

**State: MAHARASHTRA**

**Agriculture Contingency Plan for District: AKOLA**

<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 moist semi-arid ESR with medium land deep clayey Black soils (shallow loamy to clayey Black soils as inclusion), medium to high AWC and LGP 120-150 days. <b>(K5Dm4) (6.3)</b>	
	Agro-Climatic Zone (Planning Commission)	Western plateau and hills region, Maharashtra <b>(IX)</b>	
	Agro Climatic Zone (NARP)	Central Maharashtra Plateau Zone (MH-7)	
	List all the districts or part thereof falling under the NARP Zone	Akola, Buldhana, Washim, Amravati & Yavatmal	
	Geographic coordinates of district headquarter : Akola	Latitude	Longitude
		20° 42' 10.59"N	76°59'57.97" E
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Director(Central Research Station), (CRS), Dr. P.D.K.V., Phone & Fax No.0724-2258219 Akola, Maharashtra- 444 104	
	Mention the KVK located in the district	Rural Development and Research Foundation, KVK,( Sisa), Vidya Nagar, P.O. Krishi Nagar, Akola, 444 104(MS) Phone 0724- 2456600 & Fax No.0724-2452700	

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	711.6	37	24 <sup>th</sup> MW (June 11-17)	40 <sup>th</sup> MW (01-07 Oct)
	NE Monsoon(Oct-Dec):	72.6	4	-	-
	Winter (Jan- Feb)	26.1	2	-	-
	Summer (Mar.-May)	15.0	1	-	-
	Annual	825.3	45	-	-

1.3	Land use pattern of the district (latest statistics)	Geographical Area	Cultivable area	Forest area	Land under non agricultural use	Permanent pastures	Cultivable waste land	Land under miscellaneous tree crops & groves	Barren & uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	540	455	35	5	12	6	6	18	7	5

Source: \*District Soci economic Review 2009 of respective district pub by Govt. of M.S., Mumbai

\*\* Hand Book of Basic Statistics of Maharashtra State.2006

1.4	Major Soils (common names like red sandy loam deep soils (etc.))*	Area ('000 ha)	Percent (%) of total (Akola includes Washim District.)
	Deep black soil	251.34	46.5*
	Medium deep black soils	53.50	9.9*
	Shallow black soils)	235.15	43.5*
	Others (specify):		*Saline tract of Purna river valley spread on 1939 km <sup>2</sup> area. Dist of Tahasils 6 (Akola, Akot, Telhara, Balapur, & Murtizapur) Area

Source: Supplied by NBSS & LUP, Nagpur

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	434.9	120.9
	Area sown more than once	91.1	
	Gross cropped area	526	

Source: \*District Socio economic Review 2009 of respective district pub by Govt. of M.S., Mumbai

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	24.51		
	Gross irrigated area	42.82		
	Rainfed area	441.60		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		7.50	30.62
	Tanks			
	Open wells	13106	17.00	69.38
	Bore wells	32		
	Lift irrigation schemes	-	-	
	Micro-irrigation	-	-	
	Other sources (please specify)	-	-	
	Total Irrigated Area	-	24.51	
	Pump sets	36476		
	No. of Tractors	5224		
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils 7	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe	7		
	Wastewater availability and use			
	Ground water quality			

Source : i) District social and economic abstract – 2010 Directorate of finance and statistics Govt. of Maharashtra

ii) Dynamic groundwater resources of Maharashtra 2007-08 GSDA Maharashtra state and CGWB Central region Nagpur

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

1.7	Major Field Crops cultivated	Area(000ha)						
		<i>Irrigated</i>	<i>Rainfed</i>	<b>Total</b>	<i>Irrigated</i>	<i>Rainfed</i>	<b>Summer</b>	<b>Total</b>
	Cotton	-	168.3	168.3				168.3
	Soybean	-	137.5	137.5				137.5
	<i>Kharif</i> Jowar		46.5	46.5				46.5
	Green gram		44.40	44.40				44.40
	Black gram	-	10.0	10.0				10.0
	Pigeon pea	-	49.7	49.7				49.7
	Gram					59.0		59.0
	Wheat				34.4			34.4
	Safflower					2.5		2.5

	Horticulture crops - Fruits	Total area (ha)	Irrigated (ha)	Rainfed (ha)
	Mango	184		184
	Sapota	60	60	
	Orange (Santra) Mandarin	4374	4374	
	Sweet Orange	600	600	

S. No	Horticulture crops - Vegetable	Total area (ha)	Irrigated (ha)
	Tomato	348	348
	Brinjal	697	697
	Cabbage	171	171
	Cauliflower	237	237
	Cluster bean	225	225
	Lady's finger	392	392
	Spinach	61	61
	Fenugreek	283	283
	Ridge gourd	5	5
	Cucumber	21	21
	Bitter gourd	14	14

	Onion	1031	1031
	Other specify	107	107
	Total	3592	3592

Medicinal and Aromatic crops		Total area (ha)	Irrigated (ha)	Rainfed
1	Safed Musli	10000	10000	

Source : Maharashtra state Horticulture , Medicinal plants Board,Pune ,& State Deptt. of Agriculture.

Plantation crops		Total area	Irrigated	Rainfed
	Others such as industrial pulpwood crops etc (specify)	--	--	--
	<b>Fodder crops</b>	<b>Total area (ha)</b>	<b>Irrigated (ha)</b>	<b>Rainfed (ha)</b>
	<b>Total fodder crop area</b>			
	<b>Grazing land</b>			
	<b>Sericulture etc (Mulberry)</b>	44.12	44.12	

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	157.5	125.0	282.5
	Crossbred cattle	7.3	11.2	18.5
	Non descriptive Buffaloes (local low yielding)	4.9	50.5	55.4
	Graded Buffaloes	0.9	4.5	5.4
	Goat	41.5	140.6	182.1
	Sheep	1.0	2.9	3.9
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			

<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>
	Commercial	-	19.4
	Backyard	-	265.8

<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>	
		7		30		189	
	<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)	-		-		-	
	<b>ii) Fresh water</b> (Data Source: Fisheries Department)	4228		0.35		1492	
	<b>Others</b>						

**1.11 Production and Productivity of major crops** (Average of last 5 years: 2004, 05, 06, 07, 08; specify)

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)							
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Cotton	275.8	244					275.8	244	
	Soybean	71.9	1034					71.9	1034	
	Green gram	18.3	310					18.3	310	
	Black gram	5.0	317					5.0	317	
	Pigeon pea	38.7	626					37.7	626	
	Others (specify) Kh Jowar	163.1	2222					163.1	2222	
	Gram	40.7	652					40.7	652	
	Wheat	54.5	1758					54.5	1758	
	Safflower	2.7	657					2.7	657	

<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
	Crop							Production(t)	Productivity (t/ha)	
	Orange							37080	37.00	
	Banana							30000	30.00	
	Papaya							672	0.67	
	Fenugreek							1415	1.42	
	Brinjal							13940	13.94	

<b>1.12</b>	<b>Sowing window for 5 major field crops</b> (start and end of normal sowing period)	Cotton	Soybean	Green gram/ Black gram	Pigeonpea	Kharif sorghum
	Kharif- Rainfed	15 <sup>th</sup> June – 30 <sup>th</sup> June	15 <sup>th</sup> June – 15 <sup>th</sup> July	15 <sup>th</sup> June – 30 <sup>th</sup> June	15 <sup>th</sup> June – 10 <sup>th</sup> July	15 <sup>th</sup> June – 10 <sup>th</sup> July
	Kharif-Irrigated	20 <sup>th</sup> May -30 <sup>th</sup> May (Premonsoon) 1-30June	--	--	--	--
	Rabi- Rainfed	Wheat	Chickpea	Safflower		
	Rabi-Irrigated	1-15 Oct	1-15 Oct	25 Sept-7Oct		
		1-15 Nov	15 Oct- 15 Nov	1-30 Oct		

<b>1.13</b>	<b>What is the major contingency the district is prone to</b> (Tick mark)	Regular	Occasional	None
	Drought	--	✓	--
	Flood	--	✓	--
	Cyclone	--	--	✓
	Hail storm	--	✓	--
	Heat wave	--	✓	--
	Cold wave	--	✓	--
	Frost	--	--	✓
	Sea water intrusion	--	--	✓
Pests and disease outbreak* (specify)	✓	-	--	

1) Soybean:-Spodoptera litura/Semilooper/Soybean Mosaic Virus (2) Cotton:- Mealy bug/ Sucking Pest/ (3) Pigeonpea:- Pod borer complex, SMD (4)Citrus:- Phytophthora (gummosis)/CTV/FSM

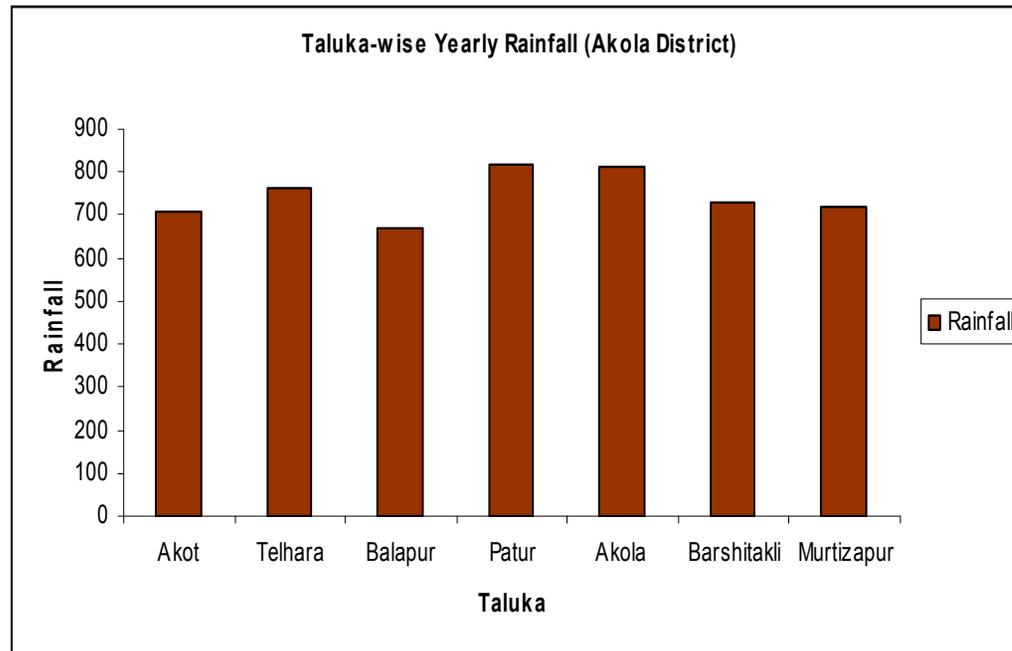
<b>1.14</b>	<b>Include Digital maps of the district for</b>	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

Annexure-I: Akola District at a Glance

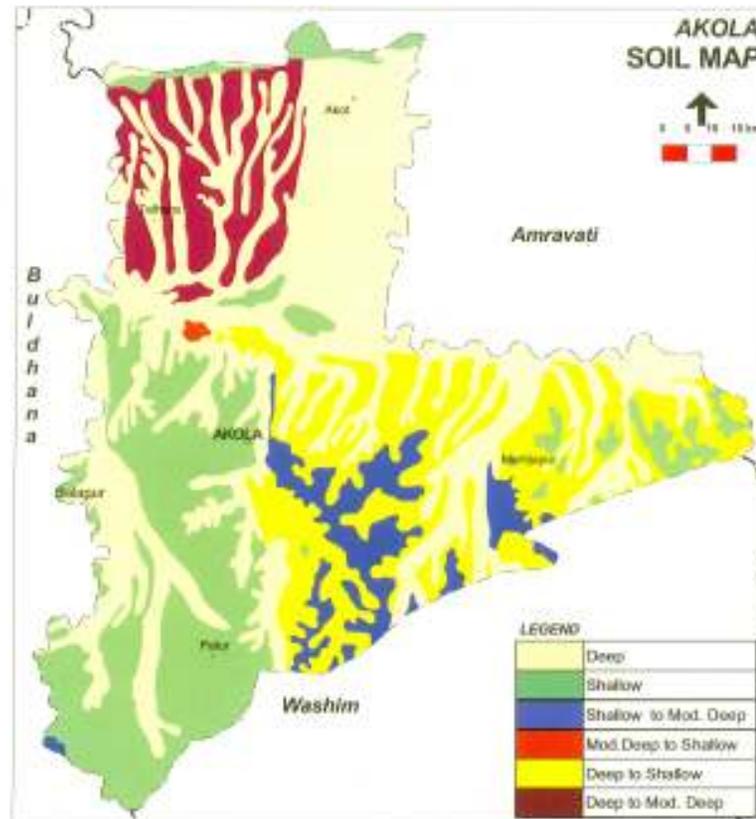


District Akola		
Taluka	Rainfall	Rainy Day
Akola	708.8	44.9
Telhara	760.7	43.8
Balapur	667.1	42.4
Patur	819.0	42.0
Akola	810.4	45.6
Barshitakli	729.0	42.1
Murtizapur	720.0	44.8
Overall	745.0	43.7

Annexure II: Mean Annual Rainfall (mm)



Annexure III- Soil map



## 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 25 <sup>th</sup> June- 1 <sup>st</sup> July 26 <sup>th</sup> MW		BtCotton	No change	Normal recommended Package of Practices by Dr. PDKV, Akola	
	Deep & Medium deep black soils	Cotton +Pigeonpea	No change in crop or variety	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> (Cotton + Pigeonpea 6:2 & Cotton+Greengram/ Blackgram 1:1 intercropping system.)	Linkage with Dr.PDKV / MSSC NSC
		Soybean	No change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> (Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+Carbendazim 1gm+ <i>Trichoderma</i> 4 gm/Kg of seed Intercrop one row of pigeon pea after every 4 or 6 rows of soybean as per convenience Open furrow after six /Three rows of soybean)	
		Pigeonpea	No change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> Intercrop Soybean+ Pigeonpea(4:2 / 6:2) Cotton + Pigeonpea(8:1 / 6:2)	
		Sorghum (Kh. Jowar)	No Change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> Seed Treatment of Imidachloprid 70 WS 7g/Kg Seed Sulphur 4g/Kg Seed	
	Shallow black soils	Soybean	No change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> (Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+Carbendazim 1gm+ <i>Trichoderma</i> 4 gm/Kg of seed	

		Green gram	No Change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + <i>Trichoderma</i> 4 gm/Kg of seed	
		Black gram	No Change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + <i>Trichoderma</i> 4 gm/Kg of seed	

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
<b>Delay by 4 weeks</b> <b>28<sup>th</sup> wk</b> <b>9-15<sup>th</sup> July</b>	Deep to medium deep black soils	Bt Cotton	<b>Soybean,</b> JS-335, JS-93 -05 <b>Pigeonpea</b> Varieties AKT- 8811, Vipula , PKV- Tara, BSMR-736	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> (Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+Carbendazim 1gm+ <i>Trichoderma</i> 4 gm/Kg of seed Intercrop one row of pigeon pea after every 4 or 6 rows of soybean as per convenience Open furrow after six /Three rows of soybean)	Linkage with Dr.PDKV / MSSC NSC
		Cotton +Pigeonpea	Use early varieties of American /Deshi cotton varieties No change in varieties for Pigeonpea	Use 20-25% more than recommended seed rate and reduce fertilizer dose by 25% for Cotton.  Replace the hybrids with improved varieties in cotton.(American Cotton:- AKH-8828,PKV Rajat,AKH-081, Desi Cotton:- AKA-5, AKA-7, AKA-8 Avoid sowing of Greengram and Blackgram. To reduce the risk of late sowing follow Cotton: Sorghum: Pigeon pea: Sorghum (6:1:2:1) intercropping system.	Linkage with PDKV / MSSC NSC
		Soybean	No Change	Follow Normal Recommended Package of Practices	
		Pigeonpea	Change in variety AKT 8811,Vipula,	Use spacing 90 x 20 cm instead of 90 X 30 cm.	

			PKV- Tara, BSMR-736		
		Sorghum (Kh. Jowar)	Replace sorghum by soybean Varieties JS-335, JS-93 -05 or Pigeonpea variety AKT 8811, Vipula, PKV- Tara, BSMR-736	Follow Normal Recommended Package of Practices	
	Shallow black soils	Soybean	No change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> (Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+Carbendazim 1gm+ <i>Trichoderma</i> 4 gm/Kg of seed	
		Green gram	Replace Greengram & Blackgram by Soybean Varieties JS-335, JS-93 -05	Follow Normal Recommended Package of Practices Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + <i>Trichoderma</i> 4 gm/Kg of seed	
		Black gram	No Change	<b>Normal recommended Package of Practices by Dr. PDKV, Akola</b> Seed Treatment with <i>Rhizobium</i> + PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + <i>Trichoderma</i> 4 gm/Kg of seed	

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks 23-29 July 30 <sup>th</sup> MW	Deep to Medium deep black soils	Bt Cotton	Sole Pigeonpea AKT-8811, Vipula, PKV Tara, BSMR-736. Sunflower (hybrids) / Sesame AKT64/ Castor AKC-1, GCH-4, 5, 6& DCH-117, 32/Pearlmillet. PKV Raj Shradha, Saburi Pearlmillet + Pigeonpea inter-cropping(2:1, 4:2)	Adopt closer spacing(60x30 cm)for pigeonpea Follow <i>insitu</i> moisture conservation measures	

		Cotton +Pigeonpea	Sole Pigeonpea AKT-8811, Vipula, PKV Tara, BSMR-736. Sunflower (hybrids) /Pearlmillet. PKV Raj Shradha, Saburi / Sesame AKT64/ Castor GCH-4,5,6& DCH-117, Pearlmillet + Pigeon pea inter-cropping(2:1,.4:2).		For Seed Source and Technology contact Dr.PDKV / KVK/MSSC/ NSC.
		Soybean	-do-		
		Pigeon pea	Pigeonpea AKT-8811, Vipula, PKV Tara, BSMR-736.		
		Sorghum	Sole Pigeonpea AKT-8811, Vipula, PKV Tara, BSMR-736. Sunflower (hybrids)/ Sesame AKT64/ CastorAKC-1, GCH-4, 5, 6& DCH-117, 32/pearlmillet. PKV Raj Shradha, Saburi Pearlmillet +Pigeon pea inter-cropping (2:1,.4:2).	Adopt closer spacing(60x30 cm)for pigeonpea Follow <i>insitu</i> moisture conservation measures	For Seed Source and Technology contact Dr.PDKV / KVK/MSSC/ NSC.
	Shallow black soils	Soybean	Sole Pigeonpea AKT-8811,Vipula Sunflower (hybrids) / Sesame AKT64/ Pearlmillet. PKV Raj Shradha, Saburi Pearlmillet + Pigeon pea inter-cropping (2:1, 4:2).	Adopt closer spacing(45x20cm)for pigeonpea Follow <i>insitu</i> moisture conservation measures	
		Greengra	Sole Pigeonpea AKT-8811,Vipula Sunflower (hybrids) / Sesame AKT64/ Pearlmillet. PKV Raj Shradha, Saburi Pearlmillet + Pigeon pea inter-cropping (2:1,.4:2)	Adopt closer spacing(45x20 cm)for pigeonpea Follow <i>insitu</i> moisture conservation measures	For Seed Source and Technology contact Dr.PDKV / KVK/MSSC/ NSC.
		Black gram	-do-	-do-	-do-

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					

<b>Delay by 8 weeks 6-12 August, 32<sup>nd</sup> MW</b>	Deep to Medium deep black soils	BtCotton	Sole Pigeonpea AKT-8811,Vipula, Sunflower (hybrids) / sesame AKT64/ CastorAKC-1, GCH-4,5,6& DCH-117, 32/pearlmillet. PKV Raj Shradha, Saburi	Adopt closer spacing(60x30 cm)for pigeonpea Follow <i>insitu</i> moisture conservation measures	
		Cotton +Pigeonpea	-do-	-do-	
		Soybean	-do-	-do-	
		Pigeonpea	Pigeonpea Varieties PKV Tara, BSMR-736,	-do-	
		Sorghum (Kh. Jowar)	Sole Pigeonpea AKT-8811,Vipula, Sunflower (hybrids) / sesame AKT64/ CastorAKC-1, GCH-4,5,6& DCH-117, 32/pearlmillet. PKV Raj Shradha, Saburi	-do-	
	Shallow black soils	Soybean	Sunflower (hybrids) / Sesame AKT64/ pearlmillet. PKV Raj Shradha, Saburi,	Follow <i>insitu</i> moisture conservation measures	
		Green gram	-do-	-do-	
		Black gram	-do-	-do-	

<b>Condition</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Suggested Contingency measures</b>		
			<b>Crop management</b>	<b>Soil nutrient &amp; moisture conservation measues</b>	<b>Remarks on Implementation</b>
Early season drought (Normal onset)		<b>Bt Cotton</b>			
<b>Normal onset followed by 15-20 days dry spell after sowing leading to poor</b>	Deep to Medium deep black soils	Cotton +Pigeonpea	Give protective irrigation wherever possible. Raise cotton seedlings in nursery & transplant at sufficient soil moisture or Gap filling to be done by pot watering 7-10 days after sowing when crop stand is less than 80%	Avoid applying fertilizer till sufficient moisture in soil.	Sowing on BBF

<b>germination/crop stand etc.</b>		Soybean	Give protective irrigation wherever possible. Gap filling with maize and sesame. If germination is less than 50% resowing immediately after receipt of rains.	One hoeing	Rain water harvesting & recycling to be strengthened
		Pigeonpea	Gap filling either by sesame or maize. Provide protective irrigation, wherever is possible	-do-	-do-
		Sorghum (Kh. Jowar)	Follow thinning to maintain optimum plant population.	One hoeing. Fertilizer application at sufficient moisture	-do-
	Shallow black soils	Greengram	Protective irrigation if possible.	One hoeing is to be done for conservation of soil moisture.	
		Blackgram	-do-	-do-	

<b>Condition</b>			<b>Suggested Contingency measures</b>		
<b>Mid season drought (long dry spell, consecutive 2 weeks rainless (&gt;2.5 mm) period)</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Crop management</b>	<b>Soil nutrient &amp; moisture conservation measures</b>	<b>Remarks on Implementation</b>
		Bt Cotton	Weeding Intercultivation to create soil mulch to conserve moisture. Protective irrigation if possible.	Avoid applying fertilizer till there is sufficient moisture in the soil. Opening of alternate furrows.	

<b>At vegetative stage</b>	Deep to Medium deep black soils	Cotton +Pigeonpea	Weeding Intercultivation to create soil mulch to conserve moisture. Protective irrigation if possible.	Avoid applying fertilizer till there is sufficient moisture in the soil. Opening of alternate furrows.	With limited water availability prefer micro irrigation n system Intercultivation implements/ machineries to be popularized through Govt. schemes.
		Soybean	-do-	Opening of alternate furrows.	
		Pigeonpea	-do-	-do-	

		Sorghum (Kh. Jowar)	-do-	Avoid applying fertilizer till there is sufficient moisture in the soil. Opening of alternate furrows.	
	Shallow black soils	Soybean	-do-	Opening of alternate furrows. Spraying of 2 % urea or DAP.	
		Green gram	Intercultivation to create soil mulch to conserve moisture. Protective irrigation if possible.	Spraying of 2 % urea or DAP.	
		Blackgram	-do-	Spraying of 2 % urea or DAP.	

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		Bt Cotton	Protective irrigation if possible.	Spraying of 2 % urea or DAP.	
	Deep to Medium deep black soils	Cotton + Pigeonpea	-do-	-do-	
		Soybean	-do-	-do-	
		Pigeonpea	-do-	-do-	
		Sorghum (Kh. Jowar)	-do-	-do-	
	Shallow black soils	Soybean	-do-	-do-	
		Green gram	-do-	-do-	

		Blackgram	-do-	-do-	
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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)	Deep to Medium deep black soils	Bt Cotton	Giving life saving supplemental irrigation, if available or taking up harvest at physiological maturity with some realizable yield.	-	-
		Cotton + Pigeonpea Intercropping	-do-	-	-
		Soybean	-do-	Plan for <i>rabi</i> season	
		Pigeonpea	-do-		
		Sorghum (Kh. Jowar)	-do-	Plan for <i>rabi</i> season	
	Shallow black soil	Soybean	-do-		
		Greengram	-do-	Prepare for <i>rabi</i> sowing Provided irrigation is available	

### 2.1.2 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	Deep to Medium deep black soils	Wheat & Chickpea	Wheat to be replaced by Chickpea/Safflower/Mustard	Follow alternate row irrigation/irrigate at critical stages/Stream cutoff	Tapping of other sources of irrigation. Sprinkler Irrigation

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Shallow black soils	Chickpea	Safflower/Mustard	-do-	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Deep to Medium deep black soils	Wheat & Chickpea	Wheat to be replaced by Chickpea/Safflower/Mustard/Linseed/Sesamum	Follow alternate row irrigation/irrigate at critical stages/Stream cutoff	Tapping of other sources of irrigation. Sprinkler Irrigation
	Shallow black soils	Chickpea	Safflower /Mustard	-do-	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	NA	NA	NA	NA	NA

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	NA	NA	NA	NA	NA

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Open well irrigated-Rabi cropping	Wheat , Chickpea, Safflower	Chickpea, Safflower	Sprinkler Irrigation	

## 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>				
Cotton	Opening of field channels to remove surface ponding, Foliar spray of 2% Urea Interculture at optimum soil moisture to improve soil aeration	Opening of field channels to remove surface ponding, Nutrient spray to arrest flower drop	Opening of field channels to remove surface ponding,	
Soybean	-do-	-do-	-do-	
Green gram	-do-	-do-	-do-	
Black gram	-do-	-do-	-do-	

Pigeon pea	-do-	-do-	-do-	Shifting to safer place for drying
<b>Horticulture</b>				
Acid Lime and orange	Opening of field channels to remove surface ponding,	Mrig bahar not affected For Ambia bahar Opening of field channels to remove surface ponding, Nutrient spray of NAA 10 ppm+ 1% urea to prevent flowers drop	Timely harvest to avoid losses	Fungal removal followed by Washing & waxing
<b>Heavy rainfall with high speed winds in a short span</b>				
Cotton	Opening of field channels to remove surface ponding. Improved drainage and drenching with copper oxy chloride to avoid wilting incidence.	Opening of field channels to remove surface ponding, Improved drainage and drenching with copper oxy chloride by opening of the nozzle of spray pump to avoid wilting incidence. Occurrence of grey mildew-control by sulphur spray @ 25 g/10 lit.	Occurrence of grey mildew- control by sulphur spray @ 25 g/10 lit.	Shifting to safer place for drying
Soybean	Opening of field channels to remove surface ponding	Opening of field channels to remove surface ponding		-do-
Green gram				
Black gram				
Pigeon pea				
<b>Horticulture</b>				
Nagpur Mandarin	Support by bamboo if < 3 years plants.	Support by bamboo if < 3 years plants. Opening of field channels to remove surface ponding,	Opening of field channels to remove surface ponding,	Fungal removal followed by Washing & waxing
Acid lime and sweet orange				

Outbreak of pests and diseases due to unseasonable rains	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Cotton	To control Jassids and Thrips spray with Acetamiprid 20 SP @ 1.5 g/ 10 lit.	Jassids and Thrips will increase spray with Acetamiprid 20 SP @ 1.5 g/ 10 lit.	-	-
Soybean	To control semi-looper spray NSKE 5% or quinalphos 25 EC 20 ml/10 lit.	To control semi-looper spray NSKE 5% or quinalphos 25 EC 20 ml/10 lit.	-	-
Green gram	To control Powdery mildew penconozol 5 ml or dinocap 10 ml or triadomorph 5 ml or sulphur spray @ 30 g/10 lit. of water.	To control Powdery mildew penconozol 5 ml or dinocap 10 ml or triadomorph 5 ml or sulphur spray @ 30 g/10 lit. of water.	-	-
Black gram	-do-	-do-	-	-
Pigeon pea	Improved drainage and drenching with copper oxy chloride @25g/10 lit of water to avoid incidence of wilt and root rot	Improved drainage and drenching with copper oxy chloride @25g/10 lit of water to avoid incidence of wilt and root rot	-	-
<b>Horticulture</b>				
Mandarine Orange	To control Citrus <i>psylla</i> Malathion 50EC 10ml Or Quinolphos 25EC 10ml Or Cypermethrin 25 EC 4 ml/10 lit	To control Citrus <i>psylla</i> Malathion 50EC 10ml Or Quinolphos 25EC 10ml Or Cypermethrin 25 EC 4 ml/10 lit	Immediate harvesting	Selling
Sweet Orange	-do-	-do-	-do-	-do-

Note:- Field bunds on slopy area to be strengthened

### 2.3 Floods: Not Applicable

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
<b>Horticulture</b>				
Continuous submergence for more than 2 days				
<b>Horticulture</b>				
Sea water intrusion				

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Heat Wave</b>				
<b>Horticulture</b>	Increase the frequency of irrigation, Use of temporary shed net, Spraying of antitranspirant, Mulching. Pruning of damaged parts	Increase the frequency of irrigation, Spraying of antitranspirant, Mulching. Pruning of damaged parts, Application of Boudreaux paste	Increase the frequency of irrigation, Spraying of antitranspirant, Mulching. Pruning of damaged parts	Immediate harvesting of fruits, Increase the frequency of irrigation, Spraying of antitranspirant, Mulching. Pruning of damaged parts, Application of Bourdaeux paste
<b>Cold wave</b>				
<b>Horticulture</b>	Covering with poly tunnel, flood irrigation at evening	Smogging, Flood irrigation at evening, Basin Mulching, Supplementary dose of fertilizer	Smogging, Flood irrigation at evening, Basin Mulching, Foliar application of potash fertilizers	Immediate harvesting, smogging, Flood irrigation, Basin Mulching, Foliar application of potash fertilizers
<b>Frost</b>				
<b>Horticulture</b>	NA	NA	NA	NA
<b>Hailstorm</b>				
<b>Horticulture</b>	Remove damaged parts , fungicidal spray	Remove damaged parts , fungicidal spray	Remove damaged parts, fungicidal spray, Spraying of NAA 20 ppm + 1 % urea.	Harvesting and grading
<b>Cyclone</b>	NA	NA	NA	NA

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	Suggested contingency measures		
	Before the event <sup>s</sup>	During the event	After the event
<b>Drought</b>			
<b>Feed and fodder availability</b>	<p>As the district is occasionally prone to drought the following measures to be taken to mitigate the fodder deficiency problem</p> <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 for use as feed supplement during drought</p> <p>Preserving the green maize fodder as silage</p> <p>Establishment of fodder bank at village level with available dry fodder (wheat straw, Sorghum/Bajra stover etc.)</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 (wheat/Sorghum/Bajra./maize/horsegram/green gram/soya) material as fodder</p> <p>Use of unconventional and locally available cheap feed ingredients especially soya meal waste 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 to prevent infertility.</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</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>
<b>Drinking water</b>	<p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water</p>	<p>Watershed management practices shall be promoted to</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>bodies/resources</p> <p>Add alum in stagnated water bodies</p>	<p>conserve the rainwater. Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>
<b>Health and disease management</b>	<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>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>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary 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>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 does not coincide with mid summer</p>

<p><b>Floods</b></p>	<p>In case of early forewarning (EFW), harvest all the crops (wheat/Sorghum/Bajra/maize/horsegram/green gram/ 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>NA</p>		
<p><b>Heat &amp; Cold wave</b></p>	<p>Arrangement for protection from <b>heat wave</b></p> <ul style="list-style-type: none"> <li>i) Plantation around the shed</li> <li>ii) H<sub>2</sub>O sprinklers / foggers in the shed</li> <li>iii) Application of white reflector paint on the roof</li> <li>iv) Thatched sheds should be provided as a shelter to</li> </ul>	<p>Allow the animals early in the morning or late in the evening for grazing during heat waves</p> <p>Allow for grazing between 10AM to 3PM during cold waves</p> <p>Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of</p>	<p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p>

	<p>animal to minimize heat stress</p> <p><b>Cold wave :</b> Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)</p>	<p>heat waves</p> <p>Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves</p> <p>Put on the foggers / sprinklers during heat waves and heaters during cold waves</p> <p>In severe cases, vitamin 'C' and electrolytes should be added in H<sub>2</sub>O during heat waves.</p> <p>Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation</p>	
<b>Insurance</b>	Encouraging insurance of livestock	Listing out the details of the dead animals	<p>Submission for insurance claim and availing insurance benefit</p> <p>Purchase of new productive animals</p>

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

Disease	Season
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>
<b>Anthrax</b>	<b>In endemic areas only, Feb to May</b>
<b>HS</b>	<b>May to June</b>
<b>BQ</b>	<b>May to June</b>
<b>FMD</b>	<b>November to December</b>

**2.5.2 Poultry**

<b>Drought</b>	<b>Suggested contingency measures</b>		
	<b>Before the event<sup>a</sup></b>	<b>During the event</b>	<b>After the event</b>
<b>Shortage of feed ingredients</b>	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
<b>Drinking water</b>		Use water sanitizers or offer cool hygienic drinking water	
<b>Health and disease management</b>	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>			
<b>Shortage of feed ingredients</b>	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
<b>Drinking water</b>		Use water sanitizers or offer cool hygienic drinking water	
<b>Health and disease management</b>	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>	NA		
<b>Heat wave</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 Don't allow for scavenging during mid day	Routine practices are followed
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with	Routine practices are followed

		electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	
<b>Cold wave</b>			
Shelter/environment management	Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	Routine practices are followed

### 2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>1) Drought</b>			
<b>A. Capture</b>			
Marine	N.A	N.A	N.A
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 construction, operation &amp; maintenance of</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> <li>7. Utilize canal water.</li> <li>8. Aeration of water in ponds/reservoirs.</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> </ol>

	<p>irrigation system.</p> <ol style="list-style-type: none"> <li>To make people aware about conservation of water.</li> <li>Critical analysis of long range a Forecast data.</li> <li>Storage of water.</li> <li>A forestation program.</li> <li>Conservation of rivers/reservoir/ponds.</li> <li>Re-excavation of local canals and reservoirs.</li> </ol>		<ol style="list-style-type: none"> <li>Augmentation of surface water flow.</li> <li>Strengthening of water reservoirs.</li> <li>Rain water harvesting.</li> <li>Compensation claims.</li> <li>Prepare vulnerability map and place it to management committee</li> </ol>
(ii) Changes in water quality	<ol style="list-style-type: none"> <li>Storage of water disinfectant such as chlorine, alum etc. at district level.</li> <li>Prohibit dumping of solid, liquid and waste in water sources.</li> <li>Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.</li> </ol>	<ol style="list-style-type: none"> <li>Provision of water filtration system for the ponds to overcome the water contamination.</li> <li>Use disinfectants and therapeutic drugs.</li> <li>Adoption of bio-remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>Removal of runoff from land by proper means before decomposition.</li> <li>Supply of water filtration system even after the event &amp; creating awareness in farmers.</li> <li>Need based research data should be generated on water quality.</li> <li>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>Available resources will be identified and need to be kept ready for each district on the basis of forecasting of insufficient rain.</li> <li>To avoid loss due to seepage, infiltration &amp; leakage by using bentonite, ash, polythene liners etc.</li> <li>Maintain the level of water by pumping water into pond.</li> <li>Critical analysis of long range Forecast data.</li> <li>Storage of water.</li> <li>A forestation program.</li> <li>Conservation of rivers/reservoir/ponds.</li> <li>Re-excavation of local canals and reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>Water resources of the areas will be exploited with planning of proper transport facilities in affected areas.</li> <li>Maintain the level of water to the required depth.</li> <li>Add stored water in shallow water depth.</li> <li>Harvesting of fishes as early as possible to avoid mortality.</li> <li>Use stored water.</li> <li>Use surface water flow.</li> <li>Divert water from unutilized areas.</li> <li>Utilize canal water.</li> <li>Aeration of ponds</li> </ol>	<ol style="list-style-type: none"> <li>Available resources need to be listed with adequate transport arrangement.</li> <li>Desiltation of pond bottom.</li> <li>Maintenance of tanks &amp; ponds</li> <li>Need based monitoring through research plan.</li> <li>Intensive a forestation program.</li> <li>Augmentation of surface water flow.</li> <li>Construction of water reservoirs.</li> <li>Adoption of rain harvesting methods.</li> <li>Compensation claims.</li> <li>Prepare vulnerability map and place it to management committee</li> </ol>
(ii) Impact of salt load build up in	<ol style="list-style-type: none"> <li>Minimize evaporation losses.</li> <li>Dilution of water if salt load is high.</li> </ol>	<ol style="list-style-type: none"> <li>Dilution of water or exchange water to avoid salt builds up.</li> </ol>	<ol style="list-style-type: none"> <li>Trapping the water resources from other places for dilution to reduce salt</li> </ol>

ponds / change in water quality	<ol style="list-style-type: none"> <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> <li>6. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs</li> </ol>	<ol style="list-style-type: none"> <li>2. Harvesting the marketable fish to reduce the density.</li> <li>3. Use disinfectants and therapeutic drugs.</li> <li>4. Adoption of bio-remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>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	N.A	N.A	N.A
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> <li>9. Enhancement in coping capabilities of common people.</li> <li>10. Insurance for the life of people/fishermen.</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>

(ii) No. of boats / nets/damaged	<ol style="list-style-type: none"> <li>1. The prior information on safe keeping of boats and nets will be provided to the fishermen.</li> <li>2. If prior information is given bring boats &amp; nets towards the safer side.</li> <li>3. Annual repair of boats/nets and gears.</li> <li>4. Insurance of boats/nets/gears.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fishermen will be advised to stop fishing during the floods and heavy rainfall.</li> <li>2. Continuous monitoring on water level is required.</li> <li>3. Coordination of assistance</li> <li>4. Immediate management of relief supplies.</li> <li>5. Govt. support and compensation.</li> </ol>	<ol style="list-style-type: none"> <li>1. The affected fishermen will provided with compensation up to Rs. 50,000/- for damaged boats or nets.</li> <li>2. Education and training for the repair of boats/nets and gears.</li> <li>3. Loss assessment &amp; insurance claim.</li> </ol>
(iii) No. of houses damaged	<ol style="list-style-type: none"> <li>1. Forewarning regarding heavy rainfall, sudden downpour and floods will be spread in the fishermen villages on the banks of rivers.</li> <li>2. Shift the people to safer places.</li> <li>3. Proper maintenance of <i>Kaccha</i> houses.</li> <li>4. Education and training for the repair of houses</li> <li>5. Store raw material for emergency repair of houses.</li> <li>6. House insurance</li> </ol>	<ol style="list-style-type: none"> <li>1. Temporary shelter to the affected families will be provided.</li> <li>2. Arrangement of temporary shelters for homeless people.</li> <li>3. Damaged house enumeration and need assessment.</li> <li>4. Coordination of assistance.</li> <li>5. Immediate management of relief supplies.</li> </ol>	<ol style="list-style-type: none"> <li>1. The housing facilities on higher elevation shall be provided to affected families by the Government agencies.</li> <li>2. Provide compensation from Govt. to build/repair houses.</li> <li>3. Loss assessment &amp; insurance claim.</li> <li>4. Govt. assistance claim.</li> </ol>
(iv) Loss of stock	<ol style="list-style-type: none"> <li>1. Harvesting the existing fish stock</li> <li>2. Keep boats, nets/gears ready for emergency use.</li> <li>3. Store fuels, food/other item</li> <li>4. Develop flood control management plans.</li> <li>5. Stock material insurance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Search/locate the tock/input.</li> <li>2. Mobilize local people for protection.</li> <li>3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood</li> </ol>	<ol style="list-style-type: none"> <li>1. Provided subsidy on seeds by Govt.</li> <li>2. Implementation of Insurance policy.</li> <li>3. Locate backup stocks and verify its usability time.</li> <li>4. Follow flood control management plan.</li> <li>5. Notify utilities of the critical demand about loss of stock and inputs.</li> <li>6. Loss assessment &amp; insurance claim.</li> </ol>
(v) 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. Provision to stop/close the effluent/sewerage discharge point in water odies</li> <li>3. Store chemicals, disinfectants and therapeutic drugs.</li> <li>4. Develop flood control management plan.</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. Do not use contaminated water</li> <li>3. Proper preparation and management through emergency aeration.</li> <li>4. Use appropriate amount of disinfectants,</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 to maintain water quality,</li> </ol>

		<p>chemicals and therapeutic drugs.</p> <p>5. Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies.</p> <p>6. Need based bioremediation</p>	<p>4. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</p> <p>5. Contact Govt. and industrial organization for immediate remedy and cleaning of the water bodies.</p> <p>6. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan</p>
(vi) Health and diseases	<p>1. Water filtration system &amp; control measures for diseases should be available.</p> <p>2. Advance planning and preparedness.</p> <p>3. Store chemicals, disinfectants and therapeutic drugs.</p> <p>4. Stock sufficient stores of medicines</p>	<p>1. Periodical checking particularly with respective fish mortality should be done during flood &amp; dead fishes disposed properly.</p> <p>2. Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal.</p> <p>3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</p> <p>4. Emergency aeration or splashing in water bodies.</p>	<p>1. Setting health &amp; disease management training centre at district level for fisherman community by Govt. or with the help of NGO.</p> <p>2. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</p> <p>3. Eradicating the disease where possible.</p> <p>4. Follow up surveillance and monitoring after disease outbreak.</p> <p>5. Need based research data should be generated.</p> <p>6. Loss assessment &amp; insurance claim.</p>

<b>B. Aquaculture</b>			
(i) Inundation with flood water	<p>1. In the flood prone areas proper draining system from ponds need to be developed and planned in flood situation before forecasting of flood.</p> <p>2. Site should be away from flood prone area.</p> <p>3. Dyke should be stable in all weather condition &amp; not liable to collapse during heavy rains.</p> <p>4. Proper channels to be provided to pass surplus water &amp; to avoid breakage to the bundh.</p> <p>5. Proper facility construction for ponds and its stock safety.</p> <p>6. Development of flood control management plan.</p>	<p>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.</p> <p>2. On the basis of forecasting, information to farmers for sale of marketable fish with sufficient transport facility through various media.</p> <p>3. Proper drainage should be adopted so that inundation with flood water should be minimized. Excess water should be</p>	<p>1. Planning even after the event should be made for proper drainage and creating awareness and trainings in flood situations.</p> <p>2. Pinning even after the event should be made for proper drainage &amp; creating awareness &amp; training in flood situation.</p> <p>3. Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan</p> <p>4. Reallocate fish to maintain appropriate biomass so that waste</p>

	<ol style="list-style-type: none"> <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>	<ol style="list-style-type: none"> <li>drained from pond by providing screen outlets or using pumps.</li> <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>assimilation capacity of pond is not exceeded.</li> <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>
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(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.</li> <li>3. Use of <math>\text{kmno}_4</math> for bath of fish as prophylactics</li> <li>4. Do not use contaminated water.</li> <li>5. Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas.</li> <li>6. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>7. Maintaining the purity and quality of water bodies.</li> <li>8. 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; disease management through training</li> <li>3. &amp; list of trained personnel should be available at each district level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodical checking particularly with respective fish mortality should be done during flood.</li> <li>2. Services of trained personnel need to be made available in affected areas with sufficient supply of life saving medicines.</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> <li>2. Routine training programmed as a refresher course need to be implemented in relation to health &amp;</li> </ol>

	<p>4. Adequate stock of medicine should be available at each district level.</p> <p>5. Antibiotics fortified feeding as prophylactics</p> <p>6. Advance planning and preparedness.</p> <p>7. Store chemicals, disinfectants and therapeutic drugs.</p> <p>8. Stock sufficient emergency medicines.</p>	<p>3. Disinfectants formalin treatments as prophylactics</p> <p>4. Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish.</p> <p>5. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</p> <p>6. Determination of nature and speed of transmission of diseases.</p> <p>7. Emergency aeration or splashing in water bodies</p>	<p>disease management during flood.</p> <p>3. Lime treatment for oxidation</p> <p>4. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</p> <p>5. Eradicating the disease.</p> <p>6. Follow up surveillance and monitoring.</p> <p>7. Proper disposal of dead fish.</p> <p>8. Loss assessment &amp; insurance claim</p>
(iv) Loss of stock and inputs (feed, chemicals etc)	<p>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.</p> <p>2) Flood situation going to exist then moves the feed, chemicals &amp; other accessories to safer places.</p> <p>3) Keep the stock/input at safe place for emergency purpose.</p> <p>4) Store fuels, food/other item.</p> <p>5) Develop flood control management plan.</p> <p>6) Stock material insurance.</p>	<p>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.</p> <p>2) Available fish stock should be recovered. Stock of inputs must be stored in well protected area.</p> <p>3) Search/locate the stock/input.</p> <p>4) Purchase/hire valuable stock/inputs from distant areas not affected by flood.</p>	<p>1) The fish farmers shall be provided with fish seed and feed at concessional rates.</p> <p>2) Feeds, chemicals etc required for the culture operation should be purchased.</p> <p>3) Strengthening of stocks.</p> <p>4) Assessment of total loss.</p> <p>5) Insurance claims</p>
(v) Infrastructure damage (pumps, aerators, huts etc)	<p>1) Prior information regarding removal of Pumps and aerators shall be given to the fish farmers.</p> <p>2) Flood situation going to exist then move the pumps, aerators &amp; other accessories to safer places.</p> <p>3) Educate and provide training for the repair of infrastructure.</p> <p>4) Follow flood control management plan.</p> <p>5) Store raw materials for repairing of pumps aerators, huts etc.</p> <p>6) Infrastructure insurance.</p>	<p>1) Pumps, aerator and generators shall be removed from the pond before the event.</p> <p>2) Use manual techniques for aeration or make substitute arrangement for the same.</p> <p>3) Notify utilities of the critical demand.</p> <p>4) Coordination of assistance.</p> <p>5) Immediate management of relief supplies.</p>	<p>1. Suitable Compensation for the damaged machinery shall be given to the fish farmers.</p> <p>2. Install the equipments during flood.</p> <p>3. Damaged infrastructure enumeration and need assessment.</p> <p>4. Locate backup equipment and verify its operation.</p> <p>5. Repair of damaged infrastructure.</p> <p>6. Loss assessment &amp; insurance claim.</p>

<b>3. Cyclone / Tsunami</b>			
A. Capture			
Marine	N.A	N.A	N.A
(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,	<ol style="list-style-type: none"> <li>1. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals &amp;</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</li> </ol>

chemicals etc)	other accessories to safer places. 2. Stock cover under insurance		purchased. 2. Seed and feed to be supplied through Deptt of fisheries,
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	1) Cyclone with heavy rain fall situation going to exist then shifted the pumps, aerators & other accessories to safer places.	1) Use manual techniques for aeration or make substitute arrangement for the same.	Compensation on assessment of actual losses & damage of pumps, aerators, shelters/huts given through RKVY, NCDC, NREGSui

<b>4. Heat wave and cold wave</b>			
<b>A. Capture</b>			
Marine	N.A	N.A	N.A
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>
(ii) Health and	1) Adequate stock of medicine should be available at each district level.	1) Periodical checking particularly with respective fish mortality should be done.	1) Setting health & disease management training centre at district level for

Disease management	<ul style="list-style-type: none"> <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> </ul>	<ul style="list-style-type: none"> <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> </ul>	<ul style="list-style-type: none"> <li>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> </ul>
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