

**State: ARUNACHAL PRADESH**  
**Agriculture Contingency Plan for District: PAPUMPARE**

<b>1.0 District Agriculture profile*</b>				
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>			
	Agro Ecological Sub Region (ICAR)	Eastern Himalayas, Warm Perhumid Eco-sub region (16.3)		
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Zone (II)		
	Agro Climatic Zone (NARP)	Sub-Tropical Plain Zone (NEH-4)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Papumpare, Tirap		
	Geographic coordinates of district headquarters head-quarters	<b>Latitude</b>	<b>Longitude</b>	<b>Altitude</b>
		26.55°N – 28.40°N	92.40° – 94.21°E	459-1250 msl
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	-		
	Mention the KVK located in the district with full address	<b>Karsingsa, Directorate of AH &amp; Veterinary, Government of Arunachal Pradesh, Nirjuli-791109</b>		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	ICAR Research Complex for NEH Region, Arunachal Pradesh Centre at Basar		

<b>1.2</b>	<b>Rainfall</b>	<b>Normal RF(mm)</b>	<b>Normal Onset ( specify week and month)</b>	<b>Normal Cessation (specify week and month)</b>
	SW monsoon (June-Sep):	1938.7	1 <sup>st</sup> week of June – 2 <sup>nd</sup> week of June	3 <sup>rd</sup> week of September – 4 <sup>th</sup> week of September
	NE Monsoon(Oct-Dec):	217.7	2 <sup>nd</sup> week of October- 4 <sup>th</sup> week of October	2 <sup>nd</sup> week of December – 4 <sup>th</sup> week of December
	Winter (Jan- February)	137.2	-	-
	Summer (March-May)	743.7	-	-
	Annual	3037.3	-	-

<b>1.3</b>	<b>Land use pattern of the district</b> (latest statistics)	Geographical Area #	Cultivable area	Forest area *	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	<b>Area ('000 ha)</b>	346.2 Sq. K.m.	20.56	324.7	1.93	0.25	2.94	1.0	0.63	2.31	2.33

# Census of India 2011, Ministry of Home Affairs, Govt. of India

\*FST: Forest Survey of India, Ministry of Environment, Forest climate change-2011

2011-12 States Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India

<b>1.4</b>	<b>Major Soils (common names like red sandy loam deep soils (etc.))*</b>	<b>Area ('000 ha)**</b>	<b>Percent (%) of total geographical area</b>
	Loam to clay loam soils		39.6
	Loam to sandy loam soils		5.2
	Loam to loamy sand soils		0.4
	Loam to sandy clay loam soils		3.9
	Loam to strong clay loam soils		12.6
	Loam soils		9.5
	Silt clay loam to clay loam soils		0.1

(data source: Soil Resource Maps of NBSS & LUP);

**Soil pH – 4.0 - 6.8**

<b>1.5</b>	<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>
	Net sown area	11.99	127.2
	Area sown more than once	3.26	
	Gross cropped area	15.25	

<b>1.6</b>	<b>Irrigation</b>	Area ('000 ha)		
	Net irrigated area	4.7		
	Gross irrigated area	4.7		
	Rainfed area	8.9		
	<b>Sources of Irrigation</b>	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	1550	2.054	42.9
	Tanks			
	Open wells			
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation	78		
	Other sources (please specify)	2864	2.72	57.03
	Ponds, river			
	Total Irrigated Area		4.7	
	Pump sets	20		
	No. of Tractors	10		
<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)	
Over exploited	-	-		
Critical	-	-		
Semi- critical	-	-		
Safe	5	100		
Wastewater availability and use	-	-		
Ground water quality	Good (50.70% i.e. 1717.57 Sq. Km) Poor (49.30% i.e. 1669.82 Sq. Km)			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

**1.7 Area under major field crops & horticulture**

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
Paddy	4.7	5.4	10.1	-	-	-	-	10.1	
Wheat	-	-	-	-	0.1	0.1		0.1	
Maize	-	-	-	-	2.5	0.2	2.2	2.5	
Millets	-	0.5	0.5	-	-	-	-	0.5	
Pulses	-	-	0.41	-	-	-	-	0.41	
Oilseeds	-	0.5	0.5	-	1.1	1.1	-	1.7	
Potato	-	-	-	-	0.2	0.2	-	0.2	

Source: Statistical abstracts of Arunachal Pradesh (Year 2007-08)

	Horticulture crops - Fruits	Area ('000 ha)		
		Total	Irrigated	Rainfed
	Orange	0.27		0.271
	Pineapple	0.14		0.148
	Banana	0.12		0.126
	Guava	0.004		0.004
	Litchi	0.027		0.027
	Horticulture crops – Vegetables / spices	Total	Irrigated	Rainfed
	Tomato, chilli, brinjal, okra, cabbage, pumpkin, sweet potato, colocasia	0.212	0.212	NA
	Ginger	0.031		0.031
	Black pepper	0.030		0.030
	Large cardamom	0.060		0.060
	Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	Plantation crops	Total	Irrigated	Rainfed
	Arecanut	Not available		

	Coconut	-do-		
	Tea	-do-		
	Jatropha	-do-		
	<b>Fodder crops</b>			
	<b>Total fodder crop area</b>			
	<b>Grazing land, reserve areas etc</b>	<b>1.461</b>		
	<b>Availability of unconventional feeds/by products eg., breweries waste, food processing, fermented feeds bamboo shoots, fish etc</b>			
	<b>Sericulture etc Other agro enterprises (mushroom cultivation etc specify)</b>			

Source: 18<sup>th</sup> Quinquennial Livestock Census, 2007, Deptt. of AH & Vety., Govt. of Arunachal Pradesh

<b>1.8</b>	<b>Livestock</b>	<b>Male ('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>
	Indigenous cattle	16.46	22.15	38.62
	Improved / Crossbred cattle	1.02	1.45	2.47
	Buffaloes (local low yielding)	Nil	Nil	Nil
	Improved Buffaloes	Nil	Nil	Nil
	Goat	10.80	15.73	26.54
	Sheep	Nil	Nil	Nil
	Pig	11.15	13.18	24.34
	Mithun	11.28	14.58	25.87
	Yak	Nil	Nil	Nil
	Others (Dog)	3785	4015	7800
	Commercial dairy farms (Number)	70		

<b>1.9</b>	<b>Poultry</b> (Data source: Live stock Census 2007)	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>				
	Commercial	250					
	Backyard		87.74				
<b>1.10</b>	<b>Fisheries</b> (Data source: Chief Planning Officer)						
	<b>A. Capture</b>						
	<b>i) Marine</b> (Data Source: Fisheries Department)	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>		<b>Storage facilities (Ice plants etc.)</b>
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
	<b>ii) Inland</b> (Data Source: Fisheries Department)	<b>No. Farmer owned ponds</b>		<b>No. of Reservoirs</b>		<b>No. of village tanks</b>	
		846				261	
	<b>B. Culture</b>						
				<b>Water Spread Area (ha)</b>	<b>Yield (t/ha)</b>	<b>Production ('000 tons)</b>	
	<b>i) Brackish water</b>						
	<b>ii) Fresh water</b> (Data Source: Fisheries Department)			3835	0.15	575.25	
	<b>Others</b>						

### 1.11 Production and Productivity of major crops

1.1 1	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	

<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Paddy	22.7	2230.7					22.7	2230.75	
	Maize	-				4.50	1800.0	4.5	1800.00	
	Millets	0.9	1300.7					0.9	1300.7	
	Wheat	-		0.3	1800.0			0.3	1800.0	
	Pulses	0.43	1050.6					0.43	1050.6	
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
	Orange	0.315	1162					0.31	1162	
	Pineapple	0.640	2720					0.64	2720	
	Banana	0.369	2930					0.36	2930	
	Guava	0.030	750					0.03	750	
	Vegetables	0.144	NA					0.14	NA	

Source: District Horticulture Officer, 2006-07

<b>1.12</b>	<b>Sowing window for 5 major field crops (start and end of normal sowing period)</b>	<b>Paddy</b>	<b>Maize</b>	<b>Millets</b>	<b>Sesame</b>	<b>Mustard</b>
	Kharif- Rainfed	June-October	May-September	April – September	April – September	
	Kharif-Irrigated					
	Rabi- Rainfed		December-April		October - January	October – February
	Rabi-Irrigated					

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular*	Occasional	None
	Drought		√	
	Flood		√	
	Cyclone			√
	Hail storm			√
	Heat wave			√
	Cold wave			√
	Frost		√	
	Sea water intrusion			√
	Snowfall			√
	Landslides	√		
	Earthquake			√
	Pests and disease outbreak (specify)		√	
	Others (like fog, cloud bursting etc.)			

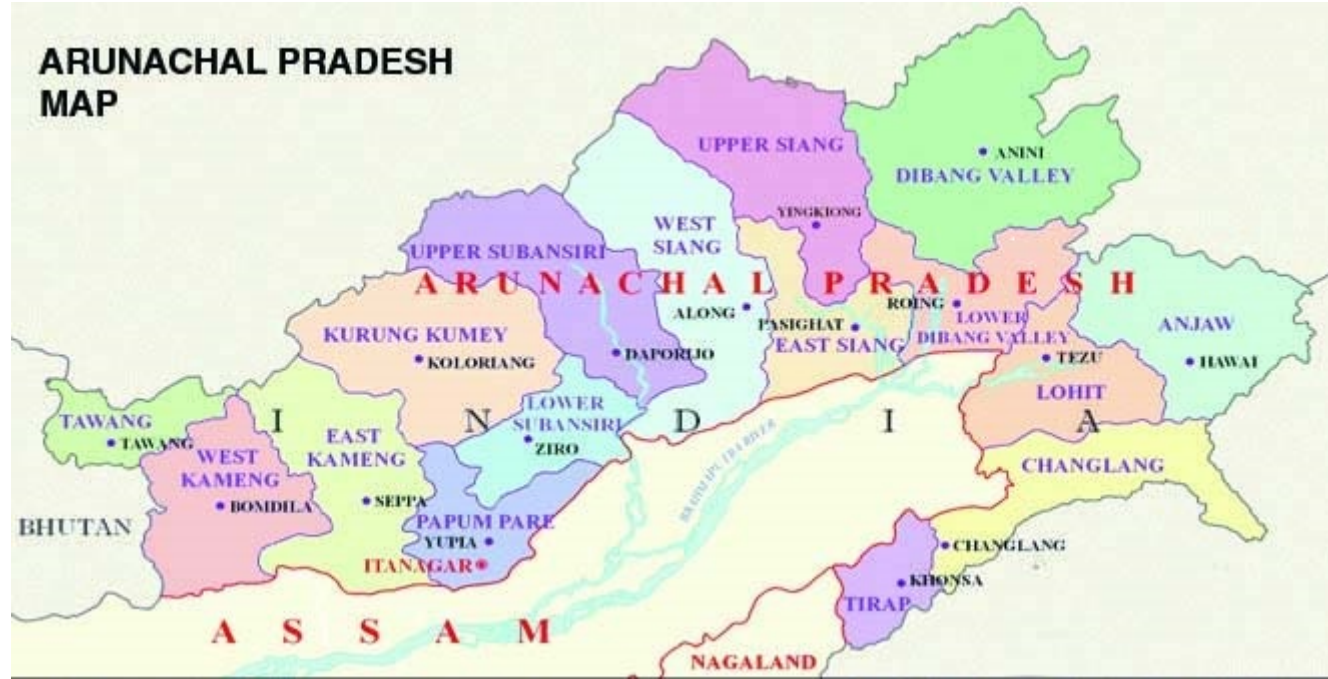
\*When contingency occurs in six out of 10 years

1.14	Include Digital maps of the district for		
		Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: No

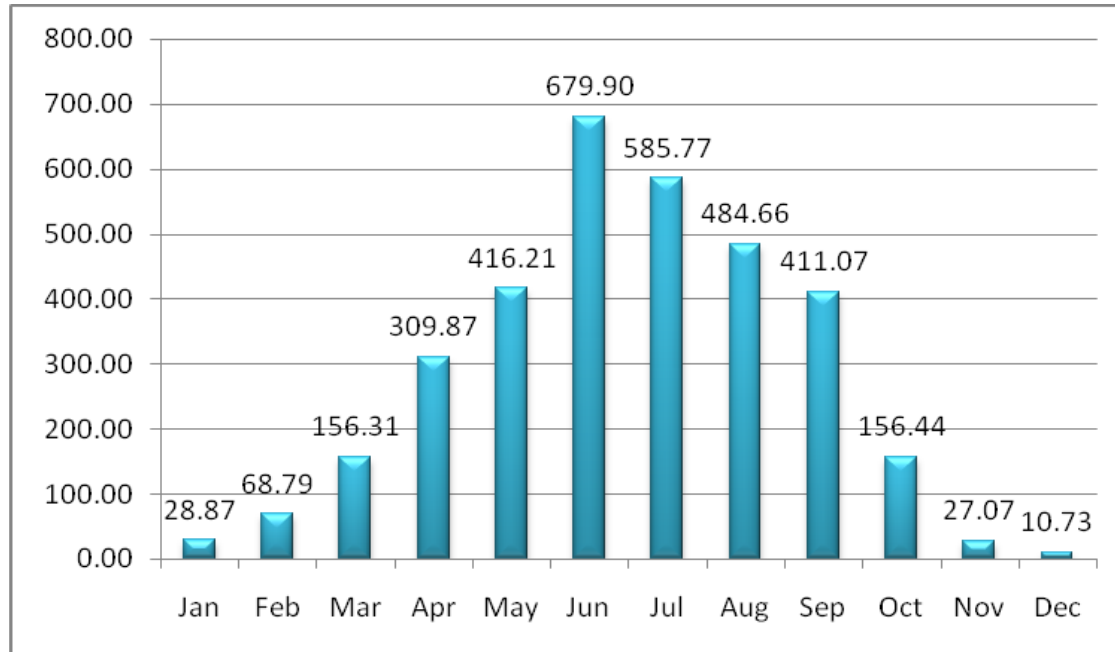


Annexure-I

Location map of Papumpare



**Annexure-II**



**(Source: IMD district-wise monthly rainfall data from 2004-2010)**

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks June 3 <sup>rd</sup> week	Medium rainfall, Loam to Sandy loam soils, lowland area.	Paddy	Prefer drought tolerant varieties of Paddy crop- Mahsuri	<ul style="list-style-type: none"> <li>Apply well decomposed organic matter for early seedling vigor</li> <li>Make conservation furrow</li> <li>Inter-cultivation and thinning to maintain plant population per unit area of the crop</li> <li>Water harvesting, summer ploughing, interculture, tillage practices, weed control and adopt close plant and row spacing</li> </ul>	-
		Maize	Growing of Drought resistant variety for Rainfed lowland : Prabhat		
		Millet	Local Variety : Hokum , Pabyo.		
	High rainfall, Loam to clay loam soils, Upland area.	Paddy	Prefer drought tolerant varieties of Paddy crop i.e. Heera & Rasi	<ul style="list-style-type: none"> <li>The field should be ploughed immediately after the harvest of previous rice crop and left until the first rain received.</li> <li>Unbunded uplands converted to bunded uplands</li> </ul>	
		Maize	Growing of local sturdy maize varieties : Pocho Top, Nyamo Top	Deep Summer ploughing and control of weeds.	
		Millet	Growing of hardy & sturdy local variety Hokum , Pabyo.	Deep summer ploughing ,contour sowing across the slope to minimize surface run- off	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
<b>Early season drought (delayed onset)</b>  <b>Delay by 4 weeks</b>  <b>July 1<sup>st</sup> week</b>	Medium rainfall, Loam to sandy loam soils, lowland area	Paddy	Growing of drought resistant variety-Bha Lum 1,Bha Lum 2, Heera and Rasi	In-situ moisture conservation, summer ploughing, interculture, weed control and Maintain more plant population for direct seeded rice.	
		Maize	Cultivation of early maturing varieties like- Ganga-11 and Local Variety	In – situ moisture conservation.  Follow ridge and furrow method of planting to store excess water during rainfall.	
		Millet	Growing of Local variety Hokum , Pabyo.	Contour ploughing and sowing across the slope in jhum areas to reduce runoff loses	
	High rainfall, Loam to clay loam soils, Upland area	Paddy	Cultivation of locally available drought resistant varieties. Such as Shako, Khile Lemi	Maintain more plant population for direct seeded rice.  Hedge row planting of Flamengia sp across the slope to minimize the surface runoff. Terrace rice cultivation practices to be followed	
		Maize	Cultivation of early maturing varieties like- NLD and Prabat	Seed treatment and proper plant protection measures should be taken to avoid germination failure.	
		Colocasia	Colocassia intercropping with maize	Deep summer ploughing, soil hoeing and Weed control	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)  Delay by 6 weeks July 3 <sup>rd</sup> week	Medium rainfall, Loam to sandy loam soils, Lowland area	Rice	Cultivation of ecommended rainfed lowland varities –IR-64, Mahsuri	In rainfed situation apply full P, K and reduce nitrogen application by 40% of the recommended dose as basal along with well decomposed organic manure for early seedling vigour.  Summer ploughing and weed control.	Seeds distributed through State Department and KVK
		Maize	Maize based cropping system: Rice-maize, Maize-potato-sugarcane	Intercropping of maize with Soybean, Greengram and cowpea	-do-
		Sesame	Arhar, Green gram, Cow pea should be grown	Complete hoeing and weeding. Provide dust mulch.	
	High rainfall, Loam to clay loam soils, Upland area	Rice	Cultivation of drought resistant varities : Rasi & Heera	Terrace rice cultivation to be followed in upland to collect rainwater for rice cultivation.  Contour cultivation in Jhum areas. Hedgerow planting with Flamengia sp, crotalaria sp.	
		Maize	Pigeonpea, green gram, cow pea should be grown	Follow strip cropping in rolling topography for moisture conservation	
		Sesame	Rice-sesame-Soybean	Deep ploughing, Line sowing, proper manuring for quick growth of the crop	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
<b>Early season drought (delayed onset)</b>  <b>Delay by 8 weeks</b>  <b>August 1<sup>st</sup> Week</b>	Medium rainfall, Loam to sandy loam soils, lowland area	Rice	<ul style="list-style-type: none"> <li>• Growing of Medium duration rice variety: mahsuri and Konark</li> <li>• Growing of drought resistant leguminous like green gram ,black gram, cow pea in the event of late onset of monsoon</li> </ul>	<ul style="list-style-type: none"> <li>• Transplant seedlings up to 45 days old</li> <li>• Apply life saving irrigation at seedling. Tillering and Panicle Initiation stage</li> <li>• Intercropping of rice with leguminous crops like green gram</li> </ul>	-
		Maize	Intercropping of maize with Soybean in 1:2 to manage water Shortage	<ul style="list-style-type: none"> <li>• Follow ridge and furrow method of planting for maize crops.</li> </ul>	
		Millet	Growing of leguminous crop like Arhar, Green gram, Soybean	<ul style="list-style-type: none"> <li>• Intercropping with pulse crop like green gram, black gram</li> <li>• Bio Mulching with crops residue and straw</li> </ul>	
	High rainfall, Loam to clay loam soils, Upland area	Paddy	Growing of drought resistant leguminous plants like green gram ,black gram, cow pea	<ul style="list-style-type: none"> <li>• Close the drainage hole and check the seepage loss in direct sown rice regularly</li> <li>• Follow plant protection measures against stem borer and blast in nursery</li> </ul>	
		Maize	Growing of local hardy & sturdy maize variety.	<ul style="list-style-type: none"> <li>• Follow strip cropping in rolling topography for moisture conservation</li> </ul>	
		Millet	Growing of leguminous crop like pigeonpea, green gram, Soybean	Summer ploughing and weed control.	

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
<b>Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.</b>	Medium rainfall, Loam to sandy loam soils, lowland area	Rice	<ul style="list-style-type: none"> <li>• Resow the crop if the mortality is more than 50%</li> <li>• Gap Filling of crop if mortality is less than 50 %</li> <li>• Fine nursery bed preparation for quick germination and Healthy seedling growth</li> </ul>	<ul style="list-style-type: none"> <li>• Application of FYM &amp; Compost</li> <li>• Strengthen the field bunds &amp; close the holes</li> <li>• Provide life saving irrigation.</li> <li>• Inter-cultivation (Soil mulching).</li> </ul>	Supply of seed drills and inter-cultural implements through State Agriculture department
		Maize	Seed treatment and proper plant protection measures should be taken to avoid germination failure.	Complete hoeing weeding and earthing up at 20 DAS for moisture conservation	
		Millet	Selection of suitable early maturing varieties	Bio mulching with crop residues for moisture conservation	
		Colocasia	One or two Ploughing followed by blade harrowing helps in weed free field and facilitates entry of the rain	Organic mulching with previous crop residues	
		Sesame	-do-	Mulching with paddy straw	
	High rainfall, Loam to clay loam soils, Upland area	Rice	<ul style="list-style-type: none"> <li>• Resow the crop if the mortality is more than 50%</li> <li>• In rainfed situation apply full P, K and reduce Nitrogen application by 40% of the recommended dose as basal along with well decomposed organic manure for early</li> </ul>	<ul style="list-style-type: none"> <li>• Weed out the field.</li> <li>• Strengthen the field bunds &amp; close the holes</li> <li>• Provide life saving irrigation.</li> <li>• Inter-cultivation (Soil mulching).</li> <li>• Organic matter, FYM</li> </ul>	

			seedling vigour	application	
		Maize	Intercropping with pulse crops like green gram, black gram etc	<ul style="list-style-type: none"> <li>• Wherever economically viable, mulching should be practiced in between crop rows using locally available mulch material</li> <li>• Follow strip cropping in rolling topography for moisture conservation</li> </ul>	
		Millet	-do-	<ul style="list-style-type: none"> <li>• Strengthen the field and contour bunds for in-situ moisture conservation.</li> <li>• Organic matter, FYM application.</li> </ul>	
		Colocasia	One or two ploughing followed by blade harrowing helps in weed free field and facilitates entry of the rain	<ol style="list-style-type: none"> <li>a. Stubbles mulching</li> <li>b. Organic matter, FYM application</li> </ol>	
		Sesame	Resow the crop if the mortality is more than 50%	Mulching with paddy straw	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Medium rainfall, Loam to sandy loam soils, lowland area	Paddy	<ul style="list-style-type: none"> <li>• Alternate arrangement of irrigation like construction of well at the farming site</li> <li>• Top dressing of</li> </ul>	Regular weeding <ul style="list-style-type: none"> <li>• Strengthen the field bunds &amp; close the holes</li> <li>• Provide life saving irrigation.</li> </ul>	



			Fertilizers 2% Urea or 2% DAP or 1% KNO <sub>3</sub>	<ul style="list-style-type: none"> <li>Organic mulching with previous crop residues</li> </ul>
		Maize	<ul style="list-style-type: none"> <li>Follow ridge and furrow method of planting</li> <li>Top dressing of Fertilizers 2% Urea or 2% DAP or 1% KNO<sub>3</sub></li> </ul>	<ul style="list-style-type: none"> <li>Regular weeding</li> <li>Removal of unhealthy and diseased plant</li> <li>Follow strip cropping in rolling topography for moisture conservation</li> </ul>
		Millet	-do-	<ul style="list-style-type: none"> <li>Inter cropping with pulse crop</li> <li>Follow strip cropping in rolling topography for moisture conservation</li> </ul>
		Colocasia	-do-	<ul style="list-style-type: none"> <li>Provide life saving irrigation.</li> <li>Inter-cultivation (Soil mulching).</li> </ul>
		Sesame	-do-	<ul style="list-style-type: none"> <li>Conservation furrow.</li> <li>Organic mulching with previous crop residues</li> </ul>
	High rainfall, Loam to clay loam soils, Upland area	Paddy	<ul style="list-style-type: none"> <li>Alternate arrangement of irrigation like construction of well at the farming site</li> <li>Top dressing with fertilizers like 2% Urea or 2% DAP or 1% KNO<sub>3</sub></li> </ul>	<ul style="list-style-type: none"> <li>Weeding, removal of unhealthy and diseased plant</li> <li>Strengthen the field bunds &amp; close the holes</li> <li>Provide life saving irrigation.</li> <li>Inter-cultivation (Soil mulching).</li> </ul>
		Maize	Intercropping with black gram.	<ul style="list-style-type: none"> <li>Regular weeding</li> <li>Provide life saving irrigation</li> </ul>
		Millet	Inter cropping with pulse crop	<ul style="list-style-type: none"> <li>Weeding, removal of unhealthy and diseased plant</li> </ul>
		Colocasia	a. Alternate	<ul style="list-style-type: none"> <li>Provide life saving</li> </ul>

			arrangement of irrigation like construction of well at the farming site	irrigation. <ul style="list-style-type: none"> <li>• Inter-cultivation (Soil mulching).</li> </ul>	
		Sesame	-do-	<ul style="list-style-type: none"> <li>• Weeding, removal of unhealthy and diseased plant</li> </ul>	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
<b>At flowering/ fruiting stage</b>	Medium rainfall, Loam to sandy loam soils, lowland area	Paddy	<ul style="list-style-type: none"> <li>• Proper maintenance of water level.</li> <li>• Remove and destroy pest and disease affected plants</li> </ul>	<ul style="list-style-type: none"> <li>• Provide irrigation at flowering and grain filling stage.</li> <li>• In case of complete failure of Kharif crop, go for pre-rabi crops/ minor pulses like Horsegram (var. urmi).</li> </ul>	
		Maize	Irrigation needed at such stage but water logging should be avoided. Intercropping with beans, cowpea etc.	Provide life saving irrigation	
		Millet		Incase of complete failure of Kharif crop, go for pre-rabi crops/ minor pulses like Horsegram (var. Urmi).	
		Colocasia	-do-	Provide life saving irrigation	
		Sesame	-do-	Provide life saving irrigation	
	High rainfall, Loam to clay	Paddy	Spray methyl demeton/ dimethioate to control stem	Incase of complete failure of Kharif crop, go for pre-	

	loam soils, Upland area		borer and Gundhi bug	rabi crops/ minor pulses like Horsegram (var. Urmi).	
		Maize	Irrigation needed at such stage but water logging should be avoided. Intercropping with beans, cowpea etc.	<ul style="list-style-type: none"> <li>Gulli plugging and recycling of rain water</li> <li>Provide life saving irrigation</li> </ul>	
		Millet	-	Provide life saving irrigation	
		Colocasia	-do-	Provide life saving irrigation	
		Sesame	-do-	Gulli plugging and recycling of rain water	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Medium rainfall, Loam to sandy loam soils, lowland area	Paddy	Cultivation of early maturing varieties, Crop variety : Sahyadri, application of organic manures or FYM.	Relay cropping with mustard and toria.	Construction of Jhalkund through RKVY Linkage with , NSC for seed supply
		Maize	Cultivation of early maturing varieties	-do-	-do-
		Millet	Weed Management	Cultivation of pulses like Cowpea, Green gram , black gram.	
	High rainfall, Loam to clay loam soils, Upland area	Paddy	Harvesting of Rice at physiological maturity will realize 80-85% of normal yield.	Utilization of residual moisture for early sowing of pre-rabi crops like Cowpea, green gram	Construction of Rain Water Harvesting tank at Farm through NABARD, Department Assistance

		Maize	Harvesting of plants for fodder purpose if cob formation hampered.	Grow crucifer vegetables & other high yielding Solanaceous vegetables	-do-
		Millet	Checking of weeds. Harvesting at physiological maturity	Raise Brinjal seedlings for rabi, which may withstand moisture stress condition.	-do-

### 2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Canal irrigated, Loam to sandy loam, lowland areas.	Paddy	Growing Drought tolerant varieties: Heera & Rasi	Life saving irrigation from the check dam at critical stages of the crop growth, weeding and thinning operation of the diseased /unhealthy plant population.	Seeds through Department of Agriculture & KVK
		Maize	Growing of short duration varieties: Ganga 11	Operation like mulching, hoeing, weeding etc.	-do-
		Millet	Growing improved varieties of finger millet to withstand adverse condition of weather: RAU-8, VL-148	Operation like mulching, hoeing, weeding etc.	-do-

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Canal irrigated, Loam to sandy loam, lowland areas.	Paddy	Growing Drought tolerant varieties: Heera & Rasi	Life saving irrigation from the check dam at critical stages of the crop growth, weeding and thinning operation of	Seeds through Department of Agriculture and KVK

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				the diseased /unhealthy plant population.	
		Maize	Growing of short duration varieties: Ganga 11, Prabhat	Operation like mulching, hoeing, weeding etc.	-do-
		Millet	Growing improved varieties of finger millet to withstand adverse condition of weather: RAU-8, VL-148	Operation like mulching, hoeing, weeding etc.	-do-

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	NA				
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	NA				
Insufficiency of surface water for irrigation	Irrigated loamy to sandy loam,	Paddy	Growing Drought tolerant varieties : Bha Lum 1, Bha Lum 2	Life saving irrigation from the check dam at critical stages of the crop growth, weeding and thinning operation of the diseased /unhealthy plant population.	
		maize	Growing of short duration varieties: Prabhat	Operation like mulching, hoeing, weeding etc.	
		millet	Growing Improved varieties :	Operation like mulching,	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agonomic measures	Remarks on Implementation
			RAU-8, VL-148	hoeing,weeding etc.	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agonomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Not Applicable				

## 2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
<b>Continuous high rainfall in a short span leading to water logging</b>				
Rice	Not a substantial problem as uplands don't maintain water logging condition for long time	Provide drainage If possible	Drain out excess water, harvest at physiological maturity	Shifting to a safer place Dry in shade and in a well ventilated space
Maize	Provide drainage	Provide drainage	Drain out excess water, harvest at physiological maturity	-do-
Sesame	Drainage if water logging persists	Provide drainage	Lodged pods may be harvested at physiological maturity stage	Shifting to a safer place Dry in shade and in a well ventilated space
Greengram	-do-	-do-	-do-	Shifting to a safer place Dry in shade and in a well ventilated space

				Safe storage against pest & diseases
Millet	Thinning of plant population	-do-	Harvesting at proper physiological maturity	Proper drying
<b>Horticulture</b>				
Orange			Harvesting ripe fruit before rain	Fruits are to be stored in well aerated farm shed or house to avoid loses
Pineapple			Delay harvesting	Fruits are to be stored in well aerated farm shed or house to avoid loses
Banana			Harvest bunches before or after rain for ripening	
Guava			Harvest mature fruit and marketing.	
Vegetables	1. Provision of drainage to remove excess water. 2. Earthing up of plants. 3. Field bunding to prevent entry of water from surrounding areas.	1. Provision of drainage to remove excess water. 2. Earthing up of plants. 3. Field bunding to prevent entry of water from surrounding areas.	Harvest the crop and market immediately.	
<b>Heavy rainfall with high speed winds in a short span</b>				
<b>Horticulture</b>				
Orange	1. Pruning of weak and disease branches. 2. Intercropping with cover crop or sod culture to prevent soil erosion. 3. Earthing up of young plants to avoid uprooting due to wind.	Wind break around the orchard to protect crop from wing damage	1. Harvest ripe fruit before windstorm. 2. Propping heavy bearing tree and weak tree by bamboo pole.	Fruits are to be stored in well aerated farm shed or house to avoid loses.
Pineapple	Earthing up plants for better development and anchorage.	Earthing up to prevent up rooting.	Delay harvesting	NA
Banana	Earthing up plants for better development and anchorage.	Earthing up and propping by bamboo pole to prevent up rooting and falling of plants.	Harvest bunches before or after rain for ripening	Artificial ripening

Guava	1. Pruning of weak and disease branches. 2. Intercropping with cover crop or sod culture to prevent soil erosion. 3. Earthing up of young plants to avoid uprooting due to wind.	Earthing up to prevent up rooting.	Harvest the crop and market immediately	NA
Vegetables	1. Provision of drainage to remove excess water. 2. Earthing up of plants. 3. Field bunding to prevent entry of water from surrounding areas.	1. Provision of drainage to remove excess water. 2. Earthing up of plants. 3. Field bunding to prevent entry of water from surrounding areas.	Harvest the crop and market immediately.	NA
<b>Outbreak of pests and diseases due to unseasonal rains</b>				
Paddy (Blast)	Removal and destruction of infected plant	Destruction of weed hosts	Drain out excess water, harvesting at proper physiological stage	Dry in shade and well ventilated place
Paddy (Brown Spot)	do	do	do	do
Paddy (Yellow Stem Borer)	Flooding and clipping of tips of paddy plants	do	do	do
Paddy (Gall Midge)	Removal of alternate host plants including weeds and grasses; destruction of infected plants	Providing proper drainage system	do	do
Potato (Early Blight)	Removal and destruction of infected plants and weeds	Water logging should be avoided by providing proper drainage system	Harvesting at proper physiological stage	do
<b>Horticulture</b>				
Orange	Spraying of fenvalerate, cypermethrin for controlling leaf minor. Praying of wettable sulphur, carbendizim to control powdery mildews	Spraying of fenvalerate, cypermethrin for controlling leaf minor. Praying of wettable sulphur, carbendizim to control powdery mildews	Spraying of Neem formulation control fruit sucking moth and citrus butterfly.	Store harvest fruit in bamboo local bamboo basket in shady room.



Pineapple				
Banana				
Guava				
Vegetables	Spraying of Ekalux against Red pumpkin beetle, Collection & destruction of eggs/grubs, Soil drenching of COC & streptomycin against wilting	Spraying Endosulfan against leaf eating caterpillars Metalaxyl against Powdery mildew, Carbendazim against leaf spot & blight	Poison baiting with Malathion & Jaggery against fruit fly	Destruction of overripe & infested fruits

### 2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Transient water logging/partial inundation<sup>1</sup></b>				
Rice	Drainage of the Nursery bed, If not possible go for re-sowing	Drainage of excess water. In partially damaged field. gap filling may be done by redistributing the tillers. Management of pests & diseases Management of pests & diseases	Drainage of excess water. If flood comes during reproductive stage, emphasis should be given on forthcoming rabi crops. Utilization of residual soil moisture and use of recharged soil profile for growing pulses Growing of vegetables after receding flood water and adoption of integrated farming system to obtain more income and to compensate the loss during kharif.	Drainage of excess water. If flood comes during reproductive stage, emphasis should be given on forthcoming rabi crops  Supply of seeds and other agro-inputs of <i>rabi</i> crops at subsidized rate, provision of bank loan etc. Wet seeding of short duration  Utilization of residual soil moisture and use of recharged soil profile for growing pulses Growing of cucurbits after receding flood water
<b>Horticulture /Plantation</b>				

<b>crops</b>				
Orange				
Pineapple				
Banana				
Guava				
Vegetables				
<b>Continuous submergence for more than 2 days<sup>2</sup></b>	Not applicable			
<b>Horticulture / Plantation crops</b>				
<b>Sea water intrusion<sup>3</sup></b>	Not applicable			

#### 2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone

Extreme event type	Suggested contingency measure <sup>r</sup>			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Heat Wave</b>	Not applicable			
<b>Cold wave</b>	Not applicable			
<b>Frost</b>	Not applicable			
<b>Hailstorm</b>	Not applicable			
<b>Cyclone</b>				
<b>Sand deposition or heavy siltation</b>	Not applicable			

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Feed and fodder availability	<ol style="list-style-type: none"> <li>1. Livestock insurance,</li> <li>2. Awareness on fodder cultivation in village grazing lands, near rivers, field boundaries and in barren lands.</li> <li>3. Excess fodder may be stored as hay/silage in the flush season.</li> <li>4. Stacking of paddy straws.</li> <li>5. Installation of feed block machines in the block level and creating feed/fodder block banks to be used in emergency.</li> </ol>	<ol style="list-style-type: none"> <li>1. Grazing in the forest areas (indigenous livestock).</li> <li>2. Good management practices to avoid wastage of feed/fodder.</li> <li>3. Improving the poor quality roughages (urea treatment, ammoniation etc).</li> <li>4. Use of feed additives to improve digestibility.</li> <li>5. Use of unconventional feed/fodders resources.</li> </ol>	<ol style="list-style-type: none"> <li>1. Avail crop insurance,</li> <li>2. Supplementary feeding of livestock to boost or regain the production ability.</li> <li>3. Thorough Examination and selective culling.</li> <li>4. Gradual replacement of the stock.</li> </ol>
Drinking water	<ol style="list-style-type: none"> <li>1. Construction of water harvesting structures.</li> <li>2. Developing watershed areas.</li> </ol>	<ol style="list-style-type: none"> <li>1. Procuring water from watershed areas.</li> <li>2. Transport subsidy for water tankers.</li> </ol>	Analysis of the present experience and remodeling of the planning process.
Health and disease management	<ol style="list-style-type: none"> <li>1. Stocking of veterinary medicines and supplements.</li> <li>2. Training of the paravets and creating Vet scouts in the potential clusters.</li> <li>3. Regular radio/TV telecast of management / remedial measures.</li> <li>4. Phone-in facility in every dispensary / clinic for consultations.</li> <li>5. Housing / management modifications to reduce heat stress.</li> </ol>	<ol style="list-style-type: none"> <li>1. Massive awareness cum treatment camp.</li> <li>2. Improved management practices – e.g reducing exercise, feeding during cooler period of the day etc.</li> </ol>	-do-
<b>Floods</b>			
Feed and fodder availability	<ol style="list-style-type: none"> <li>1. Livestock insurance,</li> <li>2. Awareness on fodder cultivation in village grazing lands, near rivers, field boundaries and in barren lands.</li> <li>3. Excess fodder may be stored as hay/silage in the flush season.</li> <li>4. Stacking of paddy straws.</li> </ol>	<ol style="list-style-type: none"> <li>1. Storage of feeds and fodder in high raised platform.</li> <li>2. Avoid feeding of rotten feeds and fodders.</li> <li>3. Use of trees leaves as fodder.</li> <li>4. Shifting of livestock to high raised areas.</li> </ol>	Supplementary feeding and use of probiotics etc to improve digestibility.

	5. Installation of feed block machines in the block level and creating feed/fodder block banks to be used in emergency.		
Drinking water	<ol style="list-style-type: none"> <li>1. Preserving safe drinking water in community tanks / water harvesting structures which is not prone to seepage of flood water.</li> <li>2. Arrangement of chlorine tablets for sanitization of water and bleaching powder for disinfection of habitats &amp; shelter places.</li> <li>3. Installation of large sized sand water filters</li> <li>3. Training &amp; awareness camp among extension personnel</li> </ol>	Chlorination of the drinking water and use of sand filter where chlorine is not available.	Disinfection of the area.
Health and disease management	<ol style="list-style-type: none"> <li>1. Precautionary vaccination</li> <li>2. Precautionary Antibiotic feeding</li> <li>3. Stocking of veterinary medicines and supplements.</li> <li>4. Training of the paravets and creating Vet scouts in the potential clusters.</li> <li>5. Construction of shelters / shed in high raised areas.</li> </ol>	<ol style="list-style-type: none"> <li>1. Massive awareness cum treatment camp.</li> <li>2. Improved management practices</li> </ol>	<ol style="list-style-type: none"> <li>1. Vaccination campaign for dreaded diseases</li> <li>2. Immediate attention to the ailing animals.</li> <li>3. Sanitization of the shed and surrounding areas.</li> </ol>
<b>Cyclone</b>			
Feed and fodder availability			
Drinking water			
Health and disease management			
<b>Heat wave and cold wave</b>			
Shelter/environment management			
Health and disease management			
<b>Snowfall</b>			
<b>Earthquake</b>			
<b>Landslides</b>	1. Livestock insurance,	1. Storage of feeds and fodder in high raised	1. Supplementary feeding and use of probiotics

	<p>2. Awareness on fodder cultivation in village grazing lands, near rivers, field boundaries and in barren lands.</p> <p>3. Excess fodder may be stored as hay/silage in the flush season.</p> <p>4. Stacking of paddy straws.</p> <p>5. Installation of feed block machines in the block level and creating feed/fodder block banks to be used in emergency.</p>	<p>platform.</p> <p>2. Avoid feeding of rotten feeds and fodders.</p> <p>3. Use of trees leaves as fodder.</p> <p>4. Shifting of livestock to high raised areas.</p>	<p>etc to improve digestibility.</p>
	<p>6. Preserving safe drinking water in community tanks / water harvesting structures which is not prone to seepage.</p> <p>7. Arrangement of chlorine tablets for sanitization of water and bleaching powder for disinfection of habitats &amp; shelter places.</p> <p>8. Installation of large sized sand water filters</p> <p>9. Training &amp; awareness camp among extension personnel</p>	<p>5. Chlorination of the drinking water and use of sand filter where chlorine is not available.</p>	<p>2. Disinfection of the area.</p>

<sup>s</sup> based on forewarning wherever available

### 2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event	During the event	After the event	
<b>Drought</b>	<p>1. Insurance of poultry bird</p> <p>2. Procurement of feed ingredients in bulk.</p> <p>3. Installation of feed plant</p>	<p>Availing feed from the local resources / feed plant</p>	<p>Availing insurance for the losses.</p>	
Shortage of feed ingredients	<p>Check water source for ensuring sufficient potable water during</p>	<p>1. Procuring water from watershed areas.</p>	<p>Installation of deep bore</p>	

	draught	2. Transport subsidy for water tankers.	well for secured water supply	
Drinking water	Procurement of vaccines and medicines and anti-stress agent. Feeding antibiotics Procurement of litter materials	Administration of vaccines Continue feeding of antistress agent	Culling of affected birds	
Health and disease management				
<b>Floods</b>	1. Insurance of poultry bird 2. Procurement of feed ingredients in bulk from outside the district 3. Installation of feed plant	Availing feed from the local resources / feed plant	Availing insurance for the losses.	
Shortage of feed ingredients	1. Preserving safe drinking water in community tanks / water harvesting structures which is not prone to seepage of flood water. 2. Arrangement of chlorine tablets for sanitization of water and bleaching powder for disinfection of habitats & shelter places. 3. Installation of large sized sand water filters 3. Training & awareness camp among extension personnel	Chlorination of the drinking water and use of sand filter where chlorine is not available.	Disinfection of the area.	
Drinking water	Procurement of vaccines and medicines and anti-stress agent. Feeding antibiotics Stocking of litter materials	Administration of vaccines Continue feeding of anti-stress agent	Culling of affected birds	
Health and disease management				
<b>Cyclone</b>				

Shortage of feed ingredients				
Drinking water				
Health and disease management				
<b>Heat wave and cold wave</b>				
Shelter/environment management				
Health and disease management				
Snowfall				
Earthquake, Landslides etc				

<sup>a</sup> based on forewarning wherever available

### 2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>1) Drought</b>			
Shallow water in ponds due to insufficient rains/inflow	1. Supplementary water harvest structures like pond and tanks has to be developed. 2. Renovation and maintenance of existing water harvest structures	1. Restrict lifting of water for irrigation purpose of crops 2. Catch the stock, market the produce to reduce the density of population in ponds.	1. Excavate the ponds to increase the depth. 2. Try to release water into the pond if it rains in off-season
Impact of heat & salt load build up in ponds / change in water quality	1. Prepare to release water into the habitat	1. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	1. Monitoring the water quality and health of aquatic organisms
<b>Floods</b>			

Inundation with flood waters	1. Construction of humane shelter. 2. Storage of sand filled bags for emergency use. 3. Repair and maintenance of bunds. 4. Preparedness for relief 5. Insurance coverage provision for life and property	1. Timely broadcast and telecast and other types of announcement warning about the danger level with respect to water level. 2. Evacuation of people to flood shelter areas. 3. Relief operation.	1. Relief operation will continue. 2. Care of health of affected people 3. Settlement of insurance. 4. Financial support to other people.
Water contamination & change in BOD	1. Take appropriate measures to check seepage into pond e.g. Raising bunds to prevent entry of water 2. Application of lime.	1. Check the water quality & take appropriate action 2. Application of $KMnO_4$	1. Application of lime and geolite. 2. Application of Alum. 3. Application of $KMnO_4$
Health and diseases management	Stock preventive medicines, vaccines	1. Prevent influx of diseased fish from outside source, Check through nets 2. Application of Alum.  3. Administer medicines through random catch Disinfect water by lime, $KMnO_4$	1. Application of lime and $KMnO_4$ . 2. Assessment of the health status of fish and accordingly control measure should be taken. 3. Control on transport of brooders and seeds.
<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		
Shallow water in ponds due to insufficient rains/inflow	1. Supplementary water harvest structures like pond and tanks has to be developed. 2. Renovation and maintenance of existing water harvest structures	3. Restrict lifting of water for irrigation purpose of crops 4. Catch the stock, market the produce to reduce the density of population in ponds.	3. Excavate the ponds to increase the depth. 4. Try to release water into the pond if it rains in off-season
Impact of heat & salt load build up in ponds / change in water quality	2. Prepare to release water into the habitat	2. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	2. Monitoring the water quality and health of aquatic organisms
<b>Floods</b>			
Inundation with flood waters	1. Construction of humane shelter. 2. Storage of sand filled bags for emergency use. 3. Repair and maintenance of bunds. 4. Preparedness for relief	1. Timely broadcast and telecast and other types of announcement warning about the danger level with respect to water level. 2. Evacuation of people to flood	1. Relief operation will continue. 2. Care of health of affected people 3. Settlement of insurance. 4. Financial support to other people.



	5. Insurance coverage provision for life and property	shelter areas. 3. Relief operation.	
Water contamination & change in BOD	1. Take appropriate measures to check seepage into pond e.g. Raising bunds to prevent entry of water 2. Application of lime.	1. Check the water quality & take appropriate action 2. Application of KmnO4	1. Application of lime and geolite. 2. Application of Alum. 3. Application of KmnO4
Health and diseases management	Stock preventive medicines, vaccines	1. Prevent influx of diseased fish from outside source, Check through nets 2. Application of Alum.  3. Administer medicines through random catch Disinfect water by lime , KMnO4	1. Application of lime and KmnO4. 2. Assessment of the health status of fish and accordingly control measure should be taken. 3. Control on transport of brooders and seeds.
<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		
Shallow water in ponds due to insufficient rains/inflow	1. Supplementary water harvest structures like pond and tanks has to be developed. 2. Renovation and maintenance of existing water harvest structures	5. Restrict lifting of water for irrigation purpose of crops 6. Catch the stock, market the produce to reduce the density of population in ponds.	5. Excavate the ponds to increase the depth. 6. Try to release water into the pond if it rains in off-season
Impact of heat & salt load build up in ponds / change in water quality	3. Prepare to release water into the habitat	3. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	3. Monitoring the water quality and health of aquatic organisms
<b>Floods</b>			
Inundation with flood waters	1. Construction of humane shelter. 2. Storage of sand filled bags for emergency use. 3. Repair and maintenance of bunds. 4. Preparedness for relief 5. Insurance coverage provision for life and property	1. Timely broadcast and telecast and other types of announcement warning about the danger level with respect to water level. 2. Evacuation of people to flood shelter areas. 3. Relief operation.	1. Relief operation will continue. 2. Care of health of affected people 3. Settlement of insurance. 4. Financial support to other people.
Water contamination & change in BOD	1. Take appropriate measures to check seepage into pond e.g. Raising bunds to prevent entry of water	1. Check the water quality & take appropriate action 2. Application of KmnO4	1. Application of lime and geolite. 2. Application of Alum. 3. Application of KmnO4

	2. Application of lime.		
Health and diseases management	Stock preventive medicines, vaccines	1. Prevent influx of diseased fish from outside source, Check through nets 2. Application of Alum.  3. Administer medicines through random catch Disinfect water by lime , KMnO4	1. Application of lime and KmnO4. 2. Assessment of the health status of fish and accordingly control measure should be taken. 3. Control on transport of brooders and seeds.
<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		
Shallow water in ponds due to insufficient rains/inflow	1. Supplementary water harvest structures like pond and tanks has to be developed. 2. Renovation and maintenance of existing water harvest structures	7. Restrict lifting of water for irrigation purpose of crops 8. Catch the stock, market the produce to reduce the density of population in ponds.	7. Excavate the ponds to increase the depth. 8. Try to release water into the pond if it rains in off-season
Impact of heat & salt load build up in ponds / change in water quality	4. Prepare to release water into the habitat	4. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	4. Monitoring the water quality and health of aquatic organisms
<b>Floods</b>			
Inundation with flood waters	1. Construction of humane shelter. 2. Storage of sand filled bags for emergency use. 3. Repair and maintenance of bunds. 4. Preparedness for relief 5. Insurance coverage provision for life and property	1. Timely broadcast and telecast and other types of announcement warning about the danger level with respect to water level. 2. Evacuation of people to flood shelter areas. 3. Relief operation.	1. Relief operation will continue. 2. Care of health of affected people 3. Settlement of insurance. 4. Financial support to other people.
Water contamination & change in BOD	1. Take appropriate measures to check seepage into pond e.g. Raising bunds to prevent entry of water 2. Application of lime.	1. Check the water quality & take appropriate action 2. Application of KmnO4	1. Application of lime and geolite. 2. Application of Alum. 3. Application of KmnO4
Health and diseases management	Stock preventive medicines, vaccines	1. Prevent influx of diseased fish from outside source, Check through nets	1. Application of lime and KmnO4. 2. Assessment of the health status of fish and accordingly control measure should be taken.

		2. Application of Alum. 3. Administer medicines through random catch Disinfect water by lime , KMnO <sub>4</sub>	3. Control on transport of brooders and seeds.
<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		
Shallow water in ponds due to insufficient rains/inflow	1. Supplementary water harvest structures like pond and tanks has to be developed. 2. Renovation and maintenance of existing water harvest structures	9. Restrict lifting of water for irrigation purpose of crops 10. Catch the stock, market the produce to reduce the density of population in ponds.	9. Excavate the ponds to increase the depth. 10. Try to release water into the pond if it rains in off-season
Impact of heat & salt load build up in ponds / change in water quality	5. Prepare to release water into the habitat	5. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	5. Monitoring the water quality and health of aquatic organisms
<b>Floods</b>			
Inundation with flood waters	1. Construction of humane shelter. 2. Storage of sand filled bags for emergency use. 3. Repair and maintenance of bunds. 4. Preparedness for relief 5. Insurance coverage provision for life and property	1. Timely broadcast and telecast and other types of announcement warning about the danger level with respect to water level. 2. Evacuation of people to flood shelter areas. 3. Relief operation.	1. Relief operation will continue. 2. Care of health of affected people 3. Settlement of insurance. 4. Financial support to other people.
Water contamination & change in BOD	1. Take appropriate measures to check seepage into pond e.g. Raising bunds to prevent entry of water 2. Application of lime.	1. Check the water quality & take appropriate action 2. Application of KmnO <sub>4</sub>	1. Application of lime and geolite. 2. Application of Alum. 3. Application of KmnO <sub>4</sub>
Health and diseases management	Stock preventive medicines, vaccines	1. Prevent influx of diseased fish from outside source, Check through nets 2. Application of Alum.  3. Administer medicines through random catch Disinfect water by lime , KMnO <sub>4</sub>	1. Application of lime and KmnO <sub>4</sub> . 2. Assessment of the health status of fish and accordingly control measure should be taken. 3. Control on transport of brooders and seeds.

<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		
Shallow water in ponds due to insufficient rains/inflow	1. Supplementary water harvest structures like pond and tanks has to be developed. 2. Renovation and maintenance of existing water harvest structures	11. Restrict lifting of water for irrigation purpose of crops 12. Catch the stock, market the produce to reduce the density of population in ponds.	11. Excavate the ponds to increase the depth. 12. Try to release water into the pond if it rains in off-season
Impact of heat & salt load build up in ponds / change in water quality	6. Prepare to release water into the habitat	6. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	6. Monitoring the water quality and health of aquatic organisms
<b>Floods</b>			

<sup>a</sup> based on forewarning wherever available