State: MAHARASHTRA

Agriculture Contingency Plan for District: NASHIK

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro-Ecological Sub Region (ICAR)	Western Ghat and coastal plain hot humid (6.2)			
	Agro-Climatic Region (Planning Commission)	Western plateau and hills region (IX)			
	Agro Climatic Zone (NARP)	Western Ghat Zone - ZARS, Igatpuri, Dist. Nashik Western Maharashtra Scarcity Zone (MH-6),- ZARS, Solapur Sub Montane Zone – ZARS, Kolhapur Plain Zone – ZARS, Ganeshkhind, Pune			
	List all the districts falling under the NARP Zone	**Western Ghat Zone** - Nashik (Western Part), Nandurbar, Satara, Kolhapur, Pune **Scarcity Zone** - Sangli, Nandurbar, Nasik (Eastern Part), Dhule, Ahmednagar, Pune, Solapur, Satara(Part), Kolhapur (Part), Jalgaon **Western Maharashtra Plain Zone** – Pune (Eastern Part), Kolhapur, Sangli, Satara, Nashik (Central Part) **Sub Montane Zone** – Part of Satara, Nashik (Western Part) , Kolhapur, Pune			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		$19^0$00’02.38” NL	$73^0$46’51.07 EL	648 m MSL	
	Name and address of the concerned ZRS/ZARS/RARS/RRS/RRTTS	Zonal Agricultural Research Station, Igatpuri, Dist-Nashik, 422 403 E-mail: adrigatpuri@gmail.com			
	Mention the KVK located in the district	Krishi Vignyan Kendra,Yashwantrao Chavan Maharashtra Open University, Nashik. PIN 422 005			
1.2	**Rainfall**	Normal rainfall (mm)	Normal rainy days (No.)	Normal onset	Normal cessation
	SW monsoon (June-Sep)	926.2	29	18^{th} to 24^{th} June	22^{nd} to 28^{th} October
	NE Monsoon(Oct-Dec)	105.3	8	-	-

	Winter (Jan-Feb)	8.2	2	-	-
	Summer(Mar-May)	36.1	3	-	-
	Annual	1076.0	42	-	-

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 Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	1536.4	809.0	320.6	10.6	33.2	115.0	5.7	35.7	66.5	140.1

Source: District socio-economic review (2006)
Source: Epitome of Maharashtra state 2006-07

1.4	**Major Soils**	Area (000 ha)
	Shallow red soils	536.7
	Medium red / black soils	170.3
	Deep black soils	101.9

1.5	**Agricultural land use**	Area (000 ha)	Cropping intensity %	
	Net sown area	742.4	107.5	
	Area sown more than once	56.1		
	Gross cropped area	798.5		
1.6	**Irrigation**	Area (000 ha)		
	Net irrigated area	193.0		
	Gross irrigated area	407.4		
	Rainfed area	549.4		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		51.3	26.1
	Tanks	885	9.7	4.9

	Open wells	124927	94.3	48.1
	Bore wells	179	9.1	4.6
	Lift irrigation schemes	14	28.1	14.3
	Micro-irrigation	--	--	--
	Other sources	--	3.4	1.7
	Total irrigated area	--	196.0	100
	Pump sets (Diesel + Electrical)	100181		
	No. of tractors	19187		

Source: District socio-economic review (2006)
Source: Epitome of Maharashtra state 2007-08

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**		
	Pearl millet	--	275.7	275.7	--	--	--	--	275.7
	Maize	--	66.9	66.9	--	2.3	2.3	--	69.2
	Low land Paddy-Rainfed	--	50.3	50.3	--	--	--	--	50.3
	Groundnut	--	36.3	36.3	--	--	--	2.2	38.5
	Finger millet	--	36.5	36.5	--	--	--	--	36.5
	Sugarcane	28.0	--	28.0	--	--	--	--	28.0
	Soybean	--	28.7	28.7	--	--	--	--	28.7
	Wheat	--	--	--	75.8	--	--	--	75.8
	Chickpea	--	--	--	--	43.2	--	--	43.2
	Horticultural crops-Fruits	**Total area('000 ha)**			**Irrigated**			**Rainfed**	
	Grape	31.0			31.0			--	
	Pomegranate	31.4			31.4			--	
	Guava	1.7			1.7			--	
	Horticultural crops-Vegetables	**Total area ('000 ha)**			**Irrigated**			**Rainfed**	
	Onion	65.8			65.8			--	
	Tomato	41.0			41.0			--	
	Cauliflower, Cabbage	55.0			55.0			--	
	Medicinal & Aromatic crops	**Total area**			**Irrigated**			**Rainfed**	
	Not applicable	NA							

	Plantation crops	**Total area**	**Irrigated**	**Rainfed**
	Not applicable	NA		
	Fodder crops	**Total area ('000 ha)**	**Irrigated ('000 ha)**	**Rainfed ('000 ha)**
	Lucerne	0.8	0.8	--
	Maize	1.1	1.1	--
	Total fodder crop area	3.3	3.3	--
	Grazing land	48.0	48.0	48.0
	Sericulture	1.2	1.2	--
	Others specify			

Source: Comprehensive District Agriculture plan 2010 DASAO Nasik and SREP 2008, ATMA Nasik District

1.8	**Livestock**	**Male ('000)**	**Female ('000)**		**Total ('000)**	
	Cattle	12.2	10.9		23.2	
	Buffaloes	5.4	30.4		35.9	
	Commercial dairy farms	--	--		0.03	
	Goat	0.1	0.5		0.7	
	Sheep	0.07	0.2		0.3	
	Others (Camel, **Pig**, Yak etc)	0.01	0.03		0.04	
1.9	**Poultry**	**No. of farms (**175 No.)	**Total No. of birds ('000)**			
	Commercial	63	3810.5			
	Backyard	112	3814.7			
1.10	**Fisheries**					
	A. Capture					
	i. Marine	**No. of fishermen**	**Boats**		**Nets**	
			Mechanized	**Non-mechanized**	**Mechanized**	**Non-mechanized**
		NA	**--**	**--**	**--**	**--**
	ii. Inland	**No. Farmers own ponds**	**No. of Reservoirs**		**No. of village tanks**	
		0	**123**		550	
	B. Culture	**Water spread area (ha)**	**Yield (t/ha)**		**Production ('000 t)**	
	i. Brackish water	--	--		--	
	ii. Fresh water	19990	0.195		3900	

Source: District socio-economic review (2006)

1.11 Production and productivity of major crops (Av. of last five years 2004, 05, 06, 07, 08)

1.11	Name of crop	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
Major field crops									
	Pearl millet	209.7	760.6	--	--	--	--	209.7	760.6
	Low land Paddy	61.1	1214.7	--	--	--	--	61.1	1214.7
	Maize	157.0	2346.7	6.5	2826.0	--	---	163.5	5172.8
	Finger millet	32.0	876.7	--	--	--	--	32.0	876.7
	Groundnut	27.4	759.0	--	--	2.8	1272.7	30.2	2031.7
	Soybean	45.6	1588.8					45.6	1588.8
	Chickpea	--	--	23.7	548.6			23.7	548.6
	Wheat	--	--	115.9	1529.0			115.9	1529.0
	Sugarcane	1468.1	80664.8					1468.1	80664.8
	Cotton	3500	1250.0					3500	1250.0
Major Horticultural crops									
	Grape	777.0	25064.5					777.0	25064.5
	Pomegranate	596.7	19003.1					596.7	19003.1
	Onion	1052.8	16000.0					1052.8	16000.0
	Tomato	1051.3	25641.4					1051.3	25641.4
	Cabbage, Cauliflower	241.6	20827.5					241.6	20827.5

Source: Comprehensive District Agriculture plan 2010 DASAO Nasik,

Source:District socio-economic review (2006)

1.12	Sowing window for 5 major crops	Pearl millet	Maize	Low land Paddy (Rainfed)	Fingermillet	Onion	Wheat
	Kharif-Rainfed	3rd week of June to 4th week of June	3rd week of June to 2nd week of July	2nd week to 3rd week of June	3rd week of June-4th week of June	3rd week of July to 2nd week of August	--
	Kharif-Irrigated	--	--	--	--		--
	Rabi-Rainfed	--		--	--		--
	Rabi-Irrigated	--	--	--	--	3rd week of September to 2nd week of October	1st fortnight of November

1.13	What is the major contingency the district is prone to?	Regular	Occasional	None
	Drought	-	√	-
	Flood	-	√	-
	Cyclone	-	-	√
	Hail storm	-	√	-
	Heat wave	-	-	√
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water inundation	-	-	√
	Pests and diseases out break (specify)	-	√	-

1.14	Include Digital maps of the district for	Location map of district with in State as Annexure I	**Enclosed :** Yes
		Mean Annual Rainfall as Annexure II	**Enclosed :** Yes
		Soil map as Annexure II	**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**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 Week July 1st week	Shallow red soils	Pearl millet	Shanti, Shraddha, Saburi	Hoeing at 15 and 30 DAS	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Groundnut	JL-24 , JL-286, JL-501	As above	
		Finger millet	Dapoli-1, HR-374, RAU-8, PR-202	Line transplanting	
	Medium red / black soils	Low land Paddy (Rainfed)	Indrayani, LK-248, Phule Radha, Phule Samrudhi	--	

		Maize	Karveer, Rajarshee,	Sowing on ridges and furrows	
		Niger	Sahyadri, Phule Karala	Hoeing and weeding	
	Deep black soils	Maize	Karveer, Rajarshee,	Sowing on ridges and furrows	
		Onion	Basavant -780	Raise seedling under irrigation	

Condition	**Suggested Contingency measures**				
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 Week July 3rd week	Shallow red soils	Pearl millet	Shanti, Shraddha, Saburi	Hoeing at 15 and 30 DAS	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Groundnut	JL-24 , JL-286, JL-501	As above	
		Finger millet	Dapoli-1, HR-374, RAU-8, PR-202	Line transplanting	
	Medium red / black soils	Low land Paddy (Rainfed)	Indrayani, LK-248, Phule Radha, Phule Samrudhi	--	
		Maize	Karveer, Rajarshee,	Sowing on ridges and furrows	
		Niger	Sahyadri, Phule Karala	Hoeing and weeding	
	Deep black soils	Maize	Karveer, Rajarshee,	Sowing on ridges and furrows	
		Onion	Basavant -780, N-2-4-1, Phule Samarth	Raise seedling under irrigation	

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks August 1st week	Shallow red soils	Pearl millet	Shanti, Shraddha, Saburi	Hoeing at 15 and 30 DAS	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Groundnut	Pearlmillet (Shanti, Shraddha, Saburi)	As above	
		Finger millet	This crop area does not experience this situation		
	Medium red / black soils	Low land Paddy (Rainfed)	This crop area does not experience this situation		
		Maize	Karveer, Rajarshee,	Sowing on ridges and furrows	
		Niger	This crop area does not experience this situation		
	Deep black soils	Maize	Karveer, Rajarshee,	Sowing on ridges and furrows	
		Onion	Basavant -780, N-2-4-1, Phule Samarth	Raise seedling under irrigation	

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks August 3rd week	Not applicable				

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	**Major Farming situation**	**Normal Crop /Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Shallow red soils	Pearl millet	Hoeing Protective irrigation	Opening of conservation furrows, Weed mulch	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Groundnut	As above	As above	
		Finger millet	As above	As above	
	Medium red / black	Low land Paddy	--	--	

	soils	(Rainfed)			
		Maize	--	--	
		Niger	Thinning and gap filling	Weeding, Hoeing	
	Deep black soils	Maize	Protective irrigation in alternate rows,	Hoeing, Moisture conservation by opening of furrows	
		Onion	--	Weeding , Sprinkler irrigation	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (2.5 mm)	**Major Farming situation**	**Normal Crop /Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Shallow red soils	Pearl millet	Hoeing Protective irrigation	Opening of conservation furrows, Weed mulch	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Groundnut	As above	As above	
		Finger millet	As above	As above	
	Medium red / black soils	Low land Paddy (Rainfed)	--	--	
		Maize	--	--	
		Niger	--	Weeding, Hoeing	
	Deep black soils	Maize	Protective irrigation in alternate rows,	Hoeing, Moisture conservation by opening of furrows	
		Onion	--	Weeding , Sprinkler irrigation	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (2.5 mm)	**Major Farming situation**	**Normal Crop /Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At reproductive stage	Shallow red soils	Pearl millet	Protective irrigation	--	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Groundnut	As above	--	
		Finger millet	As above	--	
	Medium red / black soils	Low land Paddy (Rainfed)	--	--	
		Maize	Protective irrigation in alternate rows	--	
		Niger	--	--	
	Deep black soils	Maize	Protective irrigation in alternate rows,	--	
		Onion	--	Sprinkler irrigation	

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 red soils	Pearl millet	In case of poor grain filling harvest for fodder	No rabi crop	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC,
		Groundnut	Protective irrigation or harvest at physiological maturity	As above	

		Finger millet	In case of poor grain filling harvest for fodder	As above	MSSC, Private co. distributors
	Medium red / black soils	Low land Paddy (Rainfed)	--	Ricebean, Lentil	
		Maize	Protective irrigation in alternate rows	Chickpea (Vijay, Digvijay)	
		Niger	--	--	
	Deep black soils	Maize	Protective irrigation in alternate rows,	Onion (N-2-4-1)	
		Onion	--	No rabi crop	

2.1.2 Irrigated situation

Condition	**Suggested Contingency measures**				
Delayed release of water in canals due to low rainfall	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Medium deep black / red soils	Sugarcane	No Change	Alternate furrow / drip irrigation, Sugarcane trash mulching	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Onion	Late *kharif* onion	Sprinkler irrigation	
		Vegetables	No Change	Sprinkler irrigation	
		Wheat	Trimbak, Godavari, Tapovan or Chickpea (Vijay, Digvijay, Vishal)	Irrigate at critical growth stages through Sprinkler irrigation	

Condition	**Suggested Contingency measures**				
Limited release of water in canals due to low rainfall	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Medium deep black / red soils	Sugarcane	No Change	Alternate furrow / drip irrigation, Sugarcane trash mulching	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule,

		Onion	Late *kharif* onion	Sprinkler irrigation	Kolhapur, NSC, MSSC, Private co. distributors
		Vegetables	No Change	Sprinkler irrigation	
		Wheat	Trimbak, Godavari, Tapovan or Chickpea (Vijay, Digvijay, Vishal)	Irrigate at critical growth stages through Sprinkler irrigation	

Condition	**Suggested Contingency measures**				
Non release of water in canals under delayed onset of monsoon in catchment	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Medium deep black / red soils	Sugarcane	No Change	Alternate furrow / drip irrigation, Sugarcane trash mulching	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Onion	Late *kharif* onion	Sprinkler irrigation	
		Vegetables	No Change	Sprinkler irrigation	
		Wheat	Trimbak, Godavari, Tapovan or Chickpea (Vijay, Digvijay, Vishal)	Irrigate at critical growth stages through Sprinkler irrigation	

Condition			**Suggested Contingency measures**		
Lack of inflows into tanks due to Insufficient /delayed onset of monsoon	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in crop /Cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Medium deep black / red soils	Sugarcane	No crops can be taken under such situation and for grape and pomegranate, give life saving irrigation from other sources.		
		Grape			
		Pomegranate			
		Onion			
		Wheat			
		Chickpea			

		Vegetable		

Condition			**Suggested Contingency measures**		
Insufficient groundwater recharge due to low rainfall	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in crop /Cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Medium deep black / red soils – Open well irrigated	Sugarcane	--	Alternate furrow / drip irrigation, Sugarcane trash mulching	Linkages with MPKV, Rahuri, College of Agriculture Pune, Dhule, Kolhapur, NSC, MSSC, Private co. distributors
		Grape	--	Drip irrigation, mulching with residues / grassess	
		Pomegranate	--	As above	
		Onion	Pearl millet	Protective irrigation	
		Wheat	Chickpea (Vijay, Digvijay, Vishal)	Sprinkler irrigation	
		Chickpea	As above	As above	

2.2 Unusual rains

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Pearl millet	Drain out excess water	Drain out excess water	Harvest the crop	Cover with tarpaulin, drying in shade
Maize	As Above	As Above	As above	As Above
Soybean	As above	As Above	As above	As above
Finger millet	As Above	As Above	As above	As above
Lowland Paddy	--	--	Drain out excess water	--
Horticulture				
Onion	Drain out excess water , Drenching with fungicide	Drain out excess water	Drain out excess water	Protect produce properly
Tomato	As Above	Staking to plants Drain out excess water	As above	As above
Grape	As above	Plant protection measures Drain out excess water	Harvesting, Drain out excess water	As above

Pomegranate	Drain out excess water, Plant protection measures	As above	As Above	As above
Heavy rainfall with high speed winds in a short span – Not applicable				

Outbreak of pests and diseases due to unseasonal rains	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Finger millet	**Leaf Blast and Neck Blast** : Spraying of Carbendazim50 WP 1g /L water and subsequent 2-3 spray at interval of 15 days	**Earhead Catterpiller** Endosulfan 35EC 1.5 ml /L water or dusting with Methyl parathion 2% @ 20kg/ha		
Maize	**Turcium leaf blight** 2-3 spraying of Mancozeb 75 WP @ 0.25 % & subsequent 2-3 sprays at interval of 15 days **Aphids** : Spraying of Dimethoate 30% / Methyl dematon 25% 1.5 ml/L	**Aphids:** Spraying of Dimethoate 30% / Methyl dematon 25% 1.5 ml/L **Stem borer:** Spraying of Endosulfan 35 EC 1.5ml/L **Web worms**: Endosulfan 35 EC /Dimethoate 30%1.5ml/L		
Lowland Paddy (Rainfed)	**Leaf Blast/ Neck Blast**: Carbendazim 50 WP 1 g/L subsequent 2-3 spray at interval of 15 days **Leaf scald:** Spraying of Carbendazim 50 WP 1 g/Propiconazole 25 EC 1 ml/L **Sheath blight:** Spraying of Propiconazole 1 ml/L **Leaf roller / Leaf folder:** Spraying of Monocrotophos 36% @1.5ml/L	**Leaf Blast /Neck Blast**: Spraying of Carbendazim 50 WP 1 g/L subsequent 2-3 spray at interval of 15 days **Leaf scald:** Spraying of Carbendazim 50 WP 1 g/Propiconazole 25 EC 1 ml/L **Sheath rot:** Spraying of Propiconazole 25 EC /Hexaconazole 25 EC 2 ml/L **False smut**: Spraying with Chlorothalonil 75WP 2g/L **Stem borer:** Spraying of Endosulfan 1.5ml/L **Leaf roller :** Spraying of Monocrotophos	**Sheath rot:** Spraying of Propiconazole 25 EC/Hexaconazole 2 ml/L **False smut**: Spraying with Chlorothalonil 75WP2g/L **Brown plant hoppers**: Spraying of Imidacloprid 17 SL @ 0.5ml/L or Monocrotophos 36% 1.5ml/L	

		36% @ 1.5ml/L		
Soybean	**Hairy caterpillar**: Spraying of Methyl parathion 2% or Quinolphos 25% 1.5 ml or Endosulfan 4% dust @ 20kg /ha. Chloropyriphos 20% 2 ml/L Endosulfan 35EC 1.5 ml /L. **Leaf eating caterpillar/Hairy caterpillar**: Spraying of Methyl parathion 2% or Quinolphos 25% 1.5 ml or Endosulfan 4% dust @ 20kg /ha. Chloropyriphos 20% 2 ml/L Endosulfan 35EC 1.5 ml /L.	**Spodoptera**: Spraying of Endosulfan 35EC 1.5ml/L **Leaf eating caterpillar/Hairy caterpillar**: Spraying of Methyl parathion 2% or Quinolphos 25% 1.5 ml or Endosulfan 4% dust @ 20kg /ha. Chloropyriphos 20% 2 ml /L Endosulfan 35EC 1.5 ml /L.		
Sugarcane	Insect pest – i) **Stem borer** – - Soil application of 10G Phorate @ 20 kg/ha - Removal of dead heads ii) **Top shoot borer** - Removal of dead heads - 20 EC Chloropyriphos 20%@ 5 lit. in 100 lit. water through channel	a) Insect pest – ii) **Top shoot borer** - Removal of dead heads - 20 EC Chloropyriphos 20% @ 5 lit. in 100 lit. water through channel **Wooly aphids**: Spraying of Endosulfan 35EC 2.0 ml /L + Metasystoc 2.0ml/L		
Pearl millet	a) Insect pest - **Grass hopper** - Dusting of methyl parathion 2% @ 20 kg / ha	a) Disease – **Rust** – - Spraying of Mancozeb 75 WP 2.5g/L b) Insect pest - **Blister beetle** - Dusting of methyl parathion2% @ 20 kg /ha		
Chickpea	Disease - **Wilt / root rot-** - seed treatment with carbendazium 50WP + thirum (2 g each / kg) or Phule trichoderma 5 g /kg	a) Disease - **Wilt / root rot-** - seed treatment with carbendazium 50WP + thirum (2 g each / kg) or Phule trichoderma 5 g /kg b) Insect pest – **Heliothis** - Use of pheromen traps @ 5 /ha - Spraying of Quinolphos 25% / Chloropyriphos 20%@ 20 ml / 10 lit.	a) Insect pest – **Heliothis** - Use of pheromen traps @ 5 /ha - Spraying of Quinolphos 25% / Chloropyriphos 20% @ 2.0 ml / L	

Horticulture				
Onion	**Alternaria leaf blight & Purple Blotch**: Mancozeb 75% 2.5g. or Carbondenzim 50WP 1g. or Chlorothalonil 75WP 1 ml/L **Thrips** Endosulfan 35 EC 1.5 ml /L or Methyl dematon 25% 1.5 ml /L	**Thrips:** Endosulfan 35 EC 1.5 ml /L		
Tomato	**Alternaria leaf blight**: Mancozeb 75WP 2.5g /L or carbondenzim 50WP 1 g/L or chlorothalonil 1 g/L **White fly/Mites/Thrips**: Dimethoate 30%/Methyl dematon 25% 1.5ml/L or Imidacloprid 17SL 0.5ml/L	**Alternaria leaf blight**: Mancozeb 75WP 2.5g /L or carbondenzim 50WP 1.0 g/L or chlorothalonil 1.0 g/L	**Fruit borer** : Endosulfan 35 EC 1.5 ml /L or Chloropyriphos 20% 2 ml /L	
Cauliflower/ Cabbage	**Thrips/Aphids/Jassids**: Soil application of Phorate 10G 10 kg/ha or Endosulfan 35 EC 2 ml/L or Diamethoate 30% 1.5ml/L **Diamond black moth:** Diamethoate 30% 1.5ml/L **Black fly**: Endosulfan 35 EC 2ml/L or Diamethoate 30% 1.5ml/L	**Anthracnose** – spraying of Mancozeb 75WP 2.5g or Copper oxichloride 50WP 2.5g or chlorothalonil 2.5 g/L **Black rot:** Spraying of Copper oxichloride 50WP 3g + Streptomycin 0.01 g/L **Thrips/Aphids/Jassids**: Soil application of Phorate 10G 10 kg/ha or Endosulfan 35 EC 2 ml/L or Diamethoate 30% 1.5ml/L **Diamond black moth:** Diamethoate 30% 1.5ml/L **Black fly**: Endosulfan 35 EC 2ml/L or Diamethoate 30% 1.5ml/L		

Grape	Disease – **Anthracnose** – spraying of carbendazium 50 WP 0.1 % **Powdery mildew** - Spraying of wettable sulfur 80 WP 0.2 % or penconazole 0.05 % **Downy mildew** – spraying of bordo mixture 0.4 to 1.0 % or Metalaxyl mancozeb 0.2 % or Cymoxanil mancozeb 0.2 % Insect pest – **Mealy bug** – Use of sticky traps on trunks and girdles Spraying of methyl dematon 25% / malathion 50% 1.5 to 2.0 ml / L.	Disease –**Powdery mildew** - Spraying of wettable sulfur 80 WP 0.2 % or penconazole 0.05 % ii) **Downy mildew** – spraying of bordo mixture 0.4 to 1.0 % or metalaxyl OR mancozeb 0.2 % or Cymoxanil mancozeb 0.2 % a) Insect pest – **Mealy bug** – Use of sticky traps on trunks and girdles - Spraying of methyl dematon 25% / malathion 50% 1.5 to 2.0 ml /L	a) Disease – **Anthracnose** – spraying of carbendazium 50 WP 0.1 % b) Insect pest – **Mealy bug** – Use of sticky traps on trunks and girdles - Spraying of methyl dematon 25% / malathion 50% 15-20 ml / 10 lit.	a) Insect pest – **Mealy bug** – Use of sticky traps on trunks and girdles - Spraying of methyl dematon 25% / malathion 505 1.5-2.0 ml / L
Pomegranate	a) Disease - i) **Bacterial oily spot** (Xanthomonas spp.) – Adopt recommended special package of University / NRC, Pomegranate ii) **Fungal spot-** Spraying of carbendazium 50 WP 0.1 % b) Insect pest - **Shot hole borer** - Use Geru paste with chloropyriphos 20% 2.0ml/L - Soil application of phorate 10G @ 10g/plant in basin	a) Disease - i) **Bacterial oily spot** (Xanthomonas spp.) – Adopt recommended special package of University / NRC, Pomegranate ii) **Fungal spot-** Spraying of carbendazium 50 WP 0.1 % b) Insect pest - **Shot hole borer** - Use Geru paste with chloropyriphos 20% 2.0ml/L - Soil application of phorate 10G @ 10g/plant in basin	Disease - i) **Bacterial oily spot** (Xanthomonas spp.) – Adopt recommended special package of University / NRC, Pomegranate	

2.3 Floods – Not applicable

2.4 Extreme events: Heat wave/ Cold wave/Frost/Hailstorm/Cyclone-- Not applicable

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Feed and fodder availability	1. Conservation of green fodder as silage dry fodder as hay in flush season for utilization in lean period 2. Dry fodder available should be processed i.e. Urea treatment of crop residues to enhance their nutritive value. For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to the livestock owners. 3. Judicial use of available feed resources by the livestock owners. 4. Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored. 5. Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured for productive animals. 6. Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate. 7. Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants. 8. Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A and hence should be reserved for feeding during drought. 9. Cactus is primarily found in deserts hence it is easily available	1. Judicious use of feed resources processed as per type of livestock possessed by the livestock owners. 2. Distribution of fodder, UMMB blocks, other feed resources stored in the affected area to the livestock owners as per the number and type of livestock possessed. 3. Mineral supplementation – Mineral mixture be provided for the livestock@50 g/day/Anim. 4. Disposal/Transfer of the animals in the area having feed resources availability. 5. Concentrate feeding for productive animals to support minimum production & life saving of the important animals. 6. Other non productive animals are to be fed at subsistence level. 7. Use of food grains for biodisel and distillaries should be stopped and the grains be spared for productive animals. 8. Bypass protein concentrate ingredients may be provided in order to harvest maximum nutrients for productive animals particularly high productive	1. Green fodder production in next Kharip season needs to be undertaken as a source of fodder at earliest. 2. Mineral Supplementation should be continued. 3. Concentrate feeding for productive animals so as to compensate the body condition and production. 4. The animals must be brought into cyclic stage for reproduction. 5. Young crossbred livestock needs to be attended properly so as to harness the high productivity. 6. *Adlib.* feeding may be practiced with balancing the nutrients required. 7. The unproductive/surplus livestock needs to be culled/disposed. 8. Livestock suitable with the farming system practiced only should be maintained. 9. Mechanization in agriculture needs to be encouraged. 10. Feed processing needs to be encouraged in order to minimize the

	during scarcity also. As such it is not used for feeding animals but during scarcity it can be used. 10. Mineral mixture should be procured and stored for supply. 11. **Fodder Banks**: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales. 12. **Fodder Bank:** Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banks to be established at each Taluka in the drought area. 13. Govt. should provide support to farmers for making stacks, bailing & storage. 14. State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period. 15. Cattle camp sites needs to be identified. 16. NGOs/Gorakshan Sanstha etc. needs to be identified. 17. Anticipated number of livestock & feed resources to be provided needs to be assessed. 18. Livestock registration should be compulsory with identification by tagging 19. Preparedness of veterinary services to drought prone areas. 20. Encourage farmers to cultivate fodder crops. 21. Identification of the site for fodder depot. 22. Facility to store fodder by creating centralized silage making facility with provision for transport. 23. Forage production and storage of fodder in irrigated areas. 24. Assessment of risk and vulnerability. 25. Formation of village Disaster Management Committee. 26. Establishment of drought monitoring system or early warning system. 27.Each district should have reserves (feeding 5000 ACU (maintenance ration) for about 1-3 weeks period) of the following at any point of the year for mobilization to the needy areas. Silage:20-50 t , Urea molasses mineral bricks (UMMB):50-100 t , Hay:100-250 t , Concentrates: 20-50 t , Minerals and vitamin supplements mixture:1-5 t	crossbred cows. 9. Top feeds should be used during scarcity period only. 10. Oil seed cakes are good source of proteins and hence should be used for productive animals only. 11. Feed supplements/ Additives needs to be used widely for productive animals. 12. Establishment of Cattle camps at identified sites. 13. NGOs/Gorakshan Sanstha etc. identified to be involved for participation/ implementation. 14. Feed resources @ 7 kg.dry fodder/ day/adult animal for maintenance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production. 15. Adaptation of proper distribution policy as per requirement with transport facility. 16. Regular rest periods for working animals particularly bulls during hot period of the day. 17. Capture and care of stray animals. 18. The unproductive/surplus livestock needs to be culled/disposed. 19. Sale of feed and fodder from the affected area to non affected area should be banned. 20. Distribute fodder at reasonable rate. 21. Monitoring feed and fodder prices. 22.Harvest and use all the failed crop (Sorghum, Bajra, Maize, Rice, Wheat, Groundnut) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipol etc) and unconventional feeds resources available and use as fodder for livestock (LS).	wastage of feed resources. 11. *In-situ* storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged. 12. Readiness for feed and fodder bank as and when required for each districts with transport facility. 13. Review of shortfalls in planning and refining action plan the before and during event. 14.Short duration fodder crops of Sorghum / Bajra / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, Gaint Bajra, L-74, K-6677, Ananand / African tall, Kissan composite, Moti, Manjari, BI-7) should be sown in unsown and crop failed areas

	28. Establishment of silvi-pastoral system in CPRs with ***Stylosanthus hamata*** and ***Cenchrus ciliaris*** as grass with ***Leucaena leucocephala*** as tree component. 29. Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production. 30. Increase area under short duration fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 31. Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality crop cutters. 32.Establishment of backed yard cultivation of para grass with drain water from bath room/washing area 33. Avoid burning of wheat straw and maize stover 34. Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon 35. Proper drying, bailing and densification of harvested grass	23. Available feed and fodder should be cut from CPRs and stall fed in order to reduce the energy requirements of the animals 24. **Mild drought :** hay should be transported to the needy areas 25. **Moderate drought:** hay, silage and vitamin & minerals mixture should be transported to the needy areas 26. **Severe drought:** UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the needy areas. All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS 27. Arrangements should be made for mobilization of small ruminants across the districts where no drought exits	
Drinking water	1. Water resources as in general are inadequate and hence the resources should be trapped and increased. 2. Available rain water harvesting technique should be adopted i.e. farm ponds etc. 3. Water conservations measures be adopted to increase water table like recharging of bore wells. 4. Available water resources should be tapped and reserved. 5. Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken. 6. Judicious use of water in agriculture i.e. through drip/sprinkler irrigation. 7. Wastage of water needs to be curbed. 8. Rain water harvesting measures needs to be implemented at village level. 9. Proper utilization of Water to save water. 10. Equal water distribution plan may be implemented.	1. Special distribution and carrying capacity should be implemented from other available resources. 2. Water should be used as per the requirement of animals (@10-15 lit/ 100 kg body weight). 3. Drinking water should not be used for washing animals. 4. Clean and chlorinated water be provided to prevent water borne diseases. 5. Special distribution and carrying capacity should be supplemented from other available resources. 6. Water for irrigation should be stopped. 7. Judicious use of water for livestock. 8. Supply of water through tankers during	1. Permanent water resources should be developed with campaign for public awareness. 2. Steps should be taken to conserve water. 3. Ensure fresh clean and cold water supply to livestock. 4. Specify the options (place and area) for establishment of drinking water reserves

	11. Cloud seeding desalination, recycle sewage water, transvasment river project etc. 12. Identification of water resources	contingency. 9. Private water resources such as wells shall be used for drinking water. 10. Proper utilization of Water to save water. 11. In vicinity of animal camp or chavani creation of borewell.	
Health and disease management	1. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter with stock of life saving medicine for livestock. 2. Vaccination of animals for various diseases according to season. 3. Deworming and spraying be done to get rid of endoparasites and ectoparasites to keep the health of animals in good condition. 4. Personnels should be trained for health and disease management through training 5. List of trained personnel should be available at each district head quarter. 6. Feed additives/Tonics/ Vitamin supplements should be stocked. 7. Vaccines, Insecticides, disinfectants and dewormers needs to be stocked. 8. Records/PM/ Carcass disposal arrangements needs to be ensured. 9. Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls. 10. Create temporary shade shelters to prevent heat stress on the animals. (animal camps) 11. Specify the endemic diseases (species wise) in that region. 12. Surveillance and disease monitoring network establishment.	1. Services of trained personnel need to be made available in affected area with sufficient supply of life saving medicine of livestock. 2. A team of veterinary experts be deployed for health management of drought hit livestock. 3. During occurrence of disease, affected animals should be kept isolated and treated properly and promptly. 4. Vaccination against contagious diseases like HS, FMD, Theileriosis be carried out. 5. Mineral mixture be provided to take care of deficiency disorders. 6. Tick control measures be undertaken to prevent tick borne diseases in animals under stress. 7. Deworming should be carried out. 8. Feed additives/Tonics/Vitamin supplements should be provided. 9. Post Mortem /record keeping/carcass disposal arrangements be effected. 10. Restriction on movement of the animals to prevent the spread of diseases. 11. Periodic disinfection and disinfestations of premises where animals are kept. 12. Permission of only healthy and vaccinated animals in cattle market. 13. By proper treatment with supervision and exercise over starvation. 14. Special transport facility of mobile van for veterinary team be deployed.	1. Routine training programme as a refresher course need to be implemented in relation to health and disease management during drought with stock of life saving medicine for livestock. 2. There will be stress on animals due to deterioration of health during drought period. 3. Concentrates and vitamin-mineral supplements be provided to minimize the stress on animals. 4. The animals should be observed for signs of contagious diseases or deficiency disorders. 5. Vaccination spraying and deworming programme needs to be undertaken. 6. Record of affected livestock to be submitted for compensation of the loss. 7. Farm disinfection and disinfestations. 8. Assessment of losses due to mortality if any.

Floods			
Feed and fodder availability	1. Identification of flood prone zones and flood forecasting. 2. Installation of early warning systems. 3. Steps to prevent spoilage of food and water supply due to flood water. 4. Dedicated helpline to emergency contact and communication at taluka level. 5. Avoid construction of farm buildings in flood risk areas. 6. Local ponds and canals regularly inspected and cleared off from obstruction 7. Adequate stock of Tetanus toxoid. 8. Change cropping pattern according to flood risk periods. 9. Storage of available fodder at safe place before rainy season. 10. Training of local personnel for disaster management. 11. Dry fodder available should be processed i.e. Urea treatment of crop residues to enhance their nutritive value. For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to the livestock owners. 12. Judicial use of available feed resources by the livestock owners. 13. Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored. 14. Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes,low grade grains, Govt Godowns wastes, grains unfit for human consumption etc. should be procured for productive animals. 15. Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate. 16. Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants. 17. Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder.Tree leaves are good source of protein, calcium, Vitamin A&hence should be reserved for feeding during drought. 18. Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.	1. Quick evacuation of livestock from flood plane areas before area become flooded 1. Prevent outflow of manure pit in river 2. Proper feed, vaccine, drugs, disinfecrants and feed supplement distribution policy adopted with transport facility. 3. Prevent spoilage of food and water supply 4. Judicious use of feed resources processed as per type of livestock possessed by the livestock owners. 5. Distribution of fodder, UMMB blocks, other feed resources stored in the affected area to the livestock owners as per the number and type of livestock possessed. 6. Mineral supplementation – Mineral mixture be provided for the livestock@50 g/day/Anim. 7. Disposal/Transfer of the animals in the area having feed resources availability. 8. Concentrate feeding for productive animals to support minimum production & life saving of the important animals. 9. Other non productive animals are to be fed at subsistence level. 10. Use of food grains for biodisel and distillaries should be stopped and the grains be spared for productive animals. 11. Bypass protein concentrate ingredints may be provided in order to harvest maximum nutrients for productive animals particularly high productive crossbred cows. 12. Top feeds should be used during scarcity period only. 13. Oil seed cakes are good source of proteins and hence should be used for productive animals only.	1. Green fodder production in next Kharip season needs to be undertaken as a source of fodder at earliest. Fodder seed of improved fodder crop varieties needs to be distributed. 2. Mineral Supplementation should be continued. 3. Concentrate feeding for productive animals so as to compensate the body condition and production. 4. The animals must be brought into cyclic stage for reproduction. 5. Young crossbred livestock needs to be attended properly so as to harness the high productivity. 6. *Adlib.* feeding may be practiced with balancing the nutrients required. 7. The unproductive/surplus livestock needs to be culled/disposed. 8. Livestock suitable with the farming system practiced only should be maintained. 9. Mechanization in agriculture needs to be encouraged. 10. Feed processing needs to be encouraged in order to minimize the wastage of feed resources. 11. *In-situ* storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged. 12. Fodder resources should be exploited with sufficient transport facilities from other areas of the district even after the event.

	19. Mineral mixture should be procured and stored for supply. 20. **Fodder Banks**: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales. 21. **Fodder Bank:** Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banksto be established at each Taluka in the drought area. 22. Govt. should provide support to farmers for making stacks, bailing & storage. 23. **State Animal feed resources Grid** needs to be established so as to provide feed resources during scarcity period. 24. Cattle camp sites needs to be identified. 25. NGOs/Gorakshan Sanstha etc. needs to be identified. 26. Anticipated number of livestock & feed resources to be provided needs to be assessed. 27. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the city where feeds & fodder (silage) can be stored for emergency use. 28. In case of EFW, harvest all the crops (Sorghum, Bajra, Maize, Rice, Wheat, Horse gram, Groundnut) that can be useful as fodder in future (store properly) 29. Arrange for storing minimum required quantity of hay (25-50kg) and concentrates (25kgs) per animals in farmer / LS keepers house / shed for feeding animals during floods 30. Arrangement for transportation of animals from low lying area and also for rescue animal health workers	14. Feed supplements/ Additives needs to be used widely for productive animals. 15. Establishment of Cattle camps at identified sites. 16. NGOs/Gorakshan Sanstha etc. identified to be involved for participation/ implementation. 17. Feed resources @ 7 kg.dry fodder/day/adult animal for maintenance 2.0 kg. Concentrate mixture/day/adult animal for supporting minimum milk production. 18. The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district. 19. Stall feeding of animals with stored hay and concentrates 20. Proper hygienic and sanitation of the animal shed 21. In floods, un-tether or let loose the animals (Follow up of loose housing system)	13. Repair of animal shed . 14. Bring back the animals to the shed and take proper care of the animals.
Drinking water	1. Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the flood. Rain water harvesting should be done in all districts. Every district should be made self-sufficient. Every district gas plenty of rain water which should be harvested so that these areas should become self-sufficient & if required they should be able to provide water to	1. Sufficient facility for transportation with advanced proper planning should be made in the areas of each district. 2. During flood condition there will be polluted water, whatever potable drinking water source is available should be used	1. Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. 2. Clean disinfected water from bore well or rain harvested water may be

	other dry areas too. The rain water should not be wasted in sea. 2. Shelters & temporary camps should be set up at a height in city area as well as in suburbs after choosing the right location for each area. Same provisions should be done in other Konkan districts. 3. Bore well facilities should be exploited in districts for supply of clean water. Contamination of local water resources due to flood water should be prevented 4. Potable drinking water source should be there to supply water to animals. 5. Every society should implement rain harvesting system, so that water can be stored for use whole year long. Water problem likely to be faced in future. Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken. 6. Judicious use of water in agriculture i.e. through drip/sprinkler irrigation. 7. Wastage of water needs to be curbed. 8. Rain water harvesting measures needs to be implemented even at village level with establishment of water Storage and Purification facility	with almost care. 3. Disinfection of drinking water *i.e.* chlorination of water should be carried out Stop use of drinking water for animals from contaminated water resources. 4. Disinfection of the water for consumption of the animals should be carried out to prevent water-borne diseases. Aerosol spray of the disinfectant for preventing spread of airborne infections should be carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities. 5. Judicious use of water for livestock. 6. Water tankers provision 7. Private water resources such as wells shall be used for drinking water availability only.	supplied to the animals as water-borne infections are common after floods. 3. Sources of potable drinking water should be tapped for its proper use. 4. Permanent water resources should be developed with campaign for public awareness. 5. Water storage facility created away from the flooded area.
Health and disease management	1. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for flood affected areas with stock of life saving medicine for livestock. 2. Vaccination of animals for various diseases according to season. 3. Deworming and spraying be done to get rid of endoparasites and ectoparasites to keep the health of animals in good condition. 4. Stock of life saving medicine be made. 5. Disaster management team of veterinarians be constituted at district/taluka/panchayat level. 6. Training to veterinarians in health and disease management during flood disaster be given. 7. Awareness amongst farmers regarding health care practices during flood disaster be undertaken. 8. Feedadditives/Tonics/ Vitamin supplements should be stocked. 9. Vaccines /Dewormers needs to be stocked. 10. Records/PM/ Carcass disposal arrangements needs to be ensured. 11. In flood prone area pucca cattle shed should be constructed.	1. Services of trained personnel need to be made available in affected area with sufficient supply of life saving medicine of livestock. 2. Shifting of the animals at suitable place for temporary shelter. 3. Disaster management team of veterinarians be deployed. 4. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. 5. Various referral centres in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. 6. Various diagnostic facility with modern techniques should be made available at Tahsil level besides district level so that	1. Routine training programme as a refresher course need to be implemented in relation to health and disease management during flood with stock of life saving medicine for livestock. 2. After flood condition there are chances of occurrence of specific diseases. 3. Preventive measures should be taken to reduce occurrence of diseases. Vaccination and deworming programme needs to be undertaken. 4. Animals should closely be observed for new/re-emerging diseases. 5. Proper disposal of carcass is very

	12. Preparation of walls and hips to keep flood water away from village. 13. Specify the endemic diseases (species wise) in that region. 14. Surveillance and disease monitoring network establishment	more number of farmers may approach for diagnosis & treatment. 7. Adequate nutrition including vitamin-mineral supplements should be given to animals to keep their health in proper condition. During occurrence of contagious diseases, affected animals should be kept isolated and treated properly. Isolation and treatment of ailing animals viz. hypothermia, wound, diarrhoea and pneumonia be undertaken. 8. Vaccination against HS, BQ and FMD in bovines and PPR and enterotoxaemia in small ruminants should be undertaken. 9. Deworming and spraying of apparently healthy animals be carried out. 10. Use of antivenum in snake bite cases. 15. Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken. 13. Post Mortem /record keeping/carcass disposal arrangements be effected. 14. Disinfect the premises with bleaching powder and lime. 15. Turn off electrical power. 16. Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls during floods. 17. During severe regular flood, shifting of village away from river or changing the path of river away from village. 18.Rescue of sick and injured animals and their treatment. 19. Conducting mass animal health camps.	important in flood affected areas from public health point of view Methods of disposing of dead animals include burning, burying and composting 6. Disinfection of animal sheds with 2% formaldehyde / 4% caustic soda. 7. Provide proper shelter to protect animals from cold and rain. 8. Record of affected livestock to be submitted for compensation of the loss. 9. In regular flood prone areas defenses such as levees, bunds, reservoirs and weivs should be used for future preventions. 10. Repair of animal shed 11. Bring back the animals to the shed and protect animal from stress 12. Conducting mass animal health camps

Cyclone			
Feed and fodder availability	1. There should be availability of fodder depot one each for every district. 2. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the district where feeds & fodder (silage) can be stored for emergency use. The store house should have proper walls on all sides with one entrance to avoid effect of cyclone. 3. Feed & fodder should be stored as emergency stock in Govt. warehouses which can be distributed to areas that need them.	1. Adaptation of proper distribution policy as per requirement with transport facility. 2. The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district.	1. Readiness for feed and fodder bank as and when required for each districts with transport facility should be created.
Drinking water	1. Water resources as in general are inadequate and hence the resources should be trapped and increased. 2. Rain water harvesting should be done in all districts. Every district should be made self-sufficient. Each district has plenty of rain water which should be harvested so that these areas are self-sufficient & if required they should be able to provide water to other dry areas too. The rain water should not be wasted in sea. 3. Walls of the well should be constructed much above the ground level to avoid contamination.	1. Special distribution and carrying capacity should be implemented from other available resources. 2. Rain harvested water & bore well water should be disinfected & provided to the animals. 3. Special distribution and carrying capacity should be implemented from other available resources. 4. Disinfection of the water for consumption of the animals should be carried out to prevent water-borne diseases. Aerosol spray of the disinfectant for preventing spread of airborne infections should be carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities	1. Permanent water resources should be developed even after the event with campaign for public awareness.
Health and disease management	1. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for cyclone affecting areas with stock of life saving medicine for livestock. 2. Vaccination against common infections like FMD, swine fever, black quarter, anthrax, haemorrhagic septicaemia, etc. should be given to animals. 3. Stock of medicines should be kept available for use during cyclone.	1. Keep watch on weather and listen to radio or TV and make others alert by warning. 2. Shift the animals at safer place or in well secured cattle sheds. 3. The wall and roofs of the cow sheds should be well secured. 4. Loose poles & tree branches should be	1. Routine training programme as a refresher course need to be implemented in relation to health and disease management during cyclone with stock of life saving medicine for livestock. 2. Do not free the animals unless all clear or officially advised it is safe.

	4. The walls and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind.	removed, which may become harmful during extreme wind. 5. Services of trained personnel need to be made available in cyclone affected area with sufficient supply of life saving medicine of livestock. 6. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. 7. Various referral centers in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be made available at Tahesil level besides district level so that more number of farmers may approach for diagnosis & treatment.	
Heat wave and cold wave			
Shelter /environment management	Capacity should be developed with temporary sheds at Govt./Semi Govt./NGO's/ Goshala's for heat / at district level on the basis of forecasting. There is possibility of heat stress to animal during summer season. Thatched sheds should be provided as a shelter to animal to minimize heat stress. Water splashing should be done in sheds/ on animals to reduce the surrounding temperature. Foggers can also be fitted in animal sheds. Awareness campaign should be undertaken amongst farmers about shelter management during summer, cold, winter and rainy season. Farmers should be informed through Community Radio/ TV programmes/ Publishing popular articles in local news paper. *Ad.lib*. drinking water along with water for splashing on animals Grazing during cool hours. Prefer stall feeding 0. During cold wave there should be provision of sheds for protection of animals especially young animals from direct	1. Provide proper sheds for animals and keep animals inside during hot sun. 2. Ad lib. Fresh, clean and cool drinking water. 3. Water splashing on animals. 4. Providing cooler environment to the animals. 5. Grazing during cool hours. 6. Feeding of concentrates in more quantity. 7. Stall feeding of the livestock. 8. There should be proper ventilation in the sheds. 9. The windows of the sheds should be covered with gunny bags on which water should be sprinkled to minimize direct entry of heat wave in animal shed. 10. Water splashing be done 2-3 times in sheds / on animals during hot part of the	1. Areas and various agencies should be identified and listed to overcome such events with public awareness campaign. 2. The stress on animals due to heat wave should be minimized by providing proper nutrition to the animals.

	wind/rain or during cold wave/heavy rain. 1. Nutritional requirements of animals is higher during cold and wind so adequate diet should be given. 2. Plantation of trees near sheds help in cold windbreak and also reduce heat stress.	day. 11. Animals should not be let loose for grazing during peak hours of the day i.e. 10am-5pm. 12. Bullocks should be put to work in early morning hour upto 10 am and late evening hours 5-7 pm. 13. Feed green fodder/silage / concentrates during day time and roughages /hay during night time in case of heat waves. 14. Transportation arrangement for proper shelter of livestock at the special camp sites during heat wave/ cold wave. 15. The inside environment of the shed during cold wave should be kept warm by providing heaters during night hours. 16. Windows be closed, the sides may be covered by polythene sheet or gunny bags, high wattage bulbs be provided during night hours to protect animals particularly young and old animals during cold waves. 17. Proper feeding of animals should be done. Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves	
Health and disease management	1. Feed additives/heat stress reliving drugs/ multivitamin supplements to be kept ready. 2. Vaccination of animals for various diseases according to season. 3. Deforming and spraying be done to get rid of endoparasites and ectoparasites. 4. Sufficient stock of life saving drugs such as corticosteroids, sedatives, IV fluids should be made. 5. Personnel should be trained in health management of livestock during summer/ winter through training. 6. There should be provision of sheds for protection of animals especially young animals from direct wind / rain, during cold	1. Any cases reported to be treated in isolation 2. Keep in cool condition. 3. If there is occurrence of dehydration in animals they should be kept isolated and treated properly with fluid therapy. 4. Adequate quantity of clean, cold drinking water be provided for 24 hrs during heat wave. 5. Provide mineral supplements and give multivitamins injections with adequate	1. Routine training programme as a refresher course need to be implemented in relation to health and disease management during heat wave with stock of life saving medicine for livestock. 2. There will be stress on animals due to deterioration of health during drought heat wave. 3. Proper feeding should be done to minimize the stress on animals by

	wave/ heavy rains. 7. Awareness campaign should be undertaken amongst farmers about shelter management during summer, cold, winter and rainy season. 8. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter during heat and cold waves with stock of life saving medicine for livestock. 9. During Hailstorm provide shelter with well secured sheds. 10. Specify the endemic diseases in that region. 11. Surveillance and disease monitoring net work establishment.	diet 6. Services of trained personnel need to be made available in affected area with facilities to overcome heat waves through water availability and cold through proper closed shelter with sufficient supply of life saving medicine of livestock. 7. During cold - Adequate nutrition should be given to animals to keep their health in proper condition. 8. If there is occurrence of disease, affected animals should be kept isolated and treated properly. Body of the animal may be covered with gunny bag or blanket 9. Adequate quantity of clean, cool drinking water also be provided during cold wave. 10. In Hailstorm protect animals by providing shelter, treat wounded animals immediately, provide warm, remove stone debris and clean the path. 11. Rescue of sick and injured animals and their treatment 12. Conducting mass animal health camps	supplying energy, mineral and vitamin supplement 4. Intensive rearing of animals and treatment follow-up. 5. Vaccination of animals. 6. After Hailstorm repair roofing of the cattle sheds, avoid stress and treat wounded animals properly to control mortality. 7. Management of fallen trees and poles remove broken trees and their branches. 8. Compensation for loss of property in terms of mortality in animals and damage to cattle sheds. 9. Conducting mass animal health camps

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	1. There should be availability of feed, feed ingredients and mineral mixtures with sufficient storage capacity for every district.	1. Adaptation of proper distribution policy as per requirement with transport facility. 2. Supply of feed ingredients through government channel to the end users	1. Readiness for feed, feed ingredients and mineral mixtures as and when required for each districts with transport facility. 2. Strategies to minimize the effects	

	2. Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers 3. Storage of feed ingredients of previous year in sufficient quantity to use in scarcity period. 4. Identification and storage of locally available feed ingredients as an substitute for scares ingredients. 5. A farm disaster kit should be prepared in advance. The kit should be placed in a central location and everyone should know where it is. The contents of the kit must be checked regularly to ensure fresh and complete supplies. The following items should be included in the kit in addition to the items that are used everyday: – Updated list of all farms with information about birds, their location and records of feeding, vaccination, tests. – Basic first aid kit. – Handling equipment & cages. – Waterier and feeders. – Sanitation and disinfection equipments & chemicals. – Other safety and emergency items for vehicles and trailers, e.g.,Extra tyres, winches, tools, etc. 6. Maize grain is limiting source as a feed ingredient in poultry feed.	at reduced price. 3. Make sure that birds receive adequate quantity and essential nutrients through feed to minimize stress and to prevent occurrence of disease outbreaks. 4. Crucial use of available feed avoiding excess feeding and wastage of the feed. 5. Stored feed ingredients will be utilized during contingency. 6. Birds should be evacuated and taken to shelters as soon as there is news of an imminent disaster. Every flock must have some form of durable and visible identification. 7. There should be arrangements for appropriate transport, suitable for birds. Stranded birds should be rescued and taken to safer places. 8. If the stranded place is considered safe for the next week or so, the birds may be left there but should be provided with feed and drinking water. 9. Arrangements should be made so that veterinary and Para- veterinary personnel can quickly reach all affected farms to provide necessary measures. 10. Officials and other personnel engaged in relief work should also gather intelligence on the extent and nature of the damage to individual farms and villages so that appropriate relief measures can be implemented. 11. Adequate nutrition should be given to birds to keep their health in proper condition.	of stress due to drought by optimum feeding and management of the flock. 3. Use of mineral and vitamin supplements to reduce stress. 4. Follow up of affected livestock for adequate feed supply. 5. Proper utilization of the resources should be carried out. The situation should be assessed properly and decision has to be taken on which birds to be treated first and how. 6. The birds that are in very poor condition with no chance of recovery should be culled in humane manner. 7. The dead birds should be disposed off in hygienic manner by burial or incineration. 8. The situation at the farm also should be assessed and the corrective measures should be taken as soon as possible. All damages should be repaired and shed should be made functional. Disinfection of the premises and shed should be carried to prevent spread of diseases. 9. The stress on poultry due to shortage of feed during drought period can be minimized by proper feeding of the birds after drought period. 10. Ad lib. feeding to compensate the egg production. 11. Feed additives may be used to maximize production	

	7. Store maize for poultry feed. 8. Substitute feed ingredient should be tapped as replacement for maize grain which can be used for poultry feed. 9. Concentrate ingredients such as Grains, brans, & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured. 10. Ban on export of oilseed meals needs to be implemented. 11. Feed required for broilers3.5 kg./bird for six weeks. For Layers 55 kg /layer bird for a period of 72 weeks. 12. Storing of house hold grain like maize, broken rice, bajra etc, 13. Culling of weak birds	12. The available ingredients as poultry feed should be used with utmost care. 13. Non-conventional feed ingredients can also be tapped to use as a poultry feed taking into consideration the anti-nutritional factors present in it. 14. Alternate day feeding for broilers. 15. Avoid feed wastage. 16. Restricted feeding for layers. 17. Poor layer birds to be culled. 18. Broiler rear up to 4 weeks only. 19. Use of feed additives be enhanced to maximize the feed efficiency. 20. Supplementation only for productive birds with house hold grain 21. Supplementation of shell grit (calcium) for laying birds		
Drinking water	1. Water resources as in general are inadequate and hence the resources should be trapped and increased. 2. Conservation of water for drought period. 3. Water conservations measures adopted to increase water table like recharging of bore wells. 4. Available water resources should be tapped and reserved. 5. Leak proof water supply systems. 6. Available rain water harvesting technique should be adopted i.e. farm ponds etc. 7. Water conservations measures be adopted to increase water table.	1. Special distribution and carrying capacity should be implemented from other available resources for poultry. 2. Optimum use of available water as per the requirement of birds. 3. Supply of adequate water to farms with transportation facility. 4. Supply of water through tankers during contingency. 5. Judicious use of water. 6. Use of nipples as waterers.	1. Permanent water resources should be developed even after the event with campaign for public awareness. 2. Evaluation and fine tuning of the contingency majors. 3. Ensure clean, cold water supply to birds. 4. Steps should be taken to conserve water and to develop permanent water resources. 5. Fresh and ad lib. water should be provided.	

	8. Judicious use of water. 9. Use of nipples as waterers.			
Health and disease management	1. Personnel should be trained for health and disease management of poultry through trainings and list of trained personnel should be available at each district head quarter with stock of medicine, mineral mixture and vaccine for poultry. 2. Regular and strict vaccination of birds. 3. Vaccination of wild birds through water whenever possible. 4. Deworming of birds before and after drought period. 5. Appointment of veterinarian on farms made compulsory. 6. Culling of sick birds.	1. Services of trained personnel need to be made available in affected area with sufficient supply of medicine, mineral mixture and vaccine for poultry. 2. Immediate attention to diseased birds by veterinarians. 3. Regular visits of veterinarians to detect diseased birds and veterinary care 4. Vaccination of birds if necessary. 5. If there is occurrence of disease, affected birds should be kept isolated and treated properly and promptly. 6. Periodic disinfection and disinfestations of farm and premises. 7. Measures to minimize risk of spreading contagious diseases. 8. Birds should be checked for injury/ signs of disease. 9. Antibiotic through water 10. Anti-stress supplements 11. Multivitamin supplements 12. Bio-security measures to be implemented. 13. Proper disposal of poultry carcass. 14. Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water	1. Routine training programmed as a refresher course need to be implemented in relation to health and disease management during drought with stock of life saving medicine and vaccine for poultry to prevent outbreak. Proper disposal system of poultry carcasses. 2. Efforts to minimize effects of stress through optimum feeding, management and veterinary care. 3. Assessment of losses due to mortality if any. 4. Disposal of dead birds by burning / burying with line powder in pit 5. There will be stress on birds due to deterioration of health during drought period. Hence proper feeding should be done to minimize the stress on birds by supplying vitamin supplements. 6. Birds should be tested at regular interval to confirm that they are free of contagious diseases. 7. Proper disposal of birds died of various diseases. 8. Vaccination. **9.** Replacement of stock. 10. Hygienic and sanitation of poultry house	
Floods				
Shortage of feed	1. Poultry owners needs to be advised to be in readiness for- 2. Alternate poultry sheds with feed	1. Shifting of birds at Alternate poultry sheds with feed stock at safe places. 2. Stress reducing measures to be	1. Shifting at original site after repair of the shades and restoration of the necessary facilities.	

ingredients	stock at safe places. 3. Displacement of stock- transport arrangements. 4. Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers 5. Measures to avoid spoilage of feed stores due to water. 6. Construction of feed stores to stores feed sufficient for at least one month. 7. Farmers should be encouraged to purchase and store the feed ingredient when it is cheaply available in the market. 8. Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas. 9. In case of EFW, shift the birds to safer place 10. Storing of house hold grain like maize, broken rice, bajra etc, 11. Culling of weak birds	adopted. 3. Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district. 4. Adequate nutrition should be given to birds to keep their health in proper condition. 5. Judicious use of available feed. 6. Use stored feed as supplement 7. Don't allow for scavenging	2. Proper feeding should be done to minimize the stress on birds 3. Ensure good quality feed and fodder supply to birds 4. Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district even after the event.	
Drinking water	1. Arrangement of clean and hygienic water. 2. Leak and contamination proof water supply system. 3. Installations of the watering systems targeted to optimum use of available water avoiding water wastage. 4. Source of water should be away from flood affected areas. 5. Sufficient storage capacity should	1. Sufficient facility for transportation with advanced proper planning should be made in the areas of each district. 2. Water treatment to avoid entry of pathogens through drinking water. 3. Judicious use of potable chlorinated water. 4. Avoid contamination of wells and tube wells by flood water. 5. Proper utilization of Water to save water.	1. Actions to rectify the water related issues observed during flood period. 2. Ensure potable water supply to birds. 3. Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. 4. Sources of potable drinking water should be tapped for its proper use.	

	be made available particularly during rainy season in view of the forecasting of flood. 6. Encourage the farmers for rain water harvesting. 7. Proper utilization of Water to save water.	6. Supply of water through tankers during contingency. 7. Water purification measures for ensuring hygienic water supply. 8. Sanitation of drinking water	5. Use of disinfected water. 6. Arrangements of hygienic water supply. 7. Sanitation of drinking water	
Health and disease management	1. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for flood affecting areas with stock of medicine, mineral mixture and vaccine for poultry. 2. Vaccination and deworming schedule should be observed strictly. 3. Additional deworming can be carried out before and after floods. 4. Medicine store facility with availability of adequate drugs at each farm and veterinary dispensaries. 5. Training of farmers to identify signs of common contagious diseases particularly to avoid outbreaks. 6. Avoid stranded farms. Do not built poultry house on nalla or stream or otherwise remove the birds before monsoon from such poultry house. 7. In case of EFW, add antibiotic powder in drinking water to prevent any	1. Services of trained personnel need to be made available in affected area with sufficient supply of medicine, mineral mixture and vaccine. 2. During flood if it is difficult to shift and manage large number of birds, they should be slaughter and sent to cold storage. 3. Vaccination against contagious diseases. 4. Proper disposal of birds died of diseases particularly contagious diseases. 5. Disinfection of sheds be undertaken. 6. Immediate veterinary help to the farms. 7. Adequate proper feeding and management. 8. Sanitation of poultry house 9. Treatment of affected birds 10. Prevent water logging surrounding the sheds 11. Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	1. Routine training programmed as a refresher course need to be implemented in relation to health and disease management during flood with stock of medicine and vaccine for poultry to prevent outbreak. Proper disposal system of poultry carcasses. 2. Cleaning and disinfection of poultry farms. 3. Monitoring for disease outbreaks in birds through regular farm visits by veterinarian. 4. Proper disposal of carcass is very important in flood affected areas from public health point of view. 5. Vaccination for RD and IBD to avoid outbreaks . 6. Anti-stress treatment of birds is important to prevent mortality. 7. Preventive measures should be taken to reduce occurrence of diseases, particularly use of antibiotics in drinking water. 8. Hygienic measures should be followed. 9. Birds should be served for emerging infectious diseases. 10. Restriction on movement of the birds. 11. Compensation of the loss.	

	disease outbreak		12. Disposal of poultry manure to prevent protozoal problem 13. Supplementation of coccidiostats in feed	
Cyclone				
Shortage of feed ingredients	1. Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas with storage facility. 2. In case of EFW, shift the birds to safer place 3. Storing of house hold grain like maize, broken rice, bajra etc, 4, Culling of weak birds	1. Feed and feed ingredients resources should be exploited with sufficient transport and storage facilities from other areas of the district. 2. Use stored feed as supplement 3. Don't allow for scavenging 4. Protect from thunder storms	1. Feed and feed ingredients resources should be exploited with sufficient transport and storage facilities from other areas of the district even after the event.	
Drinking water	1. Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the cyclone. 2. Provide clean drinking water	1. Sufficient facility for transportation with advanced proper planning should be made in the areas of each district. 2. Sanitation of drinking water	1. Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. 2. Sanitation of drinking water	
Health and disease management	1. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter during heat and cold waves with stock of life saving medicine, vaccine, feed and mineral mixture for poultry. 2. In case of EFW, add antibiotic powder in drinking water to	1. Services of trained personnel need to be made available in affected area with facilities to overcome heat waves through water availability and cold through proper closed shelter with sufficient supply of medicine and vaccine for poultry. During heat fogging system should be ready and during cold artificial heat through electricity need to be provided. 2. Detection & treatment of ailing birds. 3. Vaccination against contagious	1. Routine training programme as a refresher course need to be implemented in relation to health and disease management during heat and cold waves with stock of medicine and vaccine for poultry and sufficient arrangement. 2. Anti- stress to relieve stress. 3. Birds should be monitored for occurrence of diseases. 4. Vaccination to avoid outbreaks.	

	prevent any disease outbreak	diseases. 4. Antistressor preparations or multivitamins preparations through drinking water during stress. 5. *Ad. lib.* Cold water availability 6. Supply of medicine and vaccine for poultry. 7. Feed in cool hrs and increase the frequency of feeding with high density feeds. 8. Mineral & Vitamin supplementation 9. Sanitation of poultry house and Treatment of affected birds. 10. Sprinkle lime powder to prevent ammonia accumulation due to dampness	5. Proper disposal of poultry carcasses. 6. Disposal of poultry manure to prevent protozoal problem 7. Supplementation of coccidiostats in feed	
Heat wave and cold wave				
Shelter/environment management	1. Capacity should be developed with temporary sheds at Govt./Semi Govt./NGO's and private poultry farm for heat and cold wave at district level on the basis of forecasting which include backyard poultry. 2. Provision for well aerated and good shelter. 3. Provision of gunny bags on sides. 4. Roof thatching of poultry sheds. 5. Sprinklers on roof top 6. Foggers inside the sheds. 7. Stand-by water chanels 8. Clean outside area for free flow of air. 9. Whitewash on roof tiles. 10. Personnel should be trained for health and disease management through trainings and list of	1. Roof thatching of poultry sheds. 2. Sprinklers on roof top 3. Foggers inside the sheds. 4. Stand-by water chanels 5. Clean outside area for free flow of air. 6. Whitewash on roof tiles. 7. Avoid sunlight falling inside the shed. 8. Provide fans inside the shed. 9. Services of trained personnel need to be made available in affected area with sufficient supply of medicine, mineral mixture and vaccine for poultry. Proper disposal system of poultry carcasses. 10. Don't allow for scavenging during mid day. 11. Supplementation of house hold grain 12. Provide cool and clean drinking	1. Areas and various agencies should be identified and listed to overcome such events with public awareness campaign. 2. The stress on birds due to heat wave should be minimized by providing proper nutrition to the birds. 3. Anti-stress ORS be given to relieve stress 4. Compensation of the loss. 5. Routine training programme as a refresher course need to be implemented in relation to health and disease management during cyclone with stock of medicine and vaccine for poultry to prevent outbreak. Proper disposal system of poultry carcasses. 6. Anti heat stress Treatment for	

	trained personnel should be available at each district head quarter for cyclone affecting areas with stock of medicine, mineral mixture and vaccine for poultry. 11. Dissemination of information through Extension methodology.	water with electrolytes and vit. C 13. In hot summer, add anti-stress probiotics in drinking water or feed 14. During cold Poultry Houses will be protected by using gunny bag curtains. 15. Application of curtains and availing either series/ room heaters etc. during cold wave. 16. Make provision of high wattage bulbs at night hours during cold waves. 17. Transportation arrangement for proper shelter of backyard and commercial birds at the special camp sites during heat/cold waves. 18. Supplementation of grains. 19. Antibiotics in drinking water to protect birds from pneumonia	commercial poultry birds should be advised.	
Health and disease management	1. Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter during heat and cold waves with stock of life saving medicine, vaccine, feed and mineral mixture for poultry. 2. Store vaccines and medicines	1. Services of trained personnel need to be made available in affected area with facilities to overcome heat and cold waves through water availability and cold through proper closed shelter with sufficient supply of medicine and vaccine for poultry. During heat fogging system should be ready and during cold artificial heat through electricity need to be provided. 2. Detection & treatment of ailing birds. 3. Vaccination against contagious diseases. 4. Anti-stress ORS herbal preparations or multivitamins preparations through drinking water during. 5. *Ad.lib*. Cold water availability 6. supply of medicine and vaccine for poultry. 7. Feed in cool hrs and increase the	1. Routine training programme as a refresher course need to be implemented in relation to health and disease management during heat and cold waves with stock of medicine and vaccine for poultry and sufficient arrangement to overcome heat wave through foggers/ coolers and artificial heat through electricity need to be kept ready. 2. Anti-stress ORS be given to relieve stress. 3. Birds should be monitored for occurrence of diseases. 4. Vaccination to avoid outbreaks 5. Proper disposal of poultry carcasses.	

		frequency of feeding with high density feeds. 8. Mineral & Vitamin supplementation		

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow	1. Proper planning of water storage 2. Conservation & development of water resources by construction of reservoirs & dams. 3. Avoid seepage losses by lining the canals. 4. Adopt rain water harvest techniques. 5. Farmer's organizations, water users & private sectors should be involved in construction, operation & maintenance of irrigation system. 6. To make people aware about conservation of water. 7. Critical analysis of long range a Forecast data. 8. Storage of water. 9. A forestation program. 10. Conservation of rivers/reservoir/ponds. 11. Re-excavation of local canals and reservoirs.	1. Maintenance of dams & reservoirs to avoid leakage & to control theft of water. 2. Proper use of water resources on priority base. 3. Add water in shallow water pond. 4. Use stored water. 5. Use surface water flow. 6. Divert water from unutilized areas. 7. Utilize canal water. 8. Aeration of water in ponds/reservoirs.	1. Regular desiltation of reservoirs & dams. 2. Govt. should make laws on water conservation. 3. To develop demand oriented system. 4. Govt. should make laws to stop deforestation. 5. Need based monitoring through research plan. 6. Intensive forestation program. 7. Augmentation of surface water flow. 8. Strengthening of water reservoirs. 9. Rain water harvesting . 10. Compensation claims. 11. Prepare vulnerability map and place it to management committee
(ii) Changes in water quality	1. Storage of water disinfectant such as chlorine, alum etc. at district level. 2. Prohibit dumping of solid, liquid and waste in water sources. 3. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	1. Provision of water filtration system for the ponds to overcome the water contamination- 2. Use disinfectants and therapeutic drugs. 3. Adoption of bio-remedial measures	1. Removal of runoff from land by proper means before decomposition. 2. Supply of water filtration system even after the event & creating awareness in farmers. 3. Need based research data should be generated on water quality.

			4. Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	1. Available resources will be identified and need to be kept ready for each district on the basis of forecasting of insufficient rain. 2. To avoid loss due to seepage, infiltration & leakage by using bentonite, ash, polythene liners etc. 3. Maintain the level of water by pumping water into pond. 4. Critical analysis of long range Forecast data. 5. Storage of water. 6. A forestation program. 7. Conservation of rivers/reservoir/ponds. 8. Re-excavation of local canals and reservoirs.	1. Water resources of the areas will be exploited with planning of proper transport facilities in affected areas. 2. Maintain the level of water to the required depth. 3. Add stored water in shallow water depth. 4. Harvesting of fishes as early as possible to avoid mortality. 5. Use stored water. 6. Use surface water flow. 7. Divert water from unutilized areas. 8. Utilize canal water. Aeration of ponds	1. Available resources need to be listed with adequate transport arrangement. 2. Desiltation of pond bottom. 3. Maintenance of tanks & ponds 4. Need based monitoring through research plan. 5. Intensive a forestation program. 6. Augmentation of surface water flow. 7. Construction of water reservoirs. 8. Adoption of rain harvesting methods. 9. Compensation claims . 10. Prepare vulnerability map and place it to management committee
(ii) Impact of salt load build up in ponds / change in water quality	1. Minimize evaporation losses. 2. Dilution of water if salt load is high. 3. Available resources will be identified & 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. 4. On the basis of forecasting advising fish farmers for harvesting of marketable fish. 5. Prohibit dumping of solid, liquid and waste in water sources. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs	1. Dilution of water or exchange water to avoid salt builds up. 2. Harvesting the marketable fish to reduce the density. 3. Use disinfectants and therapeutic drugs. Adoption of bio-remedial measures	1. Trapping the water resources from other places for dilution to reduce salt load. 2. Need based research data should be generated on water quality. 3. Dumping of solid, liquid and waste should be stopped through enactment of legislation.
2) Floods			
A. Capture			
Marine			

Inland			
(i) Average compensation paid due to loss of human life	1. Fishermen will be given forewarning regarding heavy rains and advised not to go for fishing in rivers/reservoirs. 2. Areas need to be identified in each district prone for flood. 3. Maintenance of water drainages in proper way to avoid blockage. 4. Proper forecasting information should be available. 5. Be prepared to evacuate at a short notice. 6. Preparation of flood control action plan. 7. Warning dissemination and precautionary response. 8. Formation of flood management committee. 9. Enhancement in coping capabilities of common people. 10. Insurance for the life of people/fishermen.	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. 2. Sufficient stock of food, medicine etc. should be available. 3. Govt. should take necessary action & provide trained people for rescue operation during flood. 4. Human evacuation from the area. 5. Coordination of assistance. 6. Damage and need assessment. 7. Immediate management of relief supplies. 8. Immediate help delivery.	1. The victim's family shall be provided with compensation up to Rs. 1, 00,000/- for the deaths occurring during the fishing. 2. Rehabilitation of people. 3. Identify the causes of flood affected area & take necessary preventive measures. 4. Arrangement for rescue and casualty care. 5. Arrangement for burial control room. 6. Restoration of essential services, security and protection of property. 7. Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan. 8. Insurance and compensation claim.
(ii) No. of boats / nets/damaged	1. The prior information on safe keeping of boats and nets will be provided to the fishermen. 2. If prior information is given bring boats & nets towards the safer side. 3. Annual repair of boats/nets and gears. 4. Insurance of boats/nets/gears.	1. Fishermen will be advised to stop fishing during the floods and heavy rainfall. 2. Continuous monitoring on water level is required. 3. Coordination of assistance 4. Immediate management of relief supplies. 5. Govt. support and compensation.	1. The affected fishermen will provided with compensation up to Rs. 50,000/- for damaged boats or nets. 2. Education and training for the repair of boats/nets and gears. 3. Loss assessment & insurance claim.
(iii) No.of houses damaged	1. Forewarning regarding heavy rainfall, sudden downpour and floods will be spread in the fishermen villages on the banks of rivers. 2. Shift the people to safer places. 3. Proper maintenance of *Kaccha* houses. 4. Education and training for the repair of houses 5. Store raw material for emergency repair of	1. Temporary shelter to the affected families will be provided. 2. Arrangement of temporary shelters for homeless people. 3. Damaged house enumeration and need assessment. 4. Coordination of assistance. 5. Immediate management of relief supplies.	1. The housing facilities on higher elevation shall be provided to affected families by the Government agencies. 2. Provide compensation from Govt. to build/repair houses. 3. Loss assessment & insurance claim. 4. Govt. assistance claim.

	houses. 6. House insurance		
(iv) Loss of stock	1. Harvesting the existing fish stock 2. Keep boats, nets/gears ready for emergency use. 3. Store fuels, food/other item 4. Develop flood control management plans. 5. .Stock material insurance.	1. Search/locate the tock/input. 2. Mobilize local people for protection. 3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood	1. Provided subsidy on seeds by Govt. 2. Implementation of Insurance policy. 3. Locate backup stocks and verify its usability time. 4. Follow flood control management plan. 5. Notify utilities of the critical demand about loss of stock and inputs. 6. Loss assessment & insurance claim.
(v) Changes in water quality	1.Storage of water disinfectant such as chlorine, alum etc. at district level. 2. Provision to stop/close the effluent/sewerage discharge point in water odies 3. Store chemicals, disinfectants and therapeutic drugs. 4. Develop flood control management plan.	1.Provision of water filtration system for the ponds to overcome the water contamination- 2. Do not use contaminated water 3. Proper preparation and management through emergency aeration. 4. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 5. Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies. 6. Need based bioremediation	1.Removal of runoff from land by proper means before decomposition. 2.Supply of water filtration system even after the event & creating awareness in farmers. 3. Need based research data should be generated to maintain water quality, 4. Dumping of solid, liquid and waste should be stopped through enactment of legislation. 5. Contact Govt. and industrial organization for immediate remedy and cleaning of the water bodies. 6. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan
(vi) Health and diseases	1. Water filtration system & control measures for diseases should be available. 2. Advance planning and preparedness. 3. Store chemicals, disinfectants and therapeutic drugs. 4. Stock sufficient stores of medicines	1.Periodical checking particularly with respective fish mortality should be done during flood & dead fishes disposed properly. 2. Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal. 3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4. Emergency aeration or splashing in water bodies.	1.Setting health & disease management training centre at district level for fisherman community by Govt. or with the help of NGO. 2. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 3. Eradicating the disease where possible. 4. Follow up surveillance and monitoring after disease outbreak. 5. Need based research data should be generated.

			6. Loss assessment & insurance claim.
B. Aquaculture			
(i) Inundation with flood water	1.In the flood prone areas proper draining system from ponds need to be developed and planned in flood situation before forecasting of flood. 2.Site should be away from flood prone area. 3.Dyke should be stable in all weather condition & not liable to collapse during heavy rains. 4.Proper channels to be provided to pass surplus water & to avoid breakage to the bundh. 5.Proper facility construction for ponds and its stock safety. 6. Development of flood control management plan. 7.Preparedness with emergency backup equipment on site. 8. Stock insurance. 9. Preventive measures against entry of alien/wild organisms through flood water.	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. 2. On the basis of forecasting, information to farmers for sale of marketable fish with sufficient transport facility through various media. 3. Proper drainage should be adopted so that inundation with flood water should be minimized. Excess water should be drained from pond by providing screen outlets or using pumps. 4. Arrangement for evacuation. 5. Arrangement for rescue and casualty care. 6. Arrangement for burial control room. 7. Restoration of essential services, security and protection of property. 8. Coordination of assistance. 9. Damage and need assessment. 10. Immediate management of relief supplies. 11. Release excess water from height of T. 12. Lower the water level in culture facilities.	1). Planning even after the event should be made for proper drainage and creating awareness and trainings in flood situations. 2). Pinning even after the event should be made for proper drainage & creating awareness & training in flood situation. 3) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan 4) Reallocate fish to maintain appropriate biomass so that waste assimilation capacity of pond is not exceeded. 5) Reduce or cease feeding because uneaten food and fish waste decreases the dissolved oxygen level. 6) Strengthening of water bodies/ponds. 7) Loss assessment & insurance claim.
(ii) Water contamination and changes in water quality	1. Availability of water purifier i.e., chlorine, alum etc at district level. 2. Availability of water disinfectant such as chlorine, alum etc at district level. 3. Use of calcium hydroxide @ 150 kg/ha 4. Store chemicals, disinfectants and therapeutic drugs	1). Supply of water purifier for the ponds to overcome the contamination and changes in BOD. 2). Supply of water filtration system for ponds to overcome the contamination. Use of $kmno_4$ for bath of fish as	1). Supply of water purifier even after the event and creating awareness in farmers. 2). Supply of water filtration system even after the event & crating awareness in farmers. 3). Lime treatment for oxidation 4). To maintain water quality, need based

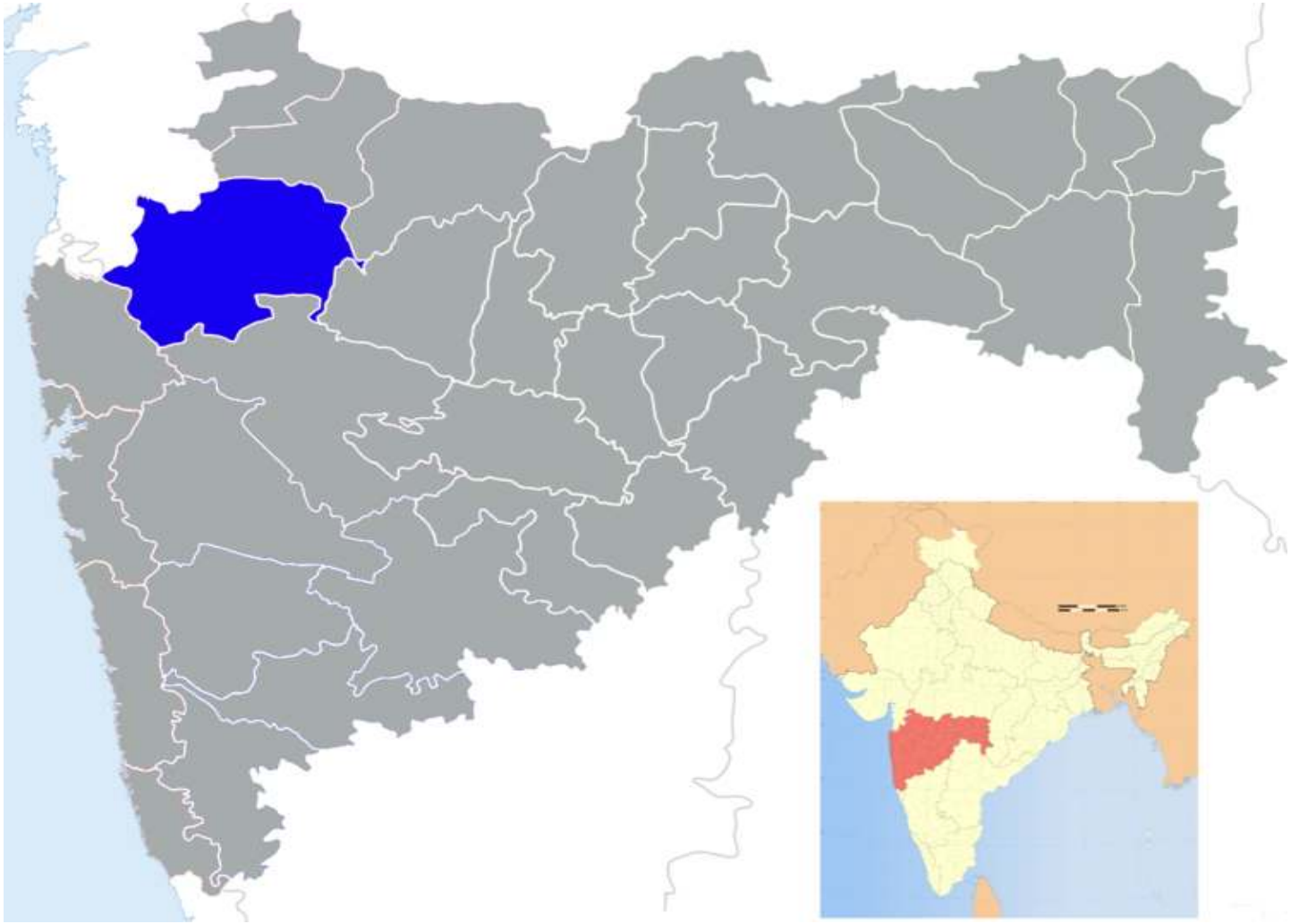
	5. Develop flood control management plan	prophylactics 3) . Do not use contaminated water. 4) Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas. 5) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 6) Maintaining the purity and quality of water bodies. 7) Need based bioremediation.	research data should be generated 5). Dumping of solid, liquid and waste should be stopped through enactment of legislation. 6). Immediate remedy and cleaning of water bodies. 7). Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.
(iii) Health and diseases	1. Storage of water purifiers and control measures for diseases should be available. 2. Personnel should be trained for health & disease management through training 3. & list of trained personnel should be available at each district level. 4. Adequate stock of medicine should be available at each district level. 5. Antibiotics fortified feeding as prophylactics 6. Advance planning and preparedness. 7. Store chemicals, disinfectants and therapeutic drugs. 8. Stock sufficient emergency medicines.	1. Periodical checking particularly with respective fish mortality should be done during flood. 2. Services of trained personnel need to be made available in affected areas with sufficient supply of life saving medicines. 3. Disinfectants formalin treatments as prophylactics 4. Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. 5. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 6. Determination of nature and speed of transmission of diseases. 7. Emergency aeration or splashing in water bodies	1). Setting health and disease management training centre at district level for fishermen and government officials. 2). Routine training programmed as a refresher course need to be implemented in relation to health & disease management during flood. 3) .Lime treatment for oxidation 4). Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 5). Eradicating the disease. 6). Follow up surveillance and monitoring. 7). Proper disposal of dead fish. 8). Loss assessment & insurance claim
(iv) Loss of stock and inputs (feed, chemicals etc)	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. 2).Flood situation going to exist then move the feed, chemicals & other accessories to safer places. 3). Keep the stock/input at safe place for emergency	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. 2).Available fish stock should be recovered. Stock of inputs must be	1) The fish farmers shall be provided with fish seed and feed at concessional rates. 2) Feeds, chemicals etc required for the culture operation should be purchased. 3) Strengthening of stocks. 4) Assessment of total loss.

	purpose. 4). Store fuels, food/other item. 5) .Develop flood control management plan. 6). Stock material insurance.	stored in well protected area. 3). Search/locate the stock/input. 4). Purchase/hire valuable stock/inputs from distant areas not affected by flood.	5) Insurance claims
(v) Infrastructure damage (pumps, aerators, huts etc)	1) Prior information regarding removal of Pumps and aerators shall be given to the fish farmers. 2) Flood situation going to exist then move the pumps, aerators & other accessories to safer places. 3) Educate and provide training for the repair of infrastructure. 4) Follow flood control management plan. 5) Store raw materials for repairing of pumps aerators, huts etc. 6) Infrastructure insurance.	1) Pumps, aerator and generators shall be removed from the pond before the event. 2) Use manual techniques for aeration or make substitute arrangement for the same. 3) Notify utilities of the critical demand. 4) Coordination of assistance. 5) Immediate management of relief supplies.	1. Suitable Compensation for the damaged machinery shall be given to the fish farmers. 2. Install the equipments during flood. 3. Damaged infrastructure enumeration and need assessment. 4. Locate backup equipment and verify its operation. 5. Repair of damaged infrastructure. 6. Loss assessment & insurance claim.
3. Cyclone / Tsunami			
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	1. If intensity of cyclone with heavy rain fall exists then harvest existing fish stock. 2. Dike should be stable in all weather condition &	1. On the basis of forecasting information to farmers for sale of marketable fish with sufficient	1. Planning even after the event should be made for proper drainage & creating awareness & training in storm situation.

	not liable to collapse during flood.	transport facility through various media. Proper drainage should be adopted so that inundation with storm water should be managed 2. Enhancement of dykes height by sand bags	
(ii) Changes in water quality (fresh water / brackish water ratio)	1. Supply of water for correcting the changes in fresh water & brackish water. 2.Maintain salinity by addition of fresh water up to 20-25 ppt.	1. Supply of water for correcting the changes in fresh water & brackish water. 2. Use euryhaline species	1. Water storage facility needs to be developed to overcome the problem of changes in fresh & brackish water ratio. 2. use Euryhaline species for culture
(iii) Health and diseases	1. Water filtration system & control measures for disease should be available. 2. Adequate stock of medicine should be available at each district level. 3. Liming and formalin treatment	1. Periodically checking particularly in respective of fish mortality & water parameter during flood. 2. Disinfectants treatments	1. Settling health & disease management training centre at district level for fishermen & Govt. official.
(iv) Loss of stock and inputs (feed, chemicals etc)	1. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals & other accessories to safer places. 2. Stock cover under insurance	1. Available fish stock should be recovered.	1. Feeds, chemicals etc required for the culture operation should be 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
(vi) Any other			
4. Heat wave and cold wave			
A. Capture			
Marine			
Inland			

B. Aquaculture			
(i) Changes in pond environment (water quality)	1)If intensity of heat wave high, add water from other source. 2)Harvest existing fish stock. 3)Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 4)Listen to local weather forecasts and stay aware of upcoming temperature changes. 5) Arrange the aerators. 6) Ensure sufficient water quantity in water bodies. 7)Formulate strategic fishing management for the heat /cold waves. 8) Tree plantation around fish ponds	1) Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 2) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. 3) Use dark materials to cover the water bodies during excessive heat waves. 4) Stay hydrated by drinking plenty of fluids during fishing/field work. 5) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths. 6) Educating the farmers through electronic or print media 7) Maintain Water level in pond	1)Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 2) Intensive afforestation program for reducing heat waves. 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. 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. 5) Loss assessment & insurance claim.
(ii) Health and Disease management	1) Adequate stock of medicine should be available at each district level. 2) Advance planning and preparedness. 3) Store chemicals, disinfectants and therapeutic drugs. 4) Develop heat/ cold wave control management plan. 5) Stock sufficient emergency medicines.	1)Periodical checking particularly with respective fish mortality should be done. 2)Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. 3) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4) Determination of nature and speed of transmission of diseases. 5)Emergency aeration or splashing in water bodies 6)Bleaching powder 1 to 2 % , formalin treatment to prevent disease	1)Setting health & disease management training centre at district level for fishermen & Govt. official. 2) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 3) Eradicating the disease. 4) Follow up surveillance and monitoring. 5) Proper disposal of dead fish. 6) Loss assessment & insurance claim. 7)KMNO4 2 % to maintain oxygen level

Annexure I: Map of Nasik District within Maharashtra state




NASHIK
(Maharashtra)
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DHULE
JALGAON
AURANGABAD
AHMADNAGAR
THANE
Gujarat
To Arvi
To Sangamner
Taharabad
Jaikhedan
Mulher
Nampur
Galna
Khakurdi
Vaygaon
Ravalgaon
Brahmangaon
Malegaon
Bhaitana
Satana
Hatgarh
Desran
Thangode
Arai
Surgana
Kanasi
Kalvan
Lohoner
Devla
Saundane
Bahre
Sarad
Abhona
Saptashring
Umbrane
Vehelgaon
Peint
Vani
3
Manmad
Nandgaon
Waghad
Vadner
Dindori
Palkhed
Ankai Tankai
Bolthan
Shegwa
Harsul
Rasegaon
Pimpalgaon
Baswant
Lasalgaon
Goldari
Ramsej
Ojhar
Vinchur
Nagarsul
Gangapur
Gorthan
Chamberlena
Niphad
Yeola
Nashik
Deolali
Andarsul
Trimbak
Chandori
Deolali
Cantt
Jarvar
Anjini
Panday
Jeni
Bhagur
Sinnar
Pangri
Nandgaon
Tringalwadi
Ghoti
Nandur
Shingote
Igatpuri
Kalsubai
50
District Boundary
River
National Highway
Major Road
Road
Railway Track
District Headquarter
Taluk Headquarter
Town
Tourist Places
Map not to scale
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Annexure III: Soil Map