

**State: MAHARASHTRA**

**Agriculture Contingency Plan for District: SANGLI**

<b>1.0 District Agriculture profile</b>					
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>				
	Agro Ecological Sub Region (ICAR)	Deccan plateau, hot semi arid eco sub región. (6.1)			
	Agro-Climatic Region (Planning Commission)	Western plateau and hills region (IX)			
	Agro Climatic Zone (NARP)	Western Maharashtra Scarcity Zone (MH-6) Western Maharashtra Plain Zone (MH-4)			
	List all the districts or part there of falling under the NARP Zone	Scarcity Zone - Sangli, Nandurbar, Nasik, Dhule, Ahmednagar, Pune, Solapur, Satara(Part), Kolhapur (Part), Jalgaon Western Maharashtra Plain Zone – Pune (Eastern Part), Kolhapur, Sangli, Satara, Nashik			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		16 <sup>0</sup> 55' 30.05"N	74 <sup>0</sup> 25' 30.08" E	610 m MSL	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station, Kasabe Digraj, Tal. Miraj, Dist. Sangli. 416 305 Ph.No. 0233 2437275 Fax.0233 2437288 E-mail. kathmaledk@rediffmail.com Western Plain Zone, MPKV, NARP, Ganeshkhind, Pune (M.S.)			
Mention the KVK located in the district	KVK Kanchanpur, Tal. Miraj, Dist. Sangli 416 306				
<b>1.2</b>	<b>Rainfall</b>	Normal RF(mm)	Normal Rainy days	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	473.5	35	2 <sup>nd</sup> week of June	1 <sup>st</sup> Fortnight of October
	NE Monsoon(Oct-Dec):	137.6	8		

Winter (Jan- Feb)	9.4	1	-	-
Summer (Mar-May)	71.9	5	-	-
Annual	692.4	49	-	-

1.3	Land use pattern of the district (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>	861	595.6	45.1	46.0	17.7	14.6	12.9	38.8	38.5	51.8

(Source: Agricultural Statistical Information, Maharashtra State 2006 (Part II))

1.4	Major Soils	Area ('000 ha)
	Shallow black/Red soils	389.4
	Deep black soils	142.7
	Medium deep black soils	63.4

(Source: NBSS & LUP, Nagpur)

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity (Per cent)
	Net sown area	557.1	116.5
	Area sown more than once	91.9	
	Gross cropped area	649	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	174		
	Gross irrigated area	190		
	Rainfed area	421.6		
	<b>Sources of Irrigation</b>	<b>Number</b>	<b>Area ('000 ha)</b>	<b>Percentage of total irrigated area</b>
	Canals	-----	45.0	25.8
	Tanks	100	0.2	0.1
	Open wells	54065	63.6	36.5
	Bore wells	133	3.4	2.0
	Lift irrigation schemes	680	40.0	22.9
	Micro-irrigation		10.0	5.7
	Other sources (please specify)		11.7	6.7
	Total Irrigated Area		174	100.00
	Pump sets	35000		
	No. of Tractors	4000		
	<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	No. of blocks/ Tehsils	(%) area	<b>Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)</b>
	Over exploited	6	60	Good
	Critical	2	20	Good
	Semi- critical	-		
	Safe	2	20	Salty
	Wastewater availability and use	-	-	-
	Ground water quality			

1.7 Area under major field crops & horticulture etc. (2008-09)

1.7	Major Field Crops cultivated	Area ('000 ha)							
		Kharif			Rabi			Summer	Total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Sorghum	-	102.8	102.8	-	153.2	153.2	-	256.0
	Pearlmillet	-	95.6	95.6	-	-	-	-	95.6
	Soybean	-	82.6	82.6	-	-	-	-	82.6
	Sugarcane	55.7	-	55.7	-	-	-	-	55.7
	Groundnut	-	32.1	32.1	-	-	-	8.0	40.1
	Wheat	-	-	-	30.6	-	30.6	-	30.6
	<b>Horticulture crops – Fruits</b>	<b>Total area('000 ha)</b>			<b>Irrigated</b>		<b>Rainfed</b>		
	Grapes	10.2			10.2		-		
	Pomegranate	6.3			6.3		-		
	<b>Horticultural crops – Vegetables</b>	<b>Total area('000 ha)</b>			<b>Irrigated</b>		<b>Rainfed</b>		
	Tomato	2.1			2.1		-		
	Onion	1.5			1.5		-		
	<b>Spices</b>								
	Turmeric	9.0			9.0		-		
	<b>Medicinal and Aromatic crops</b>	--			--		--		
	<b>Plantation crops</b>	<b>Total area('000 ha)</b>			<b>Irrigated</b>		<b>Rainfed</b>		
	Others such as industrial pulpwood crops etc (specify)								
	<b>Fodder crops</b>	<b>Total area('000 ha)</b>			<b>Irrigated</b>		<b>Rainfed</b>		
	<b>Total fodder crop area</b>	34.7			-		34.7		
	<b>Grazing land</b>	17.7			--		--		
	<b>Sericulture etc</b>	--			--		--		

Source: District Agricultural Information, Sangli District 2009

<b>1.8</b>	<b>Livestock</b>	<b>Male ('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>
	Non descriptive Cattle (local low yielding)	79.5	66.5	146.0
	Crossbred cattle	41.7	35.9	77.6
	Non descriptive Buffaloes (local low yielding)	20.8	256.6	276.6
	Graded Buffaloes	-	-	--
	Goat	-	-	369.9
	Sheep	-	-	207.0
	Others (Camel, Pig, Yak etc.)	-	-	-
	Commercial dairy farms (Number)			8.23
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>	
	Commercial	212	2125	
	Backyard			

<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>
	NA		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		NA	NA	NA	NA	NA	NA
	<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>		
		266		392			
	<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> (Data Source: MPEDA/ Fisheries Department)	NA		NA	NA		
	<b>ii) Fresh water</b> (Data Source: Fisheries Department)	4098		712	2500		

**1.11 Production and Productivity of major crops (2004, 05, 06, 07, 08, 09)**

1.11	Name of crop	Kharif		Rabi		Summer		Total Production ('000 t)	Average Productivity (kg/ha)	Crop residue as fodder ('000 tons)
		Production ('000t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)			
<b>Major Field crops</b>										
	Sorghum	65.9	647	89.2	583	-	-	155.1	615	-
	Soybean	176.6	2154	-	-	-	-	176.6	2154	-
	Sugarcane	---	-	-	-	4634	84000	4634	84000	-
	Pearlmillet	37.7	397	-	-	-	-	37.7	397.0	-
	Groundnut	40.4	1010	-	-	-	-	40.4	1010	-
<b>Major Horticultural crops fruits</b>										
	Grape	2360	23200	-	-	-	-	2360	23200	-
	Pomegranate	377	26000	-	-	-	-	377	26000	-
<b>Major Horticultural crops vegetable</b>										
	Tomato	441	21400	-	-	-	-	441	21400	-
	Onion	22.6	12080	-	-	-	-	22.67	12080	-
<b>Spices</b>										
	Turmeric	1.0	1000	-	-	-	-	1.0	1000	

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Sorghum	Soybean	Sugarcane	Pearl millet	Groundnut
	Kharif- Rainfed	15 <sup>th</sup> June to 30 <sup>th</sup> June	15 <sup>th</sup> June to 30 <sup>th</sup> June	-	15 <sup>th</sup> June to 15 <sup>th</sup> July	15 <sup>th</sup> June to 30 <sup>th</sup> June
	Kharif-Irrigated	15 <sup>th</sup> June to 30 <sup>th</sup> June	15 <sup>th</sup> May -30 <sup>th</sup> May	Seasonal: Jan 15 <sup>th</sup> -30 <sup>th</sup> Pre seasonal: October 15 <sup>th</sup> -November 15 <sup>th</sup>	-	1 <sup>st</sup> June to 15 <sup>th</sup> July

				Adsali: August 1 <sup>st</sup> –August 15 <sup>th</sup>		
	Rabi- Rainfed	15 <sup>th</sup> September to 15 <sup>th</sup> Oct	-	-	-	
	Rabi-Irrigated	30 <sup>th</sup> September to 15 <sup>th</sup> Oct	-	-	-	

1.13	What is the major contingency the district is prone to?	Regular	Occasional	None
	Drought	--	✓	--
	Flood	--	✓ (Walava, Miraj)	--
	Cyclone	--	--	✓
	Hail storm	--	--	✓
	Heat wave	--	✓ (Rare)	--
	Cold wave	--	✓ (Rare)	--
	Frost	--	--	✓
	Sea water intrusion	--	--	✓
	Pests and disease outbreak (specify)		✓	
	Others (specify)		---	

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: No
		Soil map as Annexure 3	Enclosed: Yes

## 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 4 <sup>th</sup> week)	Shallow Black/Red Soils	Groundnut	No change.	Adopt recommended package of practices	Seed source MSSC, NSC and ARS, K. Digraj ARS, Karad MPKV, Rahuri
		Pearlmillet	No change	Adopt recommended package of practices	
	Medium deep black soils	Pigeonpea	<ul style="list-style-type: none"> <li>Pearl millet + Pigeonpea (2:1)</li> <li>Soybean + Pigeonpea (3:1)</li> </ul>	• Hoeing at 25 DAS	
		Soybean	<ul style="list-style-type: none"> <li>Soybean</li> <li>Soybean + Pigeonpea (6:2) intercropping</li> </ul>	<ul style="list-style-type: none"> <li>Prefer early cultivars of Soybean (JS-9305),</li> <li>Prefer rust tolerant variety of Soybean (DS-228)</li> <li>Seed treatment with Thiram + Carbendazim 2 g each / kg</li> <li>Treat pigeonpea seed with trichoderma 5 g per kg of seed</li> </ul>	
		Sorghum	Soybean, Soybean + Pigeonpea (6:2) intercropping	As above	
	Deep Black Soils	<i>Kharif</i> fallow	--	<ul style="list-style-type: none"> <li>Take up soil and water conservation practices (like compartmental bunding, ridges furrow, etc.) for <i>rabi</i> crops</li> </ul>	



Condition	Suggested Contingency measures						
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation		
Delay by 4 weeks July 2 <sup>nd</sup> week 28MW	Shallow Black/Red Soils	Groundnut	Groundnut (JL-286/JL-24) + Pigeonpea (Vipula) (6:2),	<ul style="list-style-type: none"> <li>Two intercultivations 20 and 40 DAS</li> <li>Application of gypsum at the time of 50% flowering @ 250 kg/ha</li> </ul>	<b>Seed source :</b> <ul style="list-style-type: none"> <li>Central campus MPKV, Rahuri,</li> <li>ARS, Mohol</li> <li>ZARS, Solapur</li> <li>NSC</li> <li>MSSC</li> <li>NRCS, Solapur</li> <li>MAU, Parbhani</li> </ul>		
			Pearlmillet (Shanti) + Pigeonpea (Vipula) (2:1)	<ul style="list-style-type: none"> <li>Basal application of 25 kg K<sub>2</sub>O per ha for pearlmillet</li> <li>Two intercultivations 30 and 45 DAS</li> </ul>			
		Pearlmillet	Pearlmillet (Shanti) or Pearlmillet (Shanti) + Pigeonpea (Vipula) (2:1)	-do-			
Medium deep black soils	Pigeonpea	Pigeonpea (BDN-708) or Pearlmillet (Shanti) + Pigeonpea (BDN-708) (2:1)	Pigeonpea (BDN-708) or Pearlmillet (Shanti) + Pigeonpea (BDN-708) (2:1)	<ul style="list-style-type: none"> <li>Application of 25 kg K<sub>2</sub>O per ha for pearlmillet</li> <li>Opening of conservation furrows in between two rows of sole pigeonpea for water / moisture conservation at 30 DAS</li> <li>Opening of conservation furrows after harvest of pearlmillet in case of pearlmillet + pigeonpea intercropping</li> </ul>			
				Soybean		Sunflower (SS-56 / Bhanu), Sunflower (SS-56 / Bhanu) + Pigeonpea (Vipula / BDN-708) (2:1)	<ul style="list-style-type: none"> <li>Hoeing at 30 DAS</li> <li>Opening of conservation furrows in between two rows of sole sunflower for water / moisture conservation at 30 DAS</li> <li>Opening of conservation furrows after harvest of sunflower in case of sunflower + pigeonpea intercropping</li> </ul>
							Sorghum
Deep Black Soils	<i>Kharif</i> fallow	--	<ul style="list-style-type: none"> <li>Take up soil and water conservation practices (like compartmental bunding, ridges furrow, etc.) for <i>rabi</i> crops</li> </ul>				

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks ( July 4 <sup>th</sup> week) 30MW	Shallow Black /Red Soils	Groundnut	Pearlmillet (Shanti / Shraddha / Saburi )	<ul style="list-style-type: none"> <li>Basal application of 25 kg K<sub>2</sub>O per ha for pearlmillet</li> <li>Two intercultivations 30 and 45 DAS</li> </ul>	<b>Seed source :</b> <ul style="list-style-type: none"> <li>Central campus MPKV, Rahuri,</li> <li>ARS, Mohol</li> <li>ZARS, Solapur</li> <li>NSC</li> <li>MSSC</li> <li>NRCS, Solapur MAU, Parbhani</li> </ul>
		Pearlmillet	-do-	-do-	
	Medium deep black soils	Pigeonpea	Sunflower (SS-56 / Bhanu)	<ul style="list-style-type: none"> <li>Hoing at 30 DAS</li> <li>Opening of conservation furrows in between two rows of sole sunflower for water / moisture</li> </ul>	
		Soybean	-do-	-do-	
		Sorghum	Fodder Sorghum (Phule Amruta / MP Chari / CSV-21F)	<ul style="list-style-type: none"> <li>Application of 20: 20 N:P<sub>2</sub>O<sub>5</sub> kg/ha as basal and remaining 20 kg N per ha at 30 DAS with sufficient soil moisture</li> </ul>	
Deep Black Soils	<i>Kharif</i> fallow	--	<ul style="list-style-type: none"> <li>Take up soil and water conservation practices (like compartmental bunding, ridges furrow, etc.) for <i>rabi</i> crops</li> </ul>		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 8 weeks August 2 <sup>nd</sup> week	Not Applicable for this district				

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Shallow Black/Red Soils	Groundnut	No change	Weeding and Hoeing	<b>Seed source :</b> <ul style="list-style-type: none"> <li>• Central campus MPKV, Rahuri,</li> <li>• ARS, Mohol</li> <li>• ZARS, Solapur</li> <li>• NSC</li> <li>• MSSC</li> <li>• NRCS, Solapur</li> <li>• MAU, Parbhani</li> </ul>
		Pearlmillet	No change	-do-	
	Medium deep black soils	Pigeonpea	Gap Filling with seed priming	<ul style="list-style-type: none"> <li>• Spray 2% urea or DAP</li> <li>• Hoeing/weeding</li> </ul>	
		Soybean	In case of less than 30 % germination take up resowing with wider spacing of 45 cm with sufficient soil moisture.	<ul style="list-style-type: none"> <li>• Hoeing/weeding</li> </ul>	
		Sorghum	Resowing with sufficient soil moisture.	<ul style="list-style-type: none"> <li>• Opening of conservation furrows</li> <li>• Protective irrigation</li> <li>• Hoeing and weeding</li> </ul>	
	Deep Black Soils	<i>Kharif</i> fallow		Take up soil and water conservation practices (like compartmental bunding, ridges furrow, etc.) for <i>rabi</i> crops	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	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	Shallow Black /Red Soils	Groundnut	Give protective irrigation	<ul style="list-style-type: none"> <li>• Hoeing/Weeding</li> <li>• Use of 8 % kaolin spray</li> <li>• 2 % urea spray,</li> </ul>	

		Pearlmillet	Give protective irrigation	<ul style="list-style-type: none"> <li>As above</li> </ul>	
	Medium deep black soils	Pigeonpea	Protective irrigation and thinning	<ul style="list-style-type: none"> <li>Hoeing/Weeding</li> <li>Use of 8 % kaolin spray</li> <li>2 % urea spray,</li> <li>Opening of conservation furrows in between two rows of pigeonpea</li> </ul>	
		Soybean	Protective irrigation	<ul style="list-style-type: none"> <li>Use of 8 % kaolin spray</li> <li>2 % urea spray,</li> <li>Hoeing and weeding</li> </ul>	
		Sorghum	Protective irrigation	<ul style="list-style-type: none"> <li>Use of anti transpirants @ 8 % kaolin,</li> <li>Postpone N dose,</li> <li>Hoeing and weeding</li> <li>Thinning of every third row and apply as mulch</li> </ul>	
	Deep Black Soils	<i>Kharif</i> fallow	--	Take up soil and water conservation practices (like compartmental bunding, ridges furrow, etc.) for <i>rabi</i> crops	

Condition	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
At flowering/ fruiting stage	Shallow Black/Red Soils	Groundnut	Protective irrigation,	Use of anti transpirants @ 8 % kaolin, Mulching	Rain water harvesting and utilization through farm ponds. Convergence with ongoing State Govt. programmes MGNREGA, RKVY etc.
		Pearlmillet	-do-	<ul style="list-style-type: none"> <li>Hoeing/Weeding</li> <li>Use of 8 % kaolin spray</li> <li>2 % urea spray,</li> </ul>	
	Medium deep black soils	Pigeonpea	-do-	<ul style="list-style-type: none"> <li>Hoeing/Weeding</li> <li>Use of 8 % kaolin spray</li> <li>2 % urea spray,</li> <li>Opening of conservation furrows in</li> </ul>	

				between two rows of pigeonpea	
		Soybean	-do-	Hoeing	
		Sorghum	-do-	As above	
	Deep Black Soils	<i>Kharif</i> fallow	-	Take up soil and water conservation practices (like compartmental bunding, ridges furrow, etc.) for <i>rabi</i> crops	

Condition	Suggested Contingency measures				
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	<u>Rabi</u> Crop planning	Remarks on Implementation
	Shallow Black/Red Soils	Groundnut	Protective irrigation or harvest at physiological maturity	No rabi crop	
		Pearlmillet	Protective irrigation, In case of poor grain filling harvest for fodder	-do-	
	Medium deep black soils	Pigeonpea	Protective irrigation	-do-	
		Soybean	-do-	Chickpea (Vijay / Digvijay ) / Safflower (Bhima) / Sunflower (SS-56 / Bhanu)	
		Sorghum	Protective irrigation, In case of poor grain filling harvest for fodder	-do-	
	Deep Black Soils	<i>Kharif</i> fallow	Adopt soil moisture conservation measures like ridges and furrows in kharif	<i>Rabi</i> sorghum (M-35.1/ Phule Vasudha / Phule Anuradha / Phule Chitra / CSV-18 / Phule Yashoda / PKV Kranti) / Chickpea (Vijay / Digvijay ) / Safflower (Bhima) / Sunflower (SS-56 / Bhanu)	

## 2.1.2 Irrigated situation

### 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	<i>Kharif</i> and <i>rabi</i> cropping under canal irrigation	Sugarcane	No change	Paired row planting Alternate furrow irrigation from available sources Mulching	
		Soybean	Short duration varieties viz., JS-9305,	Wider row spacing of 45 cm , give one supplemental irrigation at flowering stage	
		Wheat	Trimbak, Tapovan	Irrigate at critical stages CRI and flowering stage	
		Turmeric	Salem, Rajapuri	Adopt raised bed planting, adopt drip irrigation	

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	<i>Kharif</i> and <i>rabi</i> cropping under canal irrigation	Sugarcane	No change	Paired row planting Alternate furrow irrigation from available sources Mulching	
		Soybean	Short duration varieties viz., JS-9305,	Wider row spacing of 45 cm , give one supplemental irrigation at flowering stage	
		Wheat	Trimbak, Tapovan	Irrigate at critical stages CRI and flowering stage	
		Turmeric	Salem, Rajapuri	Adopt raised bed planting, adopt drip irrigation	

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	<i>Kharif</i> and <i>rabi</i> cropping under canal irrigation	Sugarcane	Pigeonpea, Sunflower, Chickpea, Sorghum	Wider row spacing of 45 cm , give one supplemental irrigation at flowering stage from available sources	
		Soybean	Short duration varieties viz., JS-9305,	-do-	
		Wheat	Chickpea (Digvijay, Vijay) Safflower (Bhima)	Irrigate at critical stages CRI and flowering stage	
		Turmeric	Soybean Short duration varieties viz., JS-9305, Chickpea (Vijay, Digvijay)	Wider row spacing of 45 cm , give one supplemental irrigation at flowering stage	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon			Not applicable		
Insufficiency of surface water for irrigation	<i>Kharif</i> and <i>rabi</i> cropping under lift irrigation	Sugarcane	No change	Paired row planting	
		Soybean	Short duration varieties viz., JS-9305,	Wider row spacing of 45 cm , give one supplemental irrigation at flowering stage	
		Wheat	Trimbak, Tapovan	Irrigate at critical stages CRI and flowering stage	
		Turmeric	Salem, Rajapuri	Adopt raised bed planting, adopt drip irrigation	

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Bore well / Open dug well Irrigated situation	Grapes	No Change	Mulching around tree basin, adopt drip irrigation,	
		Pomegranate	No Change	-do-	
		Tomato	No Change	Mulching with plastic film	
		Capsicum	No Change	-do-	

## 2.2 Unusual rains (untimely, unseasonal etc)

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>				
Pearlmillet	<ul style="list-style-type: none"> <li>Drain out excess water,</li> <li>Give second dose of N at optimum soil moisture</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water,</li> </ul>	<ul style="list-style-type: none"> <li>Harvest at physiological maturity stage</li> </ul>	<ul style="list-style-type: none"> <li>Harvest &amp; dry in drying shade</li> </ul>
<i>Kharif_Sorghum</i>	As above	As above	As above	As above
Soybean	<ul style="list-style-type: none"> <li>Drain out excess water,</li> </ul>	As above	As above	As above
Groundnut	As above	As above	As above	As above
Pigeonpea	As above	As above	As above	As above
Rabi sorghum	As above	As above	As above	As above
<b>Horticulture</b>				
Pomegranate	<ul style="list-style-type: none"> <li>Drain out excess water,</li> <li>Staking</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water,</li> <li>Staking</li> </ul>	-	<ul style="list-style-type: none"> <li>Immediate harvesting &amp; marketing</li> </ul>
Grape	As above	As above	As above	As above
Vegetable crops	As above	As above	As above	As above

<b>Heavy rainfall with high speed winds in a short span - Not applicable</b>
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<b>Outbreak of pests and diseases due to unseasonal rains</b>				
Soybean	<b>Root rot/collar rot-</b> Treat seed with carbendazim + mancozeb (2 g each/kg) or Phule Trichoderma 5 g/kg.	<b>Rust –</b> <ul style="list-style-type: none"> <li>• Early sowing in last week of may</li> <li>• Use of disease resistant variety</li> <li>• Spraying of Propiconazole @ 0.1%</li> </ul>	--	--
	<b>Spodoptera/Hairy caterpillar/Semilooper</b> Pheromone traps for Spodoptera monitoring <ul style="list-style-type: none"> <li>• Dust Quinolphos 1.5 % or Endosulphon 4% dust @ 20kg /ha.</li> <li>• Spraying of Chloropyriphos 2 ml/L or spraying of Endosulphan 35 EC 2 ml/L</li> </ul>	<b>Spodoptera/Hairy caterpillar Semilooper</b> Installation of Pheromone traps <ul style="list-style-type: none"> <li>• Dust Quinolphos 1.5 % or Endosulphon 4% dust @ 20kg /ha.</li> <li>• Spraying of Chloropyriphos 2 ml/L or spraying of Endosulphan 35 EC 2 ml/L</li> </ul>	--	--
Pigeonpea	<b>Wilt/ Root rot -</b> Treat seed with carbendazim + mancozeb (2 g each/kg) or Phule Trichoderma 5 g/kg.	Spray of neem seed extract (NSE) 5% at 10% flowering.	-	-
	<b>Leaf roller :</b> Destruction of rolled leaves Spraying of quinolphos @ 2 ml /L	Spraying of chloropyriphos / qinolphos @2 ml/L	-	-
Chickpea	Diseases: Wilt/ Root rot - Treat seed with carbendazim + mancozeb (2 g each/kg) or Phule Trichoderma 5 g/kg.	-	-	-
	Heliothis : Spray 5 % NSE	Heliothis : Installation of Pheromone traps Spray 5 % NSE followed by Endosulphan 2 ml/L		
Sorghum	Insect pests Shootfly: Installation of fishmeal traps Spraying of endosulphan 1.5 ml /L Stem Borer: Spraying of Endosulphan 1.5 ml /L Aphids/Jassids- Spraying of Dimethoate 1 ml/L	Stem Borer: Spraying of Chloropyriphos 2ml /L or Endosulfan 2ml/L	Grain Mold: Fungicide Bavistin 1g/litre against grain mold after cessation of rains	
Groundnut	Diseases	Diseases	--	Proper drying for

	Leaf spot & Rust – Spray Mancozeb 75 WP 0.25 % or Carbendazim 50WP 0.1 %	Leaf spot & Rust – Spray Mancozeb 75 WP 0.25 % or Carbendazim 50WP 0.1 %		control of Aflatoxin due to Aspergillus
	Insect pests Thrips & Jassids: Spraying of Dimethoate 1 ml/L or Methyl demeton 1 ml/L	Leaf Roller: Spraying of Quinolphos 25 EC 2 ml/L	--	--
Sugarcane	Stem Borer and white grub Soil application of 10 G Phorate 20 kg/ha or dust Endosulphan 4% 50 kg/ha or 20% Chloropyriphos 5 lit in 1000 lit of water.	Top shoot borer: Soil application of 10 G Phorate 20 kg/ha or dust Endosulphan 4% 50 kg/ha or 20% Chloropyriphos 5 lit in 1000 lit of water. White wooly aphid: Phorate 10G 15 kg/ha, or spray Methyl dematon 25 EC 1.5 ml/L or Dimethoate 30% 1.5ml/L	--	--

<b>Horticulture</b>	=		--	--
Grape	Downy mildew- Spray 0.4 to 1.0 % Bordo mixture or Metalaxyl-mancozeb 0.2 % or Cymoxanil Mancozeb 0.2 %. Anthracnose- Spray Mancozeb 75 WP 0.25 % or Carbendazim 50 WP 0.1 %	Downy mildew- Spray 0.4 to 1.0 % BM or Metalaxyl-mancozeb 0.2 % or Cymoxanil mancozeb 0.2 %. Powdery Mildew: Penconazole @ 0.05 to 0.1 % 4 times. First spray 15 day after October pruning & subsequent sprays at interval of 15 days	Botrytis rot- Spray Carbendazim 50 WP 0.1 %	
	Mealy bugs: Use of sticky traps on trunks and girdles and spraying of Dimethoate or Malathion @ 1.5 ml/L	Mealy bugs: Use of sticky traps on trunks and girdles and spraying of Dimethoate or Malathion @ 1.5 ml/L	Mealy bugs- use of sticky traps on either side of berry bunches	-

## 2.3 Floods

Condition	Suggested contingency measures			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Transient water logging/ partial inundation</b>				
Soybean	Resowing Sowing on ridges and furrows	Removal of excess water	Removal of excess water	Removal of excess water
Sugarcane	As above	As above	As above	As above
Ground nut	As above	As above	As above	As above
<b>Horticulture</b>				
Grapes	Removal of excess water	Removal of excess water	Removal of excess water	Removal of excess water
<b>Continuous submergence for more than 2 days</b>				
Soybean	Resowing	Prepare for next <i>rabi</i> season		
Ground nut	As above	As above	-	
Sugarcane	Removal of excess water Gap filling	Removal of excess water Spraying of 2 % urea	Removal of excess water Spraying of 2 % urea	-
<b>Horticulture</b>				
Grapes	Removal of excess water Provide need based plant protection measures	Removal of excess water Provide need based plant protection measures	Removal of excess water Provide need based plant protection measures	Removal of excess water Provide need based plant protection measures

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

Heat wave and cold wave are **rare** in appearance and do not warrant any contingency measures

## 2.5 Contingent strategies for Livestock and Poultry in Sangli District

### 2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Feed and fodder availability	<p>Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during North-East monsoon under dry land system for fodder production.</p> <p>Collection of soya meal waste and groundnut cake for use as feed supplement during drought</p> <p>Motivating the sugarcane farmers to convert green sugarcane tops in to silage by the end of February</p> <p>Preserving the green maize fodder as silage</p> <p>Establishment of fodder bank at village level with available dry fodder (paddy /wheat straw, Sorghum/Bajra stover, groundnut haulms, sugarcane tops)</p> <p>Development of silvopastoral models with Leucaena, Glyricidia, Prosopis as fodder trees and Marvel, Madras Anjan, Stylo, Desmanthus, etc., as under storey grass</p> <p>Encourage fodder production with Sorghum – stylo- Sorghum on rotation basis and also to cultivate short-term fodder crops like sunhemp</p> <p>Promote Azola cultivation at backyard</p> <p>Formation of village Disaster Management Committee</p> <p>Capacity building and preparedness of the stakeholders and official staff for the drought/floods</p>	<p>Harvest and use biomass of dried up crops (paddy/wheat/Sorghum/Bajra,/maize/hors egram/ groundnut/ soya) material as fodder</p> <p>Use of unconventional and locally available cheap feed ingredients especially soya meal waste and groundnut cake for feeding of livestock during drought</p> <p>Harvest all the top fodder available (Subabul, Glyricidia, Pipol, Prosopis etc) and feed the LS during drought</p> <p>Concentrate ingredients such as Grains, brans, chunnies &amp; oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding as supplement for high productive animals during drought</p> <p>Promotion of Horse gram as contingent crop and harvesting it at vegetative stage as fodder</p> <p>All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS.</p> <p>Continuous supplementation of minerals</p>	<p>Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 on their own lands with input subsidy</p> <p>Supply of quality seeds of COFS 29, Stylo and fodder slips of Marvel, Yaswant, Jaywant, Napier, guinea grass well before monsoon</p> <p>Flushing the stock to recoup</p> <p>Replenish the feed and fodder banks</p>

		<p>to prevent infertility.</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</p> <p>Arrangements should be made for mobilization of small ruminants across the districts where no drought exits</p> <p>Unproductive livestock should to be culled during severe drought</p> <p>Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals)</p> <p>Subsidized loans (5-10 crores) should be provided to the livestock keepers</p>	
Drinking water	<p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p> <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p> <p>Community drinking water trough can be arranged in shandies /community grazing areas</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water bodies/resources</p> <p>Add alum in stagnated water bodies daily basis.</p>	<p>Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>
Health and disease management	<p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p>	<p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary</p>	<p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p> <p>Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production</p>

	<p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health &amp; management measures</p> <p>Procure and stock multivitamins &amp; area specific mineral mixture</p>	<p>Force</p> <p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Tick control measures be undertaken to prevent tick borne diseases in animals</p> <p>Rescue of sick and injured animals and their treatment</p> <p>Organize with community, daily lifting of dung from relief camps</p>	<p>does not coincide with mid summer</p>
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<p><b>Floods</b></p>	<p>In case of early forewarning (EFW), harvest all the crops (paddy/wheat/Sorghum/Bajra,/maize/horsegram/ groundnut/ soya etc.) that can be useful as feed/fodder in future (store properly)</p> <p>Keeping sufficient of dry fodder to transport to the flood affected villages</p> <p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>Keep stock of bleaching powder and lime</p> <p>Carry out Butax spray for control of external parasites</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations</p>	<p>Transportation of animals to elevated areas</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe storms, un-tether or let loose the animals</p> <p>Use of unconventional and locally available cheap feed ingredients for feeding of livestock.</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Encouraging farmers to cultivate short-term fodder crops like sunhemp.</p> <p>Deworming with broad spectrum dewormers</p> <p>Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p> <p>Drying the harvested crop material and proper storage for use as fodder.</p>
<p><b>Cyclone</b></p>	<p>Harvest all the possible wetted grain (paddy/wheat/Sorghum/Bajra,/maize/horsegram/ groundnut/ soya etc) and use as animal feed.</p> <p>Stock of anti-diarrheal drugs and electrolytes should be made available for emergency transport</p> <p>Don't allow the animals for grazing in case of early forewarning (EFW) of cyclone</p> <p>Incase of EFW of severe cyclone, shift the animals to safer places.</p>	<p>Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers.</p> <p>Diarrhea out break may happen. Health camps should be organized</p> <p>In severe cases un-tether <b>or</b> let loose the animals</p> <p>Arrange transportation of highly productive animals to safer place</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Deworm the animals through mass camps</p> <p>Vaccinate against possible disease out breaks like HS, BQ, FMD and PPR</p> <p>Proper dispose of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p> <p>Bleach / chlorinate (0.1%) drinking water or water resources</p> <p>Collect drowned crop material, dry it and store for future use</p> <p>Sowing of short duration fodder crops in unsown and water logged areas when crops are damaged and no chance to replant</p>

			Application of urea (20-25kg/ha) in the inundated areas and CPR's to enhance the bio mass production.
<b>Heat &amp; Cold wave</b>	NA		

**Vaccination schedule in small ruminants (Sheep & Goat)**

<b>Disease</b>	<b>Season</b>
Foot and mouth disease (FMD)	Preferably in winter / autumn
PPR	All seasons, preferably in June-July
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May
Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	December / march

**Vaccination programme for cattle and buffalo:**

<b>Disease</b>	<b>Age and season at vaccination</b>
Anthrax	In endemic areas only, Feb to May
HS	May to June
BQ	May to June



FMD	November to December
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## 2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and IBD	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in one litre water)	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit
<b>Floods</b>			
Shortage of feed ingredients	In case of early forewarning of floods, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc,	Use stored feed as supplement Don't allow for scavenging Culling of weak birds	Routine practices are followed Deworming and vaccination against RD
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	In case of EFW, add antibiotic		

	powder (Terramycin/Ampicilline/ Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	Prevent water logging surrounding the sheds through proper drainage facility Assure supply of electricity by generator or solar energy or biogas Sprinkle lime powder to prevent ammonia accumulation due to dampness	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
<b>Cyclone</b>			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water		Use water sanitizers or offer cool drinking water	
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder (5-10g per square feet) to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / deep burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against Ranikhet Disease (0.5ml S/c)
<b>Floods</b>			
Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged	Routine practices are followed

		Don't allow for scavenging during mid day	
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	Routine practices are followed
Heat wave & Cold wave	NA		

### 2.5.3 Aquaculture and Fisheries

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>1) Drought</b>			
<b>A. Capture</b>			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ol style="list-style-type: none"> <li>1. Proper planning of water storage</li> <li>2. Conservation &amp; development of water resources by construction of reservoirs &amp; dams.</li> <li>3. Avoid seepage losses by lining the canals.</li> <li>4. Adopt rain water harvest techniques.</li> <li>5. Farmer's organizations, water users &amp; private sectors should be involved in</li> </ol>	<ol style="list-style-type: none"> <li>1. Maintenance of dams &amp; reservoirs to avoid leakage &amp; to control theft of water.</li> <li>2. Proper use of water resources on priority base.</li> <li>3. Add water in shallow water pond.</li> <li>4. Use stored water.</li> <li>5. Use surface water flow.</li> <li>6. Divert water from unutilized areas.</li> </ol>	<ol style="list-style-type: none"> <li>1. Regular desiltation of reservoirs &amp; dams.</li> <li>2. Govt. should make laws on water conservation.</li> <li>3. To develop demand oriented system.</li> <li>4. Govt. should make laws to stop deforestation.</li> <li>5. Need based monitoring through research plan.</li> <li>6. Intensive forestation program.</li> <li>7. Augmentation of surface water flow.</li> <li>8. Strengthening of water reservoirs.</li> <li>9. Rain water harvesting.</li> </ol>

	<p>construction, operation &amp; maintenance of irrigation system.</p> <ol style="list-style-type: none"> <li>6. To make people aware about conservation of water.</li> <li>7. Critical analysis of long range a Forecast data.</li> <li>8. Storage of water.</li> <li>9. A forestation program.</li> <li>10. Conservation of rivers/reservoir/ponds.</li> <li>11. Re-excavation of local canals and reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>7. Utilize canal water.</li> <li>8. Aeration of water in ponds/reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>10. Compensation claims.</li> <li>11. Prepare vulnerability map and place it to management committee</li> </ol>
(ii) Changes in water quality	<ol style="list-style-type: none"> <li>1. Storage of water disinfectant such as chlorine, alum etc. at district level.</li> <li>2. Prohibit dumping of solid, liquid and waste in water sources.</li> <li>3. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Provision of water filtration system for the ponds to overcome the water contamination-</li> <li>2. Use disinfectants and therapeutic drugs.</li> <li>3. Adoption of bio-remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Removal of runoff from land by proper means before decomposition.</li> <li>2. Supply of water filtration system even after the event &amp; creating awareness in farmers.</li> <li>3. Need based research data should be generated on water quality.</li> <li>4. Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.</li> </ol>
<b>B. Aquaculture</b>			
(i) Shallow water in ponds due to insufficient rains/inflow	<ol style="list-style-type: none"> <li>1. Available resources will be identified and need to be kept ready for each district on the basis of forecasting of insufficient rain.</li> <li>2. To avoid loss due to seepage, infiltration &amp; leakage by using bentonite, ash, polythene liners etc.</li> <li>3. Maintain the level of water by pumping water into pond.</li> <li>4. Critical analysis of long range Forecast data.</li> <li>5. Storage of water.</li> <li>6. A forestation program.</li> <li>7. Conservation of rivers/reservoir/ponds.</li> <li>8. Re-excavation of local canals and</li> </ol>	<ol style="list-style-type: none"> <li>1. Water resources of the areas will be exploited with planning of proper transport facilities in affected areas.</li> <li>2. Maintain the level of water to the required depth.</li> <li>3. Add stored water in shallow water depth.</li> <li>4. Harvesting of fishes as early as possible to avoid mortality.</li> <li>5. Use stored water.</li> <li>6. Use surface water flow.</li> <li>7. Divert water from unutilized areas.</li> <li>8. Utilize canal water.</li> <li>9. Aeration of ponds</li> </ol>	<ol style="list-style-type: none"> <li>1. Available resources need to be listed with adequate transport arrangement.</li> <li>2. Desiltation of pond bottom.</li> <li>3. Maintenance of tanks &amp; ponds</li> <li>4. Need based monitoring through research plan.</li> <li>5. Intensive a forestation program.</li> <li>6. Augmentation of surface water flow.</li> <li>7. Construction of water reservoirs.</li> <li>8. Adoption of rain harvesting methods.</li> <li>9. Compensation claims.</li> <li>10. Prepare vulnerability map and place it to management committee</li> </ol>

	reservoirs.		
(ii) Impact of salt load build up in ponds / change in water quality	<ol style="list-style-type: none"> <li>1. Minimize evaporation losses.</li> <li>2. Dilution of water if salt load is high.</li> <li>3. Available resources will be identified &amp; need to be kept ready for each district on the basis of forecasting of insufficient rain to reduce the salinity by trapping available water resources.</li> <li>4. On the basis of forecasting advising fish farmers for harvesting of marketable fish.</li> <li>5. Prohibit dumping of solid, liquid and waste in water sources.</li> </ol> <p>Preparedness with stocks of chemicals, disinfectants and therapeutic drugs</p>	<ol style="list-style-type: none"> <li>1. Dilution of water or exchange water to avoid salt builds up.</li> <li>2. Harvesting the marketable fish to reduce the density.</li> <li>3. Use disinfectants and therapeutic drugs.</li> </ol> <p>Adoption of bio-remedial measures</p>	<ol style="list-style-type: none"> <li>1. Trapping the water resources from other places for dilution to reduce salt load.</li> <li>2. Need based research data should be generated on water quality.</li> <li>3. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> </ol>
<b>2) Floods</b>			
<b>A. Capture</b>			
Marine			
Inland			
(i) Average compensation paid due to loss of human life	<ol style="list-style-type: none"> <li>1. Fishermen will be given forewarning regarding heavy rains and advised not to go for fishing in rivers/reservoirs.</li> <li>2. Areas need to be identified in each district prone for flood.</li> <li>3. Maintenance of water drainages in proper way to avoid blockage.</li> <li>4. Proper forecasting information should be available.</li> <li>5. Be prepared to evacuate at a short notice.</li> <li>6. Preparation of flood control action plan.</li> <li>7. Warning dissemination and precautionary response.</li> <li>8. Formation of flood management committee.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fishermen will be advised on use of Life saving jackets and life boats. The life saving appliances/machinery shall be kept ready for rescue operation.</li> <li>2. Sufficient stock of food, medicine etc. should be available.</li> <li>3. Govt. should take necessary action &amp; provide trained people for rescue operation during flood.</li> <li>4. Human evacuation from the area.</li> <li>5. Coordination of assistance.</li> <li>6. Damage and need assessment.</li> <li>7. Immediate management of relief supplies.</li> <li>8. Immediate help delivery.</li> </ol>	<ol style="list-style-type: none"> <li>1. The victim's family shall be provided with compensation up to Rs. 1, 00,000/- for the deaths occurring during the fishing.</li> <li>2. Rehabilitation of people.</li> <li>3. Identify the causes of flood affected area &amp; take necessary preventive measures.</li> <li>4. Arrangement for rescue and casualty care.</li> <li>5. Arrangement for burial control room.</li> <li>6. Restoration of essential services, security and protection of property.</li> <li>7. Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan.</li> <li>8. Insurance and compensation claim.</li> </ol>

	<p>9. Enhancement in coping capabilities of common people.</p> <p>10. Insurance for the life of people/fishermen.</p>		
(ii) No. of boats / nets/damaged	<p>1. The prior information on safe keeping of boats and nets will be provided to the fishermen.</p> <p>2. If prior information is given bring boats &amp; nets towards the safer side.</p> <p>3. Annual repair of boats/nets and gears.</p> <p>4. Insurance of boats/nets/gears.</p>	<p>1. Fishermen will be advised to stop fishing during the floods and heavy rainfall.</p> <p>2. Continuous monitoring on water level is required.</p> <p>3. Coordination of assistance</p> <p>4. Immediate management of relief supplies.</p> <p>5. Govt. support and compensation.</p>	<p>1. The affected fishermen will provided with compensation up to Rs. 50,000/- for damaged boats or nets.</p> <p>2. Education and training for the repair of boats/nets and gears.</p> <p>3. Loss assessment &amp; insurance claim.</p>
(iii) No.of houses damaged	<p>1. Forewarning regarding heavy rainfall, sudden downpour and floods will be spread in the fishermen villages on the banks of rivers.</p> <p>2. Shift the people to safer places.</p> <p>3. Proper maintenance of <i>Kaccha</i> houses.</p> <p>4. Education and training for the repair of houses</p> <p>5. Store raw material for emergency repair of houses.</p> <p>House insurance</p>	<p>1. Temporary shelter to the affected families will be provided.</p> <p>2. Arrangement of temporary shelters for homeless people.</p> <p>3. Damaged house enumeration and need assessment.</p> <p>4. Coordination of assistance.</p> <p>5. Immediate management of relief supplies.</p>	<p>1. The housing facilities on higher elevation shall be provided to affected families by the Government agencies.</p> <p>2. Provide compensation from Govt. to build/repair houses.</p> <p>3. Loss assessment &amp; insurance claim.</p> <p>4. Govt. assistance claim.</p>
(iv) Loss of stock	<p>1. Harvesting the existing fish stock</p> <p>2. Keep boats, nets/gears ready for emergency use.</p> <p>3. Store fuels, food/other item</p> <p>4. Develop flood control management plans.</p> <p>5. .Stock material insurance.</p>	<p>1. Search/locate the tock/input.</p> <p>2. Mobilize local people for protection.</p> <p>3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood</p>	<p>1. Provided subsidy on seeds by Govt.</p> <p>2. Implementation of Insurance policy.</p> <p>3. Locate backup stocks and verify its usability time.</p> <p>4. Follow flood control management plan.</p> <p>5. Notify utilities of the critical demand about loss of stock and inputs.</p> <p>6. Loss assessment &amp; insurance claim.</p>
(v) Changes in	1.Storage of water disinfectant such as	1.Provision of water filtration system for	1.Removal of runoff from land by proper means

water quality	<p>chlorine, alum etc. at district level.</p> <ol style="list-style-type: none"> <li>2. Provision to stop/close the effluent/sewerage discharge point in water bodies</li> <li>3. Store chemicals, disinfectants and therapeutic drugs.</li> <li>4. Develop flood control management plan.</li> </ol>	<p>the ponds to overcome the water contamination-</p> <ol style="list-style-type: none"> <li>2. Do not use contaminated water</li> <li>3. Proper preparation and management through emergency aeration.</li> <li>4. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>5. Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies.</li> <li>6. Need based bioremediation</li> </ol>	<p>before decomposition.</p> <ol style="list-style-type: none"> <li>2. Supply of water filtration system even after the event &amp; creating awareness in farmers.</li> <li>3. Need based research data should be generated to maintain water quality,</li> <li>4. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> <li>5. Contact Govt. and industrial organization for immediate remedy and cleaning of the water bodies.</li> <li>6. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan</li> </ol>
(vi) Health and diseases	<ol style="list-style-type: none"> <li>1. Water filtration system &amp; control measures for diseases should be available.</li> <li>2. Advance planning and preparedness.</li> <li>3. Store chemicals, disinfectants and therapeutic drugs.</li> <li>4. Stock sufficient stores of medicines</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodical checking particularly with respect to fish mortality should be done during flood &amp; dead fishes disposed properly.</li> <li>2. Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal.</li> <li>3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>4. Emergency aeration or splashing in water bodies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Setting health &amp; disease management training centre at district level for fisherman community by Govt. or with the help of NGO.</li> <li>2. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</li> <li>3. Eradicating the disease where possible.</li> <li>4. Follow up surveillance and monitoring after disease outbreak.</li> <li>5. Need based research data should be generated.</li> <li>6. Loss assessment &amp; insurance claim.</li> </ol>
<b>B. Aquaculture</b>			
(i) Inundation with flood water	<ol style="list-style-type: none"> <li>1. In the flood prone areas proper draining system from ponds need to be developed and planned in flood situation before forecasting of flood.</li> <li>2. Site should be away from flood prone area.</li> <li>3. Dyke should be stable in all weather condition &amp; not liable to collapse during heavy rains.</li> <li>4. Proper channels to be provided to pass surplus water &amp; to avoid breakage to the bundh.</li> </ol>	<ol style="list-style-type: none"> <li>1. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various media. Proper drainage should be adopted so that inundation with flood water should be minimized.</li> <li>2. On the basis of forecasting, information to farmers for sale of marketable fish with sufficient transport facility through various media.</li> <li>3. Proper drainage should be adopted so</li> </ol>	<ol style="list-style-type: none"> <li>1). Planning even after the event should be made for proper drainage and creating awareness and trainings in flood situations.</li> <li>2). Pinning even after the event should be made for proper drainage &amp; creating awareness &amp; training in flood situation.</li> <li>3) Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan</li> <li>4) Reallocate fish to maintain appropriate biomass so that waste assimilation capacity of pond is not exceeded.</li> </ol>

	<ol style="list-style-type: none"> <li>5. Proper facility construction for ponds and its stock safety.</li> <li>6. Development of flood control management plan.</li> <li>7. Preparedness with emergency backup equipment on site.</li> <li>8. Stock insurance.</li> <li>9. Preventive measures against entry of alien/wild organisms through flood water.</li> </ol>	<p>that inundation with flood water should be minimized. Excess water should be drained from pond by providing screen outlets or using pumps.</p> <ol style="list-style-type: none"> <li>4. Arrangement for evacuation.</li> <li>5. Arrangement for rescue and casualty care.</li> <li>6. Arrangement for burial control room.</li> <li>7. Restoration of essential services, security and protection of property.</li> <li>8. Coordination of assistance.</li> <li>9. Damage and need assessment.</li> <li>10. Immediate management of relief supplies.</li> <li>11. Release excess water from height of T.</li> <li>12. Lower the water level in culture facilities.</li> </ol>	<ol style="list-style-type: none"> <li>5) Reduce or cease feeding because uneaten food and fish waste decreases the dissolved oxygen level.</li> <li>6) Strengthening of water bodies/ponds.</li> <li>7) Loss assessment &amp; insurance claim.</li> </ol>
(ii) Water contamination and changes in water quality	<ol style="list-style-type: none"> <li>1. Availability of water purifier i.e., chlorine, alum etc at district level.</li> <li>2. Availability of water disinfectant such as chlorine, alum etc at district level.</li> <li>3. Use of calcium hydroxide @ 150 kg/ha</li> <li>4. Store chemicals, disinfectants and therapeutic drugs</li> <li>5. Develop flood control management plan</li> </ol>	<ol style="list-style-type: none"> <li>1. Supply of water purifier for the ponds to overcome the contamination and changes in BOD.</li> <li>2. Supply of water filtration system for ponds to overcome the contamination. Use of <math>KMnO_4</math> for bath of fish as prophylactics</li> <li>3. Do not use contaminated water.</li> <li>4. Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas.</li> <li>5. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>6. Maintaining the purity and quality of water bodies.</li> <li>7. Need based bioremediation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Supply of water purifier even after the event and creating awareness in farmers.</li> <li>2. Supply of water filtration system even after the event &amp; crating awareness in farmers.</li> <li>3. Lime treatment for oxidation</li> <li>4. To maintain water quality, need based research data should be generated</li> <li>5. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> <li>6. Immediate remedy and cleaning of water bodies.</li> <li>7. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.</li> </ol>
(iii) Health and diseases	<ol style="list-style-type: none"> <li>1. Storage of water purifiers and control measures for diseases should be available.</li> <li>2. Personnel should be trained for health &amp;</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodical checking particularly with respective fish mortality should be done during flood.</li> </ol>	<ol style="list-style-type: none"> <li>1. Setting health and disease management training centre at district level for fishermen and government officials.</li> </ol>



	<ol style="list-style-type: none"> <li>3. disease management through training &amp; list of trained personnel should be available at each district level.</li> <li>4. Adequate stock of medicine should be available at each district level.</li> <li>5. Antibiotics fortified feeding as prophylactics</li> <li>6. Advance planning and preparedness.</li> <li>7. Store chemicals, disinfectants and therapeutic drugs.</li> <li>8. Stock sufficient emergency medicines.</li> </ol>	<ol style="list-style-type: none"> <li>2. Services of trained personnel need to be made available in affected areas with sufficient supply of life saving medicines.</li> <li>3. Disinfectants formalin treatments as prophylactics</li> <li>4. Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish.</li> <li>5. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>6. Determination of nature and speed of transmission of diseases.</li> <li>7. Emergency aeration or splashing in water bodies</li> </ol>	<ol style="list-style-type: none"> <li>2. Routine training programmed as a refresher course need to be implemented in relation to health &amp; disease management during flood.</li> <li>3. Lime treatment for oxidation</li> <li>4. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</li> <li>5. Eradicating the disease.</li> <li>6. Follow up surveillance and monitoring.</li> <li>7. Proper disposal of dead fish.</li> <li>8. Loss assessment &amp; insurance claim</li> </ol>
(iv) Loss of stock and inputs (feed, chemicals etc)	<ol style="list-style-type: none"> <li>1. Harvestable sized fishes shall be marketed before the event to avoid losses. The inputs like feed and chemical etc. shall be stored at safe places.</li> <li>2. Flood situation going to exist then move the feed, chemicals &amp; other accessories to safer places.</li> <li>3. Keep the stock/input at safe place for emergency purpose.</li> <li>4. Store fuels, food/other item.</li> <li>5. Develop flood control management plan.</li> <li>6. Stock material insurance.</li> </ol>	<ol style="list-style-type: none"> <li>1. The pond embankments will be fenced with netting to avoid fish losses. The store rooms for inputs like feed, chemicals etc. shall be created.</li> <li>2. Available fish stock should be recovered. Stock of inputs must be stored in well protected area.</li> <li>3. Search/locate the stock/input.</li> <li>4. Purchase/hire valuable stock/inputs from distant areas not affected by flood.</li> </ol>	<ol style="list-style-type: none"> <li>1. The fish farmers shall be provided with fish seed and feed at concessional rates.</li> <li>2. Feeds, chemicals etc required for the culture operation should be purchased.</li> <li>3. Strengthening of stocks.</li> <li>4. Assessment of total loss.</li> <li>5. Insurance claims</li> </ol>
(v) Infrastructure damage (pumps, aerators, huts etc)	<ol style="list-style-type: none"> <li>1. Prior information regarding removal of Pumps and aerators shall be given to the fish farmers.</li> <li>2. Flood situation going to exist then move the pumps, aerators &amp; other accessories to safer places.</li> <li>3. Educate and provide training for the repair of infrastructure.</li> <li>4. Follow flood control management plan.</li> <li>5. Store raw materials for repairing of pumps aerators, huts etc.</li> </ol>	<ol style="list-style-type: none"> <li>1. Pumps, aerator and generators shall be removed from the pond before the event.</li> <li>2. Use manual techniques for aeration or make substitute arrangement for the same.</li> <li>3. Notify utilities of the critical demand.</li> <li>4. Coordination of assistance.</li> <li>5. Immediate management of relief supplies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Suitable Compensation for the damaged machinery shall be given to the fish farmers.</li> <li>2. Install the equipments during flood.</li> <li>3. Damaged infrastructure enumeration and need assessment.</li> <li>4. Locate backup equipment and verify its operation.</li> <li>5. Repair of damaged infrastructure.</li> <li>6. Loss assessment &amp; insurance claim.</li> </ol>

	6. Infrastructure insurance.		
<b>3. Cyclone / Tsunami</b>			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds	<ol style="list-style-type: none"> <li>1. If intensity of cyclone with heavy rain fall exists then harvest existing fish stock.</li> <li>2. Dike should be stable in all weather condition &amp; not liable to collapse during flood.</li> </ol>	<ol style="list-style-type: none"> <li>1. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various media. Proper drainage should be adopted so that inundation with storm water should be managed</li> <li>2. Enhancement of dykes height by sand bags</li> </ol>	<ol style="list-style-type: none"> <li>1. Planning even after the event should be made for proper drainage &amp; creating awareness &amp; training in storm situation.</li> </ol>
(ii) Changes in water quality (fresh water / brackish water ratio)	<ol style="list-style-type: none"> <li>1. Supply of water for correcting the changes in fresh water &amp; brackish water.</li> <li>2. Maintain salinity by addition of fresh water up to 20-25 ppt.</li> </ol>	<ol style="list-style-type: none"> <li>1. Supply of water for correcting the changes in fresh water &amp; brackish water.</li> <li>2. Use euryhaline species</li> </ol>	<ol style="list-style-type: none"> <li>1. Water storage facility needs to be developed to overcome the problem of changes in fresh &amp; brackish water ratio.</li> <li>2. use Euryhaline species for culture</li> </ol>
(iii) Health and diseases	<ol style="list-style-type: none"> <li>1. Water filtration system &amp; control measures for disease should be available.</li> <li>2. Adequate stock of medicine should be available at each district level.</li> <li>3. Liming and formalin treatment</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodically checking particularly in respective of fish mortality &amp; water parameter during flood.</li> <li>2. Disinfectants treatments</li> </ol>	<ol style="list-style-type: none"> <li>1. Settling health &amp; disease management training centre at district level for fishermen &amp; Govt. official.</li> </ol>

(iv) Loss of stock and inputs (feed, chemicals etc)	<ol style="list-style-type: none"> <li>1. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals &amp; other accessories to safer places.</li> <li>2. Stock cover under insurance</li> </ol>	<ol style="list-style-type: none"> <li>1. Available fish stock should be recovered.</li> </ol>	<ol style="list-style-type: none"> <li>1. Feeds, chemicals etc required for the culture operation should be purchased.</li> <li>2. Seed and feed to be supplied through Deptt of fisheries,</li> </ol>
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	<ol style="list-style-type: none"> <li>1) Cyclone with heavy rain fall situation going to exist then shifted the pumps, aerators &amp; other accessories to safer places.</li> </ol>	<ol style="list-style-type: none"> <li>1) Use manual techniques for aeration or make substitute arrangement for the same.</li> </ol>	<p>Compensation on assessment of actual losses &amp; damage of pumps, aerators, shelters/huts given through RKVY, NCDC, NREGS</p>
<b>4. Heat wave and cold wave</b>			
<b>A. Capture</b>			
Marine			
Inland			
<b>B. Aquaculture</b>			
(i) Changes in pond environment (water quality)	<ol style="list-style-type: none"> <li>1)If intensity of heat wave high, add water from other source.</li> <li>2)Harvest existing fish stock.</li> <li>3)Adequate facility should be ready for heat wave &amp; system for changing water temperature during cold wave.</li> <li>4)Listen to local weather forecasts and stay aware of upcoming temperature changes.</li> <li>5) Arrange the aerators.</li> <li>6) Ensure sufficient water quantity in water bodies.</li> <li>7)Formulate strategic fishing management for the heat /cold waves.</li> <li>8) Tree plantation around fish ponds</li> </ol>	<ol style="list-style-type: none"> <li>1) Adequate facility should be ready for heat wave &amp; system for changing water temperature during cold wave.</li> <li>2) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves.</li> <li>3) Use dark materials to cover the water bodies during excessive heat waves.</li> <li>4) Stay hydrated by drinking plenty of fluids during fishing/field work.</li> <li>5) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths.</li> <li>6) Educating the farmers through electronic or print media</li> <li>7) Maintain Water level in pond</li> </ol>	<ol style="list-style-type: none"> <li>1)Adequate facility should be ready for heat wave &amp; system for changing water temperature during cold wave.</li> <li>2) Intensive afforestation program for reducing heat waves.</li> <li>3) Collect basic weather data and incidence of extreme and physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition.</li> <li>4) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing.</li> <li>5) Loss assessment &amp; insurance claim.</li> </ol>

<p>(ii) Health and Disease management</p>	<ol style="list-style-type: none"> <li>1) Adequate stock of medicine should be available at each district level.</li> <li>2) Advance planning and preparedness.</li> <li>3) Store chemicals, disinfectants and therapeutic drugs.</li> <li>4) Develop heat/ cold wave control management plan.</li> <li>5) Stock sufficient emergency medicines.</li> </ol>	<ol style="list-style-type: none"> <li>1) Periodical checking particularly with respective fish mortality should be done.</li> <li>2) Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish.</li> <li>3) Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>4) Determination of nature and speed of transmission of diseases.</li> <li>5) Emergency aeration or splashing in water bodies</li> <li>6) Bleaching powder 1 to 2 % , formalin treatment to prevent disease</li> </ol>	<ol style="list-style-type: none"> <li>1) Setting health &amp; disease management training centre at district level for fishermen &amp; Govt. official.</li> <li>2) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</li> <li>3) Eradicating the disease.</li> <li>4) Follow up surveillance and monitoring.</li> <li>5) Proper disposal of dead fish.</li> <li>6) Loss assessment &amp; insurance claim.</li> <li>7) KMNO<sub>4</sub> 2 % to maintain oxygen level</li> </ol>
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Annexure-I



