recharging of ground water at individual farm and community level • Community plantation of multipurpose trees, grass on field bunds, agro forestry, fruit farming etc; • Composting and vermi-composting • Soil test based nutrient application and calcium for correcting soil acidity • Pelletization of organic material with NPK fertilizers/ agents etc;
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Timely sowing of drought tolerant varieties of field crops • Community nursery for vegetables • Mixed farming, intercropping, ally farming and catch crops • Use of low cost poly houses for vegetable production • Micro irrigation systems
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services 	<ul style="list-style-type: none"> • Seed bank/ seed production of millets of early varieties through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Uttarkashi	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Construction of low cost silpaulin based water tank • Green manuring and vermi-composting, bio-composting, FYM • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • System of Rice Intensification and direct seeding of rice • Intercropping systems - wheat + lentil, wheat + field pea, paddy + urd, millet crops + horsegram + rice bean • Drought tolerant millet crops, pigeonpea, crop rotation with finger millet - wheat - barnyard millet- lentil etc; • Community vegetable nursery • Low cost poly house for cultivation of off season vegetable • Promotion of traps to control white grubs
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses napier on farm bunds
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm implements • Poor access to live- stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice, redgram through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery

Zone V

District	Modules	Climatic Vulnerabilities	Key Interventions
Andhra Pradesh			
Anantpur	NRM	<ul style="list-style-type: none"> • Water scarcity • Frequent drought • Poor soil health 	<ul style="list-style-type: none"> • In situ moisture conservation through conservation furrows, broad beds and furrows • Use of bio mulches in sweet orange • Rainwater harvesting in farm ponds for supplemental irrigation using sprinkler • Vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Intercropping system with redgram + korra (fox tail millet) • Alternate cropping with castor, redgram • Sowing of groundnut (K 6, K 9) with seed cum fertilizer planter • Promotion of micro irrigation in high value crops like sweet orange and vegetables
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Superior breeding males for breed grading up in sheep • Fodder conservation through silage and hay making • Production and supply of seedlings of hybrid napier (APBN1)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice, redgram, korra (fox tail millet), castor, mungari cotton through farmer groups • Community managed farm machinery custom hiring canter • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Khammam	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through trench cum bunding and conservation furrow • Water harvesting in farm ponds for supplemental irrigation • Green manuring with dhaincha and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Inter cropping oil palm + cucurbits • Direct seeding of paddy with weed management • Sunhemp in rice fallows • Adapted varieties of redgram (LRG 41, MRG 1004) • Micro irrigation system in oil palm, mango • KNO₃ spray to induce early flowering in mango • ICM in Bt. cotton • INM in bhendi
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock (vaccination, deworming, mineral mixtures) • Fodder conservation through silage and hay making • Growing improved varieties of fodder grasses
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice, redgram through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Kurnool	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through conservation furrows in castor, sunflower and ridge and furrows in Bt cotton, maize • Renovation of farm ponds for supplemental irrigation • Ground water recharging through percolation ponds • Farm waste recycling (compost pits) • Reclamation of alkali soils through Gypsum • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Frequent drought • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Inter cropping with redgram + korra (fox tail millet), redgram + castor, sorghum + redgram • Zero till seeding of maize and sunflower • Shed net house for nursery and vegetable production • Micro irrigation system in mango, drumstick, chillies and plastic mulching in chillies • Direct seeding of rice with drum seeder + Zn + BIPM • Adapted varieties of redgram (PRG 158), mungari cotton (Srinandi, Yaganti) • Growing castor (PCH 111, Haritha) including management of botrytis during rainy season • Bengalgram (Jaki 9218, JG 130, Digvijay) including management of soil borne diseases
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Ram lamb rearing as livelihood activity • Grading up of local sheep through superior breeding males • Fodder conservation through silage making • Production and supply of seedlings of fodder trees/ grasses

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of rice, redgram, korra, castor, mungari cotton through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Nalgonda	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Soil and water conservation through broad bed furrows, conservation furrows, ridges and furrows • Restoration of farm ponds and old water harvesting structures • Percolation ponds and ground water recharge structures • Silt traps • Vermi-culture and vermi-compost • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Heat wave in mango and sweet orange 	<ul style="list-style-type: none"> • Inter cropping (cotton + pigeonpea, cotton + soybean, pigeonpea + greengram) • Direct seeding of paddy • Crop diversification with short duration crops (water melon, snap melon, mulberry) • Micro irrigation systems with drips and sprinklers • Mulching with rice husk/ groundnut shells/ weeds/ sun hemp • Backyard fruit nursery (mango and sweet orange) • Growing trees for shade

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promoting poultry (Rajsri, Gram Priya) • Ram lamb rearing as livelihood source • Promotion of fishery • Production and supply of seedlings of hybrid napier (APBN 1), para grass, stylo/ subabul, <i>Azolla</i> etc;
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, redgram, sorghum, greengram, dhaincha through farmer groups • Community managed farm machinery custom hiring canter • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Capacity building for agro processing and value addition • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Campaign for increasing farmers' awareness on climate change adaptation and mitigation
Srikakulam	NRM	<ul style="list-style-type: none"> • Flood • Moisture stress in <i>Rabi</i> season • Poor soil health 	<ul style="list-style-type: none"> • Improving drainage system, embankment etc; • Construction of surplus weir for community water tank • Conservation furrows in cashew plantations • Green manuring and composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood • Mid season drought 	<ul style="list-style-type: none"> • Spray of common salt 5% on panicles of harvested paddy to prevent germination (post harvest to threshing) during flood • Flood tolerant varieties of paddy (Swarna, Swarna sub 1) for rice + fish system

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Direct sowing of paddy using drum seeder in uplands • Introduction of line sowing of high yielding varieties of redgram (LRG 41, WRG 14) • Crop diversification in <i>Rabi</i> season
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through hay making • Production and supply of seedlings of fodder trees and grasses • Promotion of fishery
West Godavari	NRM	<ul style="list-style-type: none"> • Water logging • Mid season drought • Poor soil health 	<ul style="list-style-type: none"> • Seed bank/ seed production of paddy, redgram through farmer groups • Community managed farm machinery custom hiring center • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery
	Crop production	<ul style="list-style-type: none"> • Water logging • Water scarcity 	<ul style="list-style-type: none"> • Renovation of drainage channels • Renovation of embankment and outlets • In-situ soil and water conservation • Soil test based nutrient application
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses during and post flood 	<ul style="list-style-type: none"> • Adapted variety of rice (Swarna) in flood prone areas • High yielding adapted varieties of paddy (PLA 1100, MTU 1061)

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Loss of fish during flood • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i> • Management of fish during flood
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of introduced varieties of paddy and pigeonpea through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Maharashtra			
Ahmednagar	NRM	<ul style="list-style-type: none"> • Water scarcity • Frequent droughts • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through ridges and furrows, conservation furrows, broad bed and furrows • Recharging of open wells • Renovation of water tanks • Construction of farm ponds with poly lining and recycling for supplemental irrigation • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Moisture stress in <i>Rabi</i> season • Losses due to pests and diseases 	<ul style="list-style-type: none"> • Inter cropping - pearl millet + moth bean, redgram + soybean with anti stress foliar spray • Short duration varieties of Bengal gram (Digvijay), soybean (JS 9305), onion (Phule Samartha), wheat (NIAW 34), pomegranate, drumstick (PKM 1) • Foliar sprays of NPK, water absorbent polymers

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Introduction of nutritional gardens • IPM in gram for <i>Heliothis</i> • Micro irrigation systems-sprinkler and drip
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Fodder conservation through silage and hay making • Up gradation of local goat with superior Osmanabadi • Production and supply of seedlings of fodder trees/ grasses: multi-cut fodder sorghum (Jayvant) and trees, anjan grass, stylo (Phule Kranti) • Fortification of crop residues as feed by addition of urea, jaggery and mineral mixtures
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of moth bean, redgram through farmer groups • Community managed farm machinery custom hiring canter • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Amaravati	NRM	<ul style="list-style-type: none"> • Water scarcity • Deteriorating soil health 	<ul style="list-style-type: none"> • In-situ moisture conservation through trench cum bunding, contour bunding, biological bunds, ridges and furrows and bio mulching • Renovation of farm ponds and well recharging • Roof water harvesting • Vermi-composting • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Water scarcity 	<ul style="list-style-type: none"> • Integrated crop management for soybean, cotton, pigeonpea, greengram • Contingency crop planning • Micro irrigation system - sprinkler in field crops, orchards and vegetables • Post Harvest Technology for chickpea, wheat and cotton • Poly-tunnel shed net house for nursery raising • High density planting of rain fed crop • Promotion of INM in orange
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Artificial insemination in cows for grading up • Production and supply of seedlings of fodder trees/ grasses • Fodder conservation through silage making and enriched wheat straw
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ production of soybean, redgram and greengram through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • Promotion and capacity building on mushroom cultivation, value added products of soybean, kitchen garden, flower cultivation, fruit & vegetable processing
Aurangabad	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Broad bed & furrow, open furrow, tied ridges and live fencing for soil and water conservation

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Organic matter cum mulching with <i>Glyricidia</i> and plastic mulching • Water saving irrigation with drip/sprinkler • Recharging of farm ponds • Renovation of water trenches and farm ponds • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Losses due to pest and diseases 	<ul style="list-style-type: none"> • Intercropping: pigeonpea + greengram/ maize/ bajra/ soybean/ cotton; <i>Rabi</i> jowar + safflower • Sequence cropping: greengram/ soybean/ maize/ bajra - safflower/ chickpea <i>Rabi</i> jowar/ onion • Promoting adapted high yielding varieties of pigeonpea (BDN 708), soybean (MAUS 71), greengram (BM 2002 1), safflower (PBNS 12), gram (Vijay/ Digvijay), jowar (SPV 1411, Parbhani, Moti) • Crop diversification with fruit crops like pomegranate • Application of anti-transpirants during dry spells • Chemical + hand weeding (soybean, pigeonpea, maize chickpea, <i>Rabi</i> jowar, safflower etc.) • Micro irrigation system
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Breed grading up in sheep and goat • Production and supply of seedlings of fodder trees/ grasses and <i>Azolla</i> • Fodder conservation through silage and hay making
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds 	<ul style="list-style-type: none"> • Seed bank/ production of cotton, maize, redgram and soybean through farmer groups • Community managed farm machinery custom hiring centre

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Baramati	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In-situ moisture and soil conservation • Renovation of defunct rainwater harvesting structures and farm ponds • Customized structures for well and tube recharging • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Foliar spray of potash in bajra and maize and INM in jowar • Use of lihocin, nutrient management and IPM in Onion • Introduction of adapted variety of Bengalgram (Digvijay), drought tolerant bajra (ICTP 8203), jowar varieties (Mauli) for light soils and Vasudha for medium soils and rust resistant wheat (Trimbeak) • Intercropping of redgram + soybean (3:1) • Cultivation of vegetables in shed net house • Micro irrigation system
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Artificial insemination for grading up of cows • Production and supply of napier (RBN 13), lucern (RL 88), stylo (Seabrana) • Fodder conservation through silage and hay making • Enrichment of wheat straw and making urea molasses blocks

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed bank/ seed production of jowar (Vasudha), wheat (Trimbak) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Gondia	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Construction farm pond with plastic lining • Roof water harvesting • Recharging of Wells and renovation of defunct water harvesting structures in the village • Vermi-composting through groups • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Introduction of short and mid duration rice varieties • Crop diversification by introducing turmeric and beans • Vegetable (brinjal, okra) cultivation after harvesting paddy • Backyard cucurbitaceous vegetable cultivation in summer • Introduction of medium duration pigeonpea (PKV Tara) • Plantation of mango (Langada, Amrapali) on bunds • Micro irrigation systems
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Promotion of backyard poultry, goatary (Osmanabadi), fishery etc; • Production and supply of <i>Rabi</i> fodders (lucern, berseem, oat, maize)

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Fodder conservation through silage and hay making, enriched paddy straw • Promotion of lac cultivation • Seed bank/ seed production of rice (PKV Khamang), chickpea (JAKI 9218 in <i>Rabi</i>) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery
Nandurbar	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • In situ soil and water conservation: trench cum bunding, conservation furrows, ridge and furrows • Renovation of rainwater harvesting structures • Creation of group based irrigation facility • Micro irrigation system • Green manuring and bio-mass mulching • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Rain at harvesting of sorghum and blackening of seeds • Increased infestation of pests like stem borer in sorghum • Onion: excess heat in May 	<ul style="list-style-type: none"> • Short duration varieties of cotton with close spacing and fertilizer management • Inter culture with Mogi hoe developed at KVK, Nandurbar • Promotion of Shweta variety of sorghum • Demonstration and training to control stem borer • Management of mango flower drop by nutrient, pest and disease • <i>Kharif</i> late sowing on raise-bed, green manuring, drip/ sprinkler irrigation • Biological control of mealy bug in cotton with fungi - <i>Verticillium lecani</i>

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Production and supply of napier, <i>Rabi</i> fodders, forage trees on bunds • Fodder conservation through silage and hay making
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production of redgram, sorghum through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery • TNAU kit for safe storage of grains on raised bamboo or wooden platform with covering of plastic sheet to protect produce (post harvest to threshing)
Ratnagiri	NRM	<ul style="list-style-type: none"> • Flash flood • Moisture stress in <i>Rabi</i> • Poor soils 	<ul style="list-style-type: none"> • Construction of trenches across sloppy land in hilly area • Soil test based nutrient application • Promotion of perennial component of fodders
	Crop production	<ul style="list-style-type: none"> • Flash flood • Low yields of paddy and mango • Heat stress in mango 	<ul style="list-style-type: none"> • Use of Calcium silicate or Potassium silicate in rice • Training and pruning in mango • Foliar spray of Potassium nitrate in mango • Application of Paclobutrazol in mango
	Livestock & fisheries	<ul style="list-style-type: none"> • Mortality and morbidity losses due to biotic and abiotic stresses • Fodder scarcity 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Introduction of goat (Konkan Kanyal breed) farming as income generating source • Production and supply of fodder/ forage trees and <i>Azolla</i>

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate & poor access to improved seeds • Poor access to farm machinery • Poor access to live stock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Fodder conservation through silage an hay making • Seed bank/ production of groundnut (Konkan Tapora, Konkan Gaurav) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro-irrigation systems and farm machinery

Zone VI

District	Modules	Climatic Vulnerabilities	Key Interventions
Rajasthan			
Bharatpur	NRM	<ul style="list-style-type: none"> • Water scarcity • Heat wave • Poor quality ground water 	<ul style="list-style-type: none"> • Customized structures for recharging shallow tube wells • Roof water harvesting • Renovation of defunct rainwater harvesting structure • Application of gypsum • Mulching in vegetables • On farm generation of organic matter: green manuring, NADEP • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health • Salinity • Frost and cold 	<ul style="list-style-type: none"> • Soil mulching • Drought and salinity tolerant varieties of mustard (RH 819), wheat (Lok 1), gram (RSG 896) and guar • Advancement of date of sowing mustard to avoid frost/ cold injury • Integrated nutrient management • Adapting intercropping systems: bajra + guar, gram + mustard • Spray of Thio-urea and Zink sulphate to alleviate moisture stress • High tech vegetable production and net houses for seedling production • Introducing adapted fruit plantation: anola, guava, ber and bael
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Fodder production through improved varieties of sorghum and berseem • Mitigation of vitamin and mineral deficiencies in livestock through mineral mixture • Introducing better adapted high yielding breeds of livestock (goat & buffalo) • Prophylaxis of livestock

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for wheat and mustard crops through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Jhunjhunu	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting structures: farm ponds, percolation pond • Renovation of defunct rainwater harvesting structures for recharging ground water • Application of Gypsum • Soil test based nutrient application • Recycling of organic matter through compost pit
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ Drought • Frost injury • Heat stress in wheat and barley • Salinity and alkalinity • Heat wave 	<ul style="list-style-type: none"> • Drought tolerant varieties of bajra (Raj 171, HHB 60), guar (RGC 197), cowpea (RC 19) and mung (SML 668) • Frost tolerant varieties of mustard (Bio 902) and gram (RSG 888) • Heat stress tolerant varieties of wheat (Raj 4037) and barley (RD 2052) • Introducing new fodder crop oat (Kent) • Advancement in date of sowing of mustard to avoid frost/ cold injury • Inter cropping guar + bajra, bajra + cowpea, mustard + gram • Adapted fruit crops plantation: ber and pomegranate

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Spraying of Sulphuric acid (0.1%) and Dimethyl sulfoxide (75g/ ha) to mitigate frost injury in mustard and gram • Spraying of Salicylic acid (100 ppm) and Thio glycolic acid (100 ppm) to mitigate heat stress in wheat and barley • Micro irrigation systems: drip (orchards and vegetables) and mini sprinkler (gram, cowpea)
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Fodder production through improved variety of oat, sorghum and lucern • Fodder storage, tree looping (Khejari, Ardu, Babool) • Protection from cold/ heat wave by kachha and pacca shed • Prophylaxis and mitigation of mineral deficiencies in livestock
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for improved varieties of wheat, gram and guar through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Jodhpur	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting through improved tankas and nadi • Roof water harvesting • Scientific composting • Micro catchments • In situ moisture conservation: field/ farm bunds • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop	<ul style="list-style-type: none"> • Water scarcity production • Frequent drought • Poor soil health • Heat wave and wind erosion 	<ul style="list-style-type: none"> • Inter-cropping/ mixed cropping of dry land crops • Soil mulching • Harvesting the crops for fodder in case of drought • Promotion of perennial component (agro forestry) • Drip system of irrigation
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Introduction of improved perennial grasses, fodder crops their seed production • Try to restrict grazing to cooler hours, strengthen animal housing structure • Prophylaxis and mitigation of mineral deficiencies in livestock • Enrichment of paddy straw and stover by urea treatment • Breeding males of high yielding, adapted breeds of cow, goat and sheep
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for new varieties of legumes and spices through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Creating a community fodder bank • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Capacity building for agro processing and value addition
Kota	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting structures: farm ponds, percolation ponds • Renovation of defunct community rainwater harvesting structures

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • In situ moisture conservation: broad bed furrow, deep ploughing in summer, bunding of field • Recycling of organic matter through pit composting and vermi-composting • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ Drought • Heat wave • Poor soil health 	<ul style="list-style-type: none"> • High yielding adapted varieties of soybean (JS 93 05), maize (PEHM 2), mustard (Bio 902) and wheat (Raj4037) • Introduction of new crops: gram (RSG 973), fenugreek (RMT 305), urd (PU 31) and <i>Sesamum</i> (RT 127) • Appropriate intercropping system: soybean + maize/ arhar • Saplings of guava, lemon and papaya • Micro irrigation system (sprinkler in chickpea, wheat and drip in vegetables)
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Improved varieties of fodder crops like jowar, berseem, lucern etc; • Prophylaxis and mitigation of mineral deficiencies in livestock • Introducing better adapted high yielding breeds of livestock (Murrah and Gir bulls)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for new varieties of soybean, chickpea, urd and maize through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Gujarat			
Kutch	NRAM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Soil and water conservation structure nala & gally plug, farm ponds and percolation ponds • Renovation of defunct community rainwater harvesting structures • Providing inter-lock HDPE/ PVC pipes for irrigation • In-situ moisture conservation: land grading & leveling, pakka ogans • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Frequent droughts 	<ul style="list-style-type: none"> • Sowing drought tolerant varieties of castor (GCH 7), bajra (GHB 558, GHB 538), <i>Sesamum</i> (Guj til 2) and greengram (Guj greengram 4) • Net house for vegetable production • Appropriate inter-cropping systems: castor + greengram, <i>Sesamum</i> + greengram • Micro-irrigation system: drip in castor seed production
	Livestock	<ul style="list-style-type: none"> • Fodder scarcity • High mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Introduction of perennial grasses, improved variety of fodder and their seed production • Enrichment of straw by urea treatment • Introducing better adapted high yielding breeds of livestock • Prophylaxis and mitigation of mineral deficiencies in livestock and poultry
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements 	<ul style="list-style-type: none"> • Seed production and storage of mung, <i>Sesamum</i>, castor and fodder jowar through farmer groups • Creating a community fodder bank • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Rajkot	NRM	<ul style="list-style-type: none"> • Water scarcity • Frequent droughts • Soil erosion • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting structures: farm pond • Renovation of defunct rainwater harvesting structures: small check dams, community ponds in convergence with GLDC • Providing inter-lock HDPE/ PVC pipes for irrigation • In-situ moisture conservation practices • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Drought tolerant varieties of groundnut (GG 20), chickpea (GG 2), and improved varieties of cotton, wheat and onion • Introduction of new crops: soybean and garlic • Micro irrigation (rain gun) in wheat, chickpea etc;
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Improved varieties of sweet sorghum and multi cut grass • Prophylaxis of livestock and poultry
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services 	<ul style="list-style-type: none"> • Seed production and storage for groundnut, wheat, chickpea and fodder crops through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Valsad	NRM	<ul style="list-style-type: none"> • Flood in downstream tract • Water scarcity in upstream tract • Poor soil health 	<ul style="list-style-type: none"> • Soil and water conservation: CCT trench bunding, percolation tank, mulching (plastic/ straw) • Renovation of check dam • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood/ water scarcity in upstream tract • Poor soil health 	<ul style="list-style-type: none"> • Flood tolerant varieties of rice • Shed net for vegetable nursery • INM and IPM in field crops
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Adapting HYV of sorghum and maize and stress tolerant multi cut perennial grasses • Plantation of subabul for fodder, soil conservation and carbon sequestration • Feed supplement through mineral mixture and enrichment of low grade roughages by urea treatment • Prophylaxis of livestock and poultry
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for new varieties and crops through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery

Zone VII

District	Modules	Climatic Vulnerabilities	Key Interventions
Chhattisgarh			
Bilaspur	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting and recycling through farm ponds • Renovation of community rainwater harvest structures • Customized structures for recharging the open wells • In situ moisture conservation: deep ploughing and trench cum bunding • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ Drought • Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> • High yielding drought tolerant varieties of rice (MTU 1010), wheat, <i>Sesamum</i> and gram adapted to water stress conditions • Micro irrigation system: sprinkler in wheat and gram
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Promotion of fodder jowar, maize and berseem through fodder banks • Prophylaxis and mitigation of mineral deficiencies in livestock and poultry
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for wheat, rice and <i>Sesamum</i> through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Training on mushroom production

District	Modules	Climatic Vulnerabilities	Key Interventions
Dantewada	NRM	<ul style="list-style-type: none"> • Water scarcity due to dry spells • Occasional flood • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting structures: farm ponds and percolation ponds • Renovation of defunct rainwater harvesting structures • Open well with ring fittings • In situ moisture conservation: continuous contour trenching, grass on contour bunds, hedge row, boulder checks • NADEP and vermi-compost • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Occasional floods in lower tract • Water scarcity during dry spells • Poor soil health 	<ul style="list-style-type: none"> • Adapted high yielding drought tolerant rice (Poornima, Ananda) and flood tolerant rice (Jal Dubbi, Masuri), wheat (Sujata), maize (JM 216), lac (Kusumi), mustard (Pusa bold), okra (Arka Anamika), chilly (JM 218), onion (N 53) • Introduction of new crops: linseed (Kartik), tivda (Ratan), lentil (JL 3), groundnut (SB 11) and sunflower (Moden) • Appropriate inter-cropping systems: maize + groundnut/ cowpea, wheat + lentil • Micro irrigation system: sprinkler in wheat, groundnut and drip in vegetables
	Livestock	<ul style="list-style-type: none"> • Fodder scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Promotion of fodder crops: maize, lobia, cowpea and berseem • Fodder grass/ tree plantation on common and private lands and on bunds: Dinanath grass, Subabul and stylo • Prophylaxis and mitigation of vitamins and mineral deficiency in livestock and poultry • Replacing poor quality males with superior breeding males of poultry (Gram Priya), duck (Nag Hans), goat (Jamuna Pari), pig (Jabalpur black)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops 	<ul style="list-style-type: none"> • Seed production and storage for rice, mung, urd, niger, chickpea and millets through farmer groups • Community managed farm machinery custom hiring centers

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> Poor access to farm implements Poor access to livestock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Training 2-3 rural youths as a livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery Promotion of mushroom production technology as a livelihood source
Raipur	NRM	<ul style="list-style-type: none"> Water scarcity Increased dry spells during <i>Kharif</i> 	<ul style="list-style-type: none"> Rainwater harvesting structures: farm pond, percolation pond in farmers field Renovation of defunct rainwater harvesting structures In-situ moisture conservation: brown manuring in upland paddy, summer deep ploughing, cover crop and mulching Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Water scarcity Losses due to pest and diseases 	<ul style="list-style-type: none"> Introduction of drought tolerant varieties of paddy (Purnima, Sahbhagita), arhar (UPAS 120), mung (HUM 2), brinjal (Pant Samrat), okra (Varsa Uphar) Introducing new crops: wheat (Lok 1), gram (JG 16), toria (Indira Toria 1), sweet potato (Indira Madhur) Appropriate intercropping system: arhar + mung, brinjal + <i>Amaranthus</i>, gram + mustard Micro irrigation system: sprinkler in <i>Rabi</i> crops
	Livestock	<ul style="list-style-type: none"> Fodder Scarcity Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> Promotion of fodder production on common/ private lands Supply of seed and seedlings of fodder crops and trees Prophylaxis and mitigation of mineral deficiency in livestock and poultry Introducing better adapted high yielding breeds of poultry

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy, pigeonpea, wheat and gram through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Madhya Pradesh			
Balaghat	NRM	<ul style="list-style-type: none"> • Water scarcity • Depletion of ground water • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting through farm ponds with lining • Renovation of defunct rainwater harvesting structures • Customized concrete structures for recharging of wells • In- situ soil and moisture conservation through ridges and furrows, broad bed furrows • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Drought tolerant varieties of rice (JRH 5), gram (JG 130) and wheat • Introduction of new crop: linseed • Micro irrigation system: sprinkler in gram
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Promotion of fodder banks (cultivated fodder and fodder trees) • Prophylaxis and mitigation of mineral deficiency in livestock • Grading up of breed of goat with superior ones

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for rice and gram through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Chhattarpur	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Depletion of ground water • Poor soil health 	<ul style="list-style-type: none"> • Customized structures for recharging the open wells • In situ moisture conservation: deep ploughing, farm bunding, trench cum bunding • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Heat wave 	<ul style="list-style-type: none"> • Short duration adapted high yielding varieties of groundnut (JG 3), chickpea (JG 16, JG 11), mustard (Pusa Agrani, Pusa Tarak), wheat (JW 17) • Mosaic resistant varieties of soybean (JS 95 60), urd (LBG 20, PU 31) • Intercropping: groundnut + sesame • Hard pruning in ber during water scarcity • Micro irrigation system: sprinkler in chickpea wheat etc;
	Livestock	<ul style="list-style-type: none"> • Fodder scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Promotion and supply of seeds/ seedlings of fodder crops, grass and trees • Introducing better adapted high yielding breeds of goat (Jamuna Pari): replacing poor males with superior ones • Prophylaxis and mitigation of mineral deficiency in livestock

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for chick pea, wheat, groundnut, soybean, urd through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Datia	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • Customized structures for well recharging • Renovation of rainwater harvesting structures • In situ moisture conservation: summer deep ploughing, ridge and furrow system, green manuring • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity 	<ul style="list-style-type: none"> • Use of improved adapted varieties of sesame (TKG 306), groundnut (JGN 3), soybean (JS 9305), wheat (MP 3020), mustard (Pusa Agrani, Pusa Jaikisan) and chickpea (JG 11) • Micro irrigation systems: sprinkler in wheat, gram, soybean etc; • Nutritional kitchen garden (fruit plants + vegetables)
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Promoting fodder production through improved varieties of fodder crops • Introducing better adapted high yielding improved bucks of goat (Jamuna Pari and Barbari) • Prophylaxis of livestock

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for soybean, wheat, chickpea through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Promotion and capacity building of mushroom production technology as a livelihood source
Guna	NRM	<ul style="list-style-type: none"> • Water scarcity • Frequent droughts • Deteriorating soil health 	<ul style="list-style-type: none"> • Rainwater harvesting structures: farm ponds and percolation ponds • Renovation of defunct rainwater harvesting structures • In situ moisture conservation through ridge and furrows and broad bed furrows • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Drought tolerant varieties of soybean (JS 95 60), gram (JG 130), wheat • Introduction of new crops: safflower • Micro irrigation: sprinkler in soybean, wheat
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity 	<ul style="list-style-type: none"> • Cultivation of perennial fodder crops • Promotion of fodder crops, supply and production of seed of improved varieties • Promoting stall feeding under cut and carry system of fodder use • Prophylaxis and mitigation of mineral deficiency in livestock
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements 	<ul style="list-style-type: none"> • Seed production and storage for soybean, gram and wheat through farmer groups • Community managed farm machinery custom hiring centers

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Morena	NRM	<ul style="list-style-type: none"> • Water scarcity/drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting for recycling through farm pond and ground water recharge through percolation tanks • In-situ moisture conservation through conservation furrows, broad bed furrows, ridges and furrows, and summer deep tillage • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Moisture stress in <i>Rabi</i> season • Mid season drought • Frost injury in pigeonpea 	<ul style="list-style-type: none"> • Introducing adapted drought tolerant crop varieties greengram (Pusa 9531), blackgram (PU 19), sesame (JTS 8), wheat (MP 4010, HD 2864), chick pea (JG 16), mustard (Pusa Jaikisan) • Drought and frost tolerant variety of pigeonpea (UPAS 120) • Intercropping systems: jowar + pigeonpea, maize + pigeonpea, wheat + mustard, chickpea + linseed • Zero till sowing for wheat and chickpea to utilize residual moisture • 2 % spray of urea or DAP at 30-35 DAS in standing crop or 2% spray of K at 30 – 35 DAS in standing crops to mitigate midseason drought
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity 	<ul style="list-style-type: none"> • Augmentation of fodder production through jowar and berseem and conservation through hay and silage • Mitigation of vitamins and mineral deficiency in livestock • Introducing better adapted high yielding goat (Jamuna Pari and Barbari) • Prophylaxis of livestock and poultry

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for wheat, sesame, greengram, pigeonpea through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Satna	NRM	<ul style="list-style-type: none"> • Water scarcity/drought • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting for recycling through farm ponds • Ground water recharge through contour trenching, farm bunding and loose boulder check dams • In situ moisture conservation through conservation furrow, broad bed furrows and stubble mulching in cash crops • Submerged pitcher and pit depression system of planting for fruit trees and cucurbits • Vermi-compost, green manuring crops and <i>Glyricidia</i> plantation on bunds • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity • Mid season drought in <i>Kharif</i> • Moisture stress in <i>Rabi</i> crops • Heat wave 	<ul style="list-style-type: none"> • Introducing adapted drought tolerant or short duration varieties of paddy (Shubhangi, JR 201), pigeonpea (ICPL 87), soybean (JS 9560), blackgram (PU 31), wheat (HW 2004), chickpea (JG 16) and vegetable pea (Kashi Nandini) • Introducing heat tolerant (JG 14) and unirrigated (JG 11) variety of chickpea • Appropriate intercropping systems: jowar + pigeonpea, wheat + mustard, chickpea + linseed, maize + pigeonpea

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • Inclusion of short duration legumes and oil seed crops in the cropping sequence: soybean - wheat, rice - chickpea, greengram - wheat • Early sowing of <i>Rabi</i> crops • Spraying of 2% urea or DAP at 30 DAS in standing crop to mitigate the mid season drought • Micro irrigation: drip in orchards and sprinkler in soybean, wheat and vegetables
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Augmentation of fodder production through perennial moringa and conservation through hay and silage • Prophylaxis and mitigation of mineral deficiency in livestock • Grading up of local non-descript breeds: buffalo (Murrah), cow (Sahiwal) and goat (barbari)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy, soybean, gram and wheat through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Weather based pest and disease forewarning and advisory through Kisan Mobile Sandesh Seva
Tikamgarh	NRM	<ul style="list-style-type: none"> • Water scarcity/drought 	<ul style="list-style-type: none"> • Farm pond for rainwater harvesting and recycling • Percolation ponds for recharging • Renovation of defunct rainwater harvesting structure

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • In situ moisture conservation: deep ploughing, ridge and furrow, broad bed and furrow • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Frost injury 	<ul style="list-style-type: none"> • Introducing drought tolerant varieties of soybean (JS 93 05), blackgram (Azad 1), sesame (TKG 306), wheat (JW 17), maize (JM 216) • Appropriate intercropping systems: gram + mustard and wheat + mustard • Short duration pigeonpea varieties to avoid frost injury • Micro irrigation system: drip (ber) and sprinkler (wheat, maize and soybean) • Introduction of ginger crop
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Perennial grass planting in community land • Promotion of silage, hay and backyard perennial fodder • Introducing better adapted high yielding breeds of buffalo (Murrah), cattle (Sahiwal) and goats (Jamuna Pari) • Prophylaxis and mitigation of mineral deficiency in livestock and poultry
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for wheat and soybean through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youth as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory -Kisan Mobile Sandesh • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Promotion of non-farm livelihood activities: maize cobs selling, vermi-composting, fruit processing

District	Modules	Climatic Vulnerabilities	Key Interventions
Orissa			
Ganjam	NRM	<ul style="list-style-type: none"> Occasional flood Water scarcity during dry spells and <i>Rabi</i> season Poor soil health 	<ul style="list-style-type: none"> Improving traditional drainage system Rainwater harvesting and recycling through farm pond Renovation of defunct rainwater harvesting structures In situ moisture conservation: straw and leaf mulching in turmeric Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Occasional flood Mid season drought 	<ul style="list-style-type: none"> Flood tolerant varieties of rice (Naveen,NPU-1001), Drought tolerant variety of ragi (Chilika), groundnut (TMV 2) for up lands Introduction of adapted crops: elephant foot yam (Gajendra), yam bean (Rajendra Mishri Khanda) Paddy nursery in multiple dates Promotion of contingency crops maize and cowpea if monsoon is delayed Replacing of upland rice with maize Mulching with paddy straw and neem leaves in turmeric fields Appropriate intercropping systems: paddy + arhar, ragi + arhar Micro irrigation: drip in mango and cashew
	Livestock/ fisheries	<ul style="list-style-type: none"> Mortality and morbidity due to biotic and abiotic stresses Fisheries: shallow water in ponds due to insufficient rains/ inflows 	<ul style="list-style-type: none"> Mitigation of vitamins and mineral deficiency in livestock Prophylaxis of livestock and poultry Stocking of fish fingerlings with supplementary feeding and management of fish ponds Introducing superior breeding males of Ganjam goat
	Institutional	<ul style="list-style-type: none"> Poor access to improved seeds Poor access to farm implements 	<ul style="list-style-type: none"> Seed production and storage for vegetables, groundnut and paddy (Sahabhagi) through farmer groups

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> Poor access to livestock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Community managed farm machinery custom hiring centers Training 2-3 rural youths as a livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Jharsugda	NRM	<ul style="list-style-type: none"> Water scarcity Mid season drought Poor soil health 	<ul style="list-style-type: none"> In-situ moisture conservation: ridges and furrows Renovation of defunct rainwater harvesting structures Green manuring cum mulching with Dhaincha in paddy Vermi-compost Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Water scarcity/ drought Moisture stress in <i>Rabi</i> season 	<ul style="list-style-type: none"> Intercropping systems: maize + cowpea Introduction of drought tolerant varieties of rice (Sahbhagi, Vandana), maize (Navjot), cowpea (Utkal Manika) Introducing pest and disease tolerant variety of rice (Pratikshya) and nursery in multiple dates Promotion of contingency crops like maize and cowpea Introduction of new crop: greengram (PDM 139) Replace area under upland rice with maize, cowpea and pigeonpea Micro irrigation system with low cost sprinkler in cowpea and greengram
	Livestock/ fisheries	<ul style="list-style-type: none"> Fodder Scarcity Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> Prophylaxis and mitigation of vitamin and mineral deficiencies in livestock and poultry Introducing better adapted high yielding breeds of poultry (Vanraja and Giriraj)

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy and tomato through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Promotion and capacity building for mushroom production technology as a livelihood source
Kendrapara	NRM	<ul style="list-style-type: none"> • Flood in lowland • Mid season drought • Deteriorating soil health 	<ul style="list-style-type: none"> • Renovation of traditional drainage system • Renovation of defunct rainwater harvesting structures • In situ moisture conservation: mulching in vegetable • Green manuring with dhaincha in paddy • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood in lowlands • Mid season drought • Poor soil health • Losses due to pest and diseases 	<ul style="list-style-type: none"> • Introduction of flood tolerant variety of paddy (Swarna sub 1) and <i>Colocasia</i> (Muktakesi) • Introduction of aerobic rice in uplands • Introducing disease resistant varieties of greengram (PDM 54) and blackgram (PU 30) • Appropriate intercropping system: maize + <i>Cowpea</i> • SRI technique in paddy • Rice cum fish farming • Micro irrigation system with low cost sprinkler in vegetables
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> • Promotion of hybrid napier through fodder bank • Introducing better adapted high yielding breeds of livestock (goat and cow) • Prophylaxis of livestock • Promotion of aquaculture

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy, greengram and blackgram through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Promotion and capacity building for mushroom production technology and apiculture as a livelihood sources
Sonepur	NRM	<ul style="list-style-type: none"> • Flood in lowlands • Increased dry spells during monsoon • Poor soil health 	<ul style="list-style-type: none"> • Renovation of traditional drainage system • Renovation of defunct community rainwater harvesting structures and farm ponds • Ridge and furrow method for moisture and soil conservation • Planting multipurpose fodder trees on bunds • Vermi-compost and <i>Azolla</i> units • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Flood in lowlands • Water scarcity in uplands • Mid season drought • Deteriorating soil health 	<ul style="list-style-type: none"> • Introducing flood tolerant paddy varieties (Kalinga-III for up lands and Rani dhan for low lands) • Introduction of new crops: maize, groundnut (Smruti), arhar (UPAS 120), onion (Agri found dark red), cowpea (Utkal manik), yam, capsicum • Appropriate inter cropping system: groundnut + arhar
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of vitamins and mineral deficiency in livestock and poultry • Introducing better adapted high yielding buck (Ganjam/ Sirohi goat)

District	Modules	Climatic Vulnerabilities	Key Interventions
		biotic and abiotic stresses	<ul style="list-style-type: none"> • Introduction of fish fingerlings in existing ponds • Development of private/ common fodder resources and promotion of fodder banks
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy, maize and groundnut through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Promotion and capacity building for mushroom production technology as a livelihood source

Zone VIII

District	Modules	Climatic Vulnerabilities	Key Interventions
Karnataka			
Belgaum	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting through farm ponds for supplemental irrigation • Contour bunding, trenches cum bunds and deep ploughing for in-situ moisture and soil conservation • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Appropriate intercropping systems: bajra + redgram, groundnut + redgram, maize + soybean, <i>Rabi</i> jowar + gram • Strip cropping with jowar and greengram, bajra and greengram, bajra and horsegram • Micro irrigation system with low cost sprinkler in <i>Rabi</i> jowar and gram
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis of livestock • Promotion of fodder bank through cultivation of improved fodder varieties • Promoting common fodder resources-plantation of fodder trees
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for redgram, <i>Rabi</i> sorghum and soybean through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery

District	Modules	Climatic Vulnerabilities	Key Interventions
Davanagere	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Soil and water conservation: land leveling, trench cum bunding, live bunds, biomass mulching • Rainwater harvesting through farm ponds for supplemental irrigation • Renovation of defunct rainwater harvesting structures for recharging ground water • Vermi-composting and tank silt application • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • High yielding adapted varieties of maize (NAH 1137), ragi (GPU 28, Naveen, STA 326), tomato (Arka Ananya), cluster bean (Pusa Sadabahar) • Appropriate intercropping systems: maize + redgram, ragi + redgram and cotton + chilly • Promoting agro-forestry systems including tamarind + castor, amla + Hebbal avare • Micro irrigation systems with low cost drip in orchards and sprinkler and rain gun in field crops • Promotion of raising community vegetable nurseries
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of vitamin and mineral deficiencies in livestock and poultry • Introducing better adapted high yielding breeds of sheep and goat (Osmanabadi/ Sirohi goat) • Introducing fish poly-culture • Establishment of fodder banks by cultivation of fodder crops and fast growing multipurpose trees • <i>Azolla</i> as feed

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for redgram and ragi through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Kolar	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought • Depletion of ground water • deteriorating soil health 	<ul style="list-style-type: none"> • In situ moisture conservation: ridges and furrows, conservation furrow, broad bed furrows and contour bunding • Renovation of defunct rainwater harvesting structures and large water channel around the village for recharging ground water • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water Scarcity/ drought • Poor soil health 	<ul style="list-style-type: none"> • Appropriate intercropping systems: ragi + redgram, groundnut + redgram • Drought tolerant varieties of ragi (GPU 28), redgram (BRG 1,2), horsegram (PHG 9), groundnut (ICGV 91114) • Introduction of vegetable crops • Appropriate agro-forestry systems: horsegram + mango, dry land horti pastoral system • Micro irrigation system: drip and sprinkler
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of vitamins and mineral deficiency in livestock and poultry • Introduction of improved sheep breeds and promoting superior quality local goats • Development of private/ common fodder resources

District	Modules	Climatic Vulnerabilities	Key Interventions
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds of contingent crops • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for groundnut, ragi and redgram through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youth as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Tumkur	NRM	<ul style="list-style-type: none"> • Water scarcity • Depletion of ground water • deteriorating soil health 	<ul style="list-style-type: none"> • In situ moisture conservation through trench cum bunding, contour bunding, deep ploughing, ploughing across the slope, live bunds, crop mulching etc; • Rainwater harvesting structures: farm ponds, percolation pond, small check dam, channelizing run off into community pond • Tank silt application • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Appropriate intercropping systems: ragi + redgram, maize + redgram • Alley cropping with redgram + Subabul (<i>Leucaena lucocephala</i>) • Introduction of improved adapted varieties of ragi (ML 365), groundnut (GPBD 1), maize (NAH 1137), chilly (Arka Lohit) and tomato (Arka Meghali) • Promotion of Agri – Horti – Silvi culture system • Micro irrigation systems with low cost drips & sprinklers in vegetables and orchards

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Prophylaxis and mitigation of mineral deficiencies in livestock • Introduction of improved breeds of cow, buffalo, sheep and poultry • Fodder production through improved napier grass, horsegram, fodder sorghum and leguminous perennial fodder crops • Enriched ragi dry fodder and maize silage
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for introduced varieties of groundnut, ragi, maize and chilly through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Kerala			
Alleppey	NRM	<ul style="list-style-type: none"> • Floods • Water scarcity in summer • Poor soil health 	<ul style="list-style-type: none"> • Strengthening and construction of bunds and deepening of ponds • Biomass mulching • Promotion of biogas production • Soil test based nutrient application • Site specific nutrient management
	Crop production	<ul style="list-style-type: none"> • Flood in late <i>Kharif</i> • Post harvest losses due to heavy rains • Poor soil health 	<ul style="list-style-type: none"> • Introduction of short duration (Prathyasa) and flood tolerant (Swarna sub 1) paddy • Use of leaf color chart for optimizing nitrogen use • Integrated disease and pest management • Customized low-cost structures for protecting post harvest paddy

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock/ fisheries	<ul style="list-style-type: none"> Fodder Scarcity Mortality and morbidity losses due to biotic and abiotic stresses 	<ul style="list-style-type: none"> Prophylaxis and mitigation of mineral deficiency in livestock Promoting integrated fish cum duck farming system Enrichment of paddy straw
	Institutional	<ul style="list-style-type: none"> Poor access to improved seeds Poor access to farm implements Poor access to livestock services Losses due to highly uncertain weather 	<ul style="list-style-type: none"> Seed production and storage of paddy through farmer groups Community managed farm machinery custom hiring centers Training 2-3 rural youths as a livestock service providers for prophylaxis Agro advisory based on IMD weather forecast and village weather observatory Training 2-3 rural youth for maintaining farm machinery Value addition of damaged rice through SHG Promotion and capacity building for mushroom production technology as a livelihood source
Tamil Nadu			
Nagapattinam	NRM	<ul style="list-style-type: none"> Flood and cyclone Poor soil health 	<ul style="list-style-type: none"> Renovation of defunct drainage structures Mulching, green manuring and vermi-composting by using silpaulin Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> Flood Mid season drought Poor soil health Salinity Spoiling of harvested paddy 	<ul style="list-style-type: none"> Introduction of rice varieties for flood (Swarna sub) and salinity (TRY 3) Crop diversification through tomato (CO3), brinjal (CO2), annual moringa (PKM 1) Micro irrigation system: sprinkler Promoting community nursery Provision for drying yard for paddy
	Livestock/ fisheries	<ul style="list-style-type: none"> Fodder Scarcity Mortality and morbidity 	<ul style="list-style-type: none"> Improved varieties for cultivated fodder crops Development of model common fodder resources (grasses and fodder trees)

District	Modules	Climatic Vulnerabilities	Key Interventions
		<ul style="list-style-type: none"> • losses due to abiotic stresses • Loss of fish due to flood 	<ul style="list-style-type: none"> • Introduction of improved breed of goat (Telichery) • Mitigation of vitamins and mineral deficiency in livestock • Prophylaxis of livestock • Management of fish ponds during flood and adjusting the time of release of fish fingerlings
	Institutional	<ul style="list-style-type: none"> • Poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining farm machinery • Promotion and capacity building for mushroom production technology as a livelihood source • Capacity building for group marketing of rice and vegetables
Namkkal	NRM	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • Rainwater harvesting and recycling through farm pond • Renovation of defunct rainwater harvesting structures • Individual rainwater harvesting units (1 ton and 3 ton tanks) • Soil test based nutrient application
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought • Poor income 	<ul style="list-style-type: none"> • Use of Short duration and drought tolerant varieties of redgram (VBN 3), blackgram (Vamban 5) and groundnut (TMV 13, CO 6) • Diversification through floriculture (jasmine, rose) • Hybrid vegetable seedling production under shed net • Micro irrigation system: sprinkler in vegetables and field crops

District	Modules	Climatic Vulnerabilities	Key Interventions
	Livestock/ fisheries	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Development of common fodder resources: 10 ha pasture with anjan grass and stylo • Fodder bank with grass of CO4 + fodder sorghum + hedge lucerne with <i>Glyricidia</i> and subabul on border • Promotion of aquaculture and production of fish fingerlings • Introducing better adapted high yielding breeds of sheep (Swarna), goat (Tellichary), poultry (Aseel), pig (White Yorkshire) • Grading up of cows through Artificial Insemination • Prophylaxis of livestock and poultry
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for groundnut, onion, flowers (jasmine, rose) and vegetables through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Livestock based input mart • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery
Ramnatha-puram	NRM	<ul style="list-style-type: none"> • Water scarcity • Poor soil and water 	<ul style="list-style-type: none"> • Rainwater harvesting through farm pond (lined), mini check dam for supplemental irrigation • Renovation of existing pond: deepening of farm ponds • In situ moisture conservation: broad bed furrows, raised bed furrows, ridges and furrows • Management of saline and sodic soils by adding organic amendments and gypsum respectively • Management of saline water • Soil test based nutrient application

District	Modules	Climatic Vulnerabilities	Key Interventions
	Crop production	<ul style="list-style-type: none"> • Early season drought and terminal stress in rice • Poor soil health • Poor water (salty) • Short duration flood in November 	<ul style="list-style-type: none"> • Adapted rice variety for semi-dry condition - ADT(R)-45 • Seed hardening with KCl 1 % and foliar spray of 1% KCl + DAP 2% for heat stress in rice • Blending of available saline water with rainwater • Drip and fertigation system in chillies and cotton (RCH BT) • Subsurface drainage and application of organic amendments • Intercropping system: rice + dhaincha in sodic soils. • Shed net nursery for vegetable (chillies) seedling production
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Fodder development through <i>Cenchrus</i> (CO 1), fodder sorghum and fodder grass (COCN4) • Prophylaxis and mitigation of vitamins and mineral deficiency in livestock • Back yard poultry (Popcock breed)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage for paddy (ADTR 45) through farmer groups • Community managed farm machinery custom hiring centre • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery • Value addition in chillies through group activity
Villupuram	NRM	<ul style="list-style-type: none"> • Water scarcity(bulk of rainfall in short time) • Poor soil health 	<ul style="list-style-type: none"> • Rainwater harvesting through farm ponds (15x15x3m) for recycling • Percolation pond for recharging • Renovation of defunct rainwater harvesting structures

District	Modules	Climatic Vulnerabilities	Key Interventions
			<ul style="list-style-type: none"> • In situ moisture conservation: mulching with crop residues in redgram and plastics in watermelon, broad bed furrows and contour farming in vegetables • Soil test based nutrient application • Vermi-composting units
	Crop production	<ul style="list-style-type: none"> • Water scarcity/ drought 	<ul style="list-style-type: none"> • System of Rice Intensification • Introducing drought tolerant varieties of paddy (Anna 4), groundnut (TMV 4) and redgram • Foliar spray of 2 % DAP + 1% KCl during flowering and grain formation stage • 3% Kaolin at critical stages of moisture stress • Intercropping of bajra + sorghum and redgram + cow pea • Micro irrigation systems: drip in convergence with NHM
	Livestock	<ul style="list-style-type: none"> • Fodder Scarcity • Mortality and morbidity losses due to abiotic stresses 	<ul style="list-style-type: none"> • Fodder crop seed production through farmers • Prophylaxis and mitigation of vitamins and mineral deficiency in livestock • Introduction of improved breeds of goat (replacing with improved males)
	Institutional	<ul style="list-style-type: none"> • Low seed replacement rate and poor access to improved seeds • Poor access to farm implements • Poor access to livestock services • Losses due to highly uncertain weather 	<ul style="list-style-type: none"> • Seed production and storage of groundnut and blackgram through farmer groups • Community managed farm machinery custom hiring centers • Training 2-3 rural youths as a livestock service providers for prophylaxis • Agro advisory based on IMD weather forecast and village weather observatory (cell phone sms) • Training 2-3 rural youth for maintaining micro irrigation systems and farm machinery

Zone I



Pindi Blochan, Faridkot Dt: Soil and water testing Campaign



Drubgam, Phulwama Dt: water harvesting tank



Rasidpur, Ropar Dt: vegetable nursery in polyhouse



Drubgam, Phulwama Dt: Protected nursery



Rasidpur, Ropar Dt: Chilly production in polyhouse



Rasidpur, Ropar Dt: Demonstration on zero till sown mung

Zone II



KVK Jehanabad: District magistrate addressing the farmers during workshop



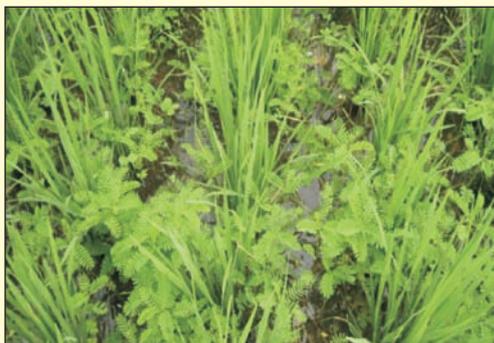
Bongheri, Nimpith Dt: Farm pond



Bongheri, Nimpith Dt: Off campus training programme



Bongheri, Nimpith Dt: Collection of soil sample



Khagribari, Coochbehar Dt: Short duration rice with INM including brown manuring and green leaf manuring



Mulching of Turmeric field for Moisture conservation Under NICRA Project, KVK, Chatra

Puraini, Chatra Dt: Mulching of turmeric field for moisture conservation

Zone III



Hengbung, Senapati Dt: Farm pond



Hengbung, Senapati Dt :Seed production of paddy



Pullnpur, West Tripura Dt: Structure for vermi composting



Pullnpur, West Tripura Dt: Mat nursery for rice transplanting



Dhansiripar,Dimapur Dt Plastering of Jalkund with clay and cowdung



Pullnpur, West Tripura Dt: Rainwater harvesting

Zone IV



Dunda, Uttarkashi Dt



Dunda, Uttarkashi Dt



Baundi, Bahraich Dt: Introduction of Moong crop



KVK Muzaffarnagar: Launch workshop

Zone V



Nacharam, Khammam Dt Use of dirps in cotton for effective WUE



Yagantipalli, Kurnool Dt Shadenet vegetable nursery



Katangtola, Gondia: Rainwater harvesting for supplemental irrigation



Umarani, Nandurbar Dt: Farm machinery for custom hiring

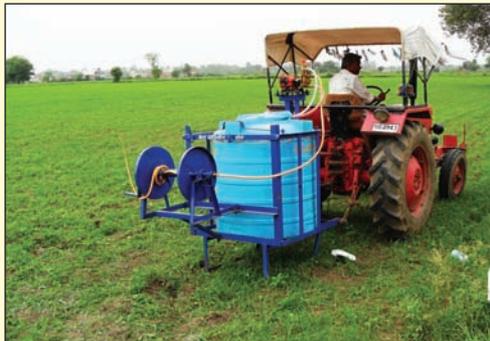
Construction of Surplus weir for Chintalavani cheruvu at Thimadam village

Sirsiwada, Srikakulam Dt

Zone VI



Chouma Kot, Kota Dt Compost Pit



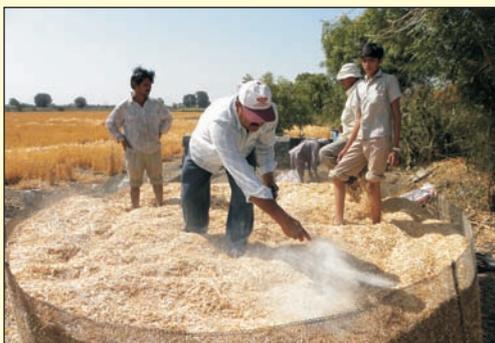
Chouma Kot, Kota Dt Use of power sprayer



Magharwada, Rajkot Pond De-silting



Magharwada, Rajkot Water Storage in the pond after desilting



Magharwada, Rajkot Dt: Enrichment of fodder by spraying mineral mixture



Ambheti, Valasad Dt Demo on paddy reaper

Zone VII



Chokhada, Chattarpur Dt: Hard pruning in ber



Bhargawan, Satna Dt Training on Summer ploughing

Kanthi, Tikamgarh Dt : Ridge and furrow method in Soybean



Kanthi, Tikamgarh Dt: Ber budding

Krushnadaspur, Kendrapara: District Agricultural Officer Addressing the farmers

Zone VIII



Bilakundi, Belgaum Dt:
Trench cum bunding



Siddanur, Davangere: Vegetable nursery in farmers home shade



D.Nagenahalli, Hirehalli Dt:
Continuous contour trenching



S. Raghuttahalli ,Kolar:
Dugout farm pond



Vadavathur, Namakkal: Vegetable seedling production in tray under shade net



Kattusiviri ,Villupuram: Demonstration of tractor drawn seed drill

Chapter-IV

Institutional Innovations

It is important to have appropriate institutional mechanism in place for successful implementation and sustainability of any agricultural development programme. Hence institutional interventions like community seed bank, fodder bank, farm machinery custom hiring center etc. are being implemented under NICRA through active involvement of farmers /stake holders across the districts. A user group has been formed for each activity. The capacity of the group was built on how to manage and organize a particular activity like seed bank, fodder bank etc. The details of different institutional innovations have been given below.

Village Climate Risk Management Committee (VCRMC)

A VCRMC representing all the categories of farmers in the village is formed with the approval of gram sabha. This committee is fully involved in the programme, implementations VCRMC participates in all discussions leading to finalizing interventions, selection of target farmers and area, and liaison with gram panchyat and local elected representatives has account which be used for all financial transactions under NICRA including maintaining farmer's contributions for different activities, handling of payments recovered from custom hiring centres. Extensive capacity building of VCRMS was taken up for post project sustainability.

Besides VCRMC, user groups, custom hiring center, fodder bank, seed bank etc., have also been formed based on the needs of villages.



VCRMC in Chainith, Buxar Dt



VCRMC in Drubgam, Pulwama Dt

Custom Hiring Center

Timely access to farm machinery for sowing, harvesting etc. is an important component of adaptation strategy to deal with climatic variability. The sowing window in rainfed areas is most of the time very short and at the same time small farmers access to farm machinery is poor. As a result many farmers are not able to sow the crop timely and incur significant yield losses. Therefore an innovative institutional arrangement in the form of a farm machinery custom hiring center has been created in each of the 100 selected villages. Ferti-seed drill, zero-till drill, power weeders, harvesters, threshers, power tillers, sprayers, rotavators for residue incorporation, sprinklers, chaff cutting machine, weighing machine etc. are some of the important farm implements and machines which are part of the custom hiring center. For instance, we have encouraged the KVKs to include a platform type weighing machinery as a part of custom hiring center in districts where small ruminants contribute significantly, so that it enables the farmers to weigh their goats and sheep at the time of sale, which may give them better bargaining power to sell the animals on per kg body weight basis. There are some common implements across districts, but there are many district specific items included in every centre depending on the local needs.



CHC in Jalagaon KP, Baramati Dt



CHC in Hirehalli, Tumkur Dt



CHC in Chouma kot, Kota Dt



CHC in khuntli, Valsad Dt

A committee of farmers nominated by the gram sabha is managing the custom hiring center. The rates for hiring the machines/ implements are decided by the committee itself. Every farmer in the village can hire the machines from these centers; the modalities are decided by the committee members themselves and amended from time to time as per the local situation and needs. This committee also uses the revenue generated for repair and maintenance.

Seed Bank

Provision timely seed for farmers (non hybrids but stress tolerant improved varieties) is one of the most relevant institutional interventions relevant to meet the goal of NICRA. This intervention has been planned in all the 100 districts with more focus in the areas where timely supply of improved seed for major crops is a major constraint. In this process, a group of 20-25 farmers has been selected for seed production of relevant varieties for 2-4 major crops of the village in all the 100 districts. The farmers group is trained and given seed and money to organize the activity. Initially the group is being supplied with the foundation seed and training on seed production, processing and storage. In some districts, seed bins are provided for proper storage of seeds a part of this intervention. In other places the storage space is hired by the group.

Fodder Bank

Livestock is one of the most important components of dryland farming systems, which plays a stabilizing role during climatic shocks. Sharp reduction in fodder production from private as well as common lands due to either drought or flash floods is the key impact of climatic variability on livestock production. Hence, Fodder Bank is a very important institutional arrangement for enhancing climate resilience of livestock production systems in dry land/ rainfed regions. Enhancing production, conservation and storage of fodder by involving SHG's / User groups is the objective. Contributory collection of fodder from the group members / villagers in the rainy season is encouraged.



Value addition to fodder Nirmalpimri,
Ahmednagar Dt



Magharvada, Rajkot Dt

Huge amount of monsoon grasses remain untapped throughout the country every year. Therefore the members of the fodder bank group are encouraged to collect monsoon grasses and store the surplus with the group. Any person who deposits fodder during rainy season will be entitled to get certain amount of fodder after adjusting for cost of conservation and weight loss. This group is trained to conserve and use such grasses during the lean season. Different mechanisms to increase livestock holders accessibility to fodder are being promoted in different districts. In typically arid regions like western Rajasthan and Gujarat, the fodder banks with provision to purchase and store fodder on community basis during harvesting season for its use during lean season is being promoted. In this arrangement, every member of the group gives requisition for future fodder requirement during lean season. Based on the consolidated requirement of the group, fodder is purchased from nearby districts on competitive rates. Initially the groups are being supported under NICRA. The members of the group may buy their requirements from the fodder bank on no profit and no loss basis. The fodder conservation through hay and silage is being promoted in other districts. In some districts like Namakkal in Tamil Nadu fodder bank for round the year production with 15 cents of land of each farmer under fodder cultivation is also being encouraged.

Capacity building

Capacity building of farmers not only on improved package of practices but also managing community based institutions is key sustain interventions under NICRA. Training of village youth as agri-service providers particularly on repair and maintenance of farm machinery of custom hiring center, maintenance of micro-irrigation systems, prophylaxis of animals, seed production, value addition of farm produce, etc. is also envisaged. Hopefully these youth would be able to charge for their services eventually and make their livelihood.

Convergence with Other Schemes

Promotion of convergence with other ongoing government schemes like MNREGS, NHM, RKVY, Integrated Watershed, and National Mission on Sustainable Agriculture is also under NICRA for up scaling on successful climate resilient interventions considered in other villages. The related line departments are taken on board right from the launch of the programme. The plan is to create a model of convergence at the village level. Besides allocation of funds for different climate resilient activities in the selected village, NICRA is enabling the regular presence of KVK scientists and technicians in the village. In a convergence mode envisaged interventions implemented in other schemes like MNREGS, RKVY, NHM, etc could be planned and implemented with technical support from the KVK scientists. Hence, it has been made mandatory for

every NICRA KVK to organize a village level launch workshop to create awareness and provide a platform for convergence. The district level officers of relevant departments like, agriculture, horticulture, animal husbandry, NHM, MNREGS, sericulture, micro-irrigation and watershed projects, etc, scientists from SAUs, ICAR institutes, representative of NGO and Village/ Block panchayat are invited in this workshops. During these workshops, NICRA approach and action plan are discussed. How each planned intervention would address the climate vulnerability of village's agriculture is explained. Further the opportunities of convergence are also discussed. As a result initial linkages are established among the major stakeholders. For instance, in many districts the farm ponds for rainwater harvesting under NICRA are dug in convergence with MNREGS and Land Development Corporations; promotion of perennial component and micro-irrigation system is being promoted in convergence with NHM and micro-irrigation projects.

Village Level NICRA Launch Workshops



KVK Alleppey



KVK Namakkal



KVK Yamunanagar



KVK Fategarh sahib



KVK Baramati



KVK Bharatpur

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Glossary

AICRPDA	All India Coordinated Research Project on Dryland Agriculture
ATMA	Agriculture Technology Management Agency
BBF	Broad Bed Furrow
BGA	Blue Green Algae
BLB	Bacterial Leaf Blight
CCT	Continuous Contour Trenching
CPRs	Common Property Resources
CRIDA	Central Research Institute for Dryland Agriculture
CRMC	Climate Risk Management Committee
DAS	Days After Sowing
FGD	Focused Group Discussion
FYM	Farm Yard Manure
GHG	Green House Gas
GLDC	Gujarat Land Development Corporation
ha	Hector
HDPE	High Density Polyethylene
HQPM	High Quality Protein Maize
HYV	High Yielding Variety
ICAR	Indian Councils Agriculture Research
ICM	Integrated Crop Management
IDM	Integrated Disease Management
IFS	Integrated Farming System
IMD	India Meteorological Department
INM	Integrated Nutrient Management
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management

ITK	Indigenous Technical Knowledge
KVK	Krishi Vigyan Kendra
LCC	Leaf Colour Chart
LDPE	Low Density Polyethylene
MNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
NAIP	National Agricultural Innovation Project
NFS	National Mission on Food Security
NGO	Non Governmental Organization
NHM	National Horticulture Mission
NREGA	National Rural Employment Guarantee Act
NRM	Natural Resource Management
PRA	Participatory Rural Appraisal
QPM	Quality Protein Maize
qtl	Quintal
RKVY	Rashtriya Krishi Vikas Yojana
SAU	State Agricultural University
SHG	Self Help Group
SRF	Senior Research Fellow
SRI	System of Rice Intensification
ZPD	Zonal Project Directorate
Ahu Rice	Ahu rice is same as aus rice. A photoperiod-insensitive, rainfed, drought-prone, lowland, or upland rice, broadcast and transplanted during the early part of the wet season from April to August in eastern India
Boro Rice	An irrigated, high-yielding, cold-tolerant, relatively pest-free and photoperiod-insensitive rice cultivated during the winter months in India and Bangladesh
Brown manuring	Brown manuring is a technique to grow <i>Sesbania</i> in standing rice crop and kill them with the help of herbicide for manuring. After

killing the color of the *Sesbania* residue become brown so it called brown manuring. Brown manuring practice introduced where *Sesbania* crop @ 20 kg/ha is broadcasted three days after rice sowing and allowed to grow for 30 days and get dried by spraying 2,4-D ethyl ester which supplied upto 35 kg/ha N, dry matter, control of broad leaf weeds, higher yield by 4 -5 q/ha due to addition of organic matter in low fertile soils.

Dapog Method It is a method of raising paddy nursery and saves almost half of the time in seedling raising. Twenty-five to 30 square meters of area is enough to raise seedlings sufficient for planting one hectare. The seedlings are raised faster in this method. The nursery beds could be prepared on an even but slightly raised (4 to 5 centimeters) surface in an open field or on even cement floor. About one square meter of seed bed should be required for every three kilograms of seed. About 36 to 48 hours pre germinated seeds broadcast uniformly over plastic or banana leaves at the rate of three kilograms per square meter. Pack the seeds to make a uniform layer of three seeds thick. Do not press too hard on seeds. Follow this by sprinkling water gently. Sprinkle water three to four times a day up to four days to keep the seed bed wet. Thereafter cover it with one to two centimeters of water till end. Also press the seeds lightly once a day till fourth day and protect them from birds. Dapog seedlings would be ready for transplanting within 11 to 14 days of sowing. The seedlings thus raised can be rolled like a carpet with roots facing outside and carried to the transplanting site. Loosen the interlocked roots carefully before transplanting. Three to four seedlings should be transplanted per hill instead of two.

Jalkunds are small ponds for rain water harvesting that are built with either concrete or LDP (Low Density Polyethelyne) lining to prevent seepage through soil and a simple thatched roof to prevent evaporation. Each jalkund can hold around 30,000 litres of water, which can irrigate 500 tomato or chilli plants or cabbage, and in addition 2 piggery units or for rearing 20 ducks or 50 poultry birds

Laser Land Leveller Laser Guided Land Leveller is operated with the help of Laser Transmitter and receiver. The field leveled by Laser Guided Land Leveller is accurate and on same level. It saves water consumptions in land as well as time

Submerged
pitcher and pit
depression
system of
planting

A pitcher is a round earthen baked pot usually used in villages for water storage and cooling, ranging from 10-15 litres in capacity. Pitcher wall is porous with millions of micro-pores from where water oozes out slowly when filled. When used for irrigation purpose, pitcher is buried in the soil down to neck and then filled with water. For this purpose, a pit of about three times as wide and two times as deep as the clay pot, is dug and the clods are broken at the bottom of the ditch. Manure is then mixed with the dug soil at a ratio of 1:3. If the soil is clay, then some sand is also mixed. When the soil is very sodic then mixing of some gypsum would be helpful in mitigating the sodium hazards. Pitcher is then placed in the pit in such a way that the neck of the pitcher remains above the soil surface. Empty space around pitcher is properly filled with soil mix and firmed. Rim of the pitcher mouth may be painted with white paint to make it more visible. The pitcher is then filled with clean water as muddy water might block the pitcher pores. In order to avoid evaporation and breeding of mosquitoes, baked clay lid is placed on the mouth of the pitcher. Water seeps out through the micro-pores by the action of inside static water pressure head and outside soil matrix potential. In a day or two when the soil in the vicinity of the pitcher becomes visibly wet, then it is considered fit for sowing seeds and planting seedlings

Sali Rice

Sali rice is one of the more important types of rice grown in Assam in northeast India. Cultivation begins in June-July and the crop is harvested in November-December.

Upland
Bari system

Rainfed crop production on uplands in northeastern India is called as upland bari system

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