

**State: GUJARAT**

**Agricultural Contingency Plan for District: NAVSARI**

<b>1.0 District Agriculture profile</b>					
<b>1.1</b>	<b>Agro-Climatic / Ecological Zone</b>				
	Agro Ecological Region / Sub Region (ICAR)	Western Ghats And Coastal Plain, Hot Humi-per humid eco region (19) : North Sahyadris and Konkan Coast, hot, humid eco-subregion(19.1)			
	Agro-Climatic Region (Planning Commission)	Gujarat plains and hills region ( XIII )			
	Agro Climatic Zone (NARP)	South Gujarat Heavy Rainfall area (GJ-1)			
	List all the districts or part thereof falling under the NARP Zone	Navsari, Valsad ,Dangs ,Tapi			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		20° 57' 07.05" N	72° 55' 16.50" E	12.33 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Navsari Agricultural University, Navsari-369 450 (Gujarat)			
	Mention the KVK located in the district	KVK, Navsari Agricultural University, Navsari (Gujarat)			
<b>1.2</b>	<b>Rainfall</b>	<b>Normal RF (mm)Average of last 10 years 2006 to 2016</b>	<b>Normal Rainy Days (number) Average of last 10 years</b>	<b>Normal Onset (specify week and month)</b>	<b>Normal Cessation (specify week and month)</b>
	SW monsoon (June-Sep):	1823	57	2 <sup>nd</sup> Week of June	4 <sup>th</sup> week of September
	NE Monsoon(Oct-Dec):	-	-	-	-
	Winter (Jan- March)	-	-	-	-
	Summer (Apr-May)	-	-	-	-
	Annual	1823	57	-	-

( Source :District Panchayat reports, reports of Agriculture department)

<b>1.3</b>	<b>Land use pattern of the district</b> (latest statistics)	Geographical area	Cultivable Area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	<b>Area (,000 ha)</b>	220.636	136.406	25.056	20.541	5.534	3.791	0.479	14.438	13.207	1.184

( Source :District Panchayat reports, reports of Agriculture department)

<b>1.4</b>	<b>Major Soils</b>	<b>Area (*000 ha)</b>	<b>Percent (%) of total</b>
	Heavy black soil with poor drainage (Plain area)	125.100	56.7
	Sandy loam soils with shallow depth (Hilly area)	67.515	30.6
	Heavy black soil with water logging and problematic soils (Coastal area)	28.021	12.7
<b>1.5</b>	<b>Agricultural land use</b>	<b>Area (*000 ha)</b>	<b>Cropping intensity %</b>
	Net sown area	136.406	125.12
	Area sown more than once	34.261	
	Gross cropped area	170.667	

(Source: District Panchayat reports, reports of Agriculture department)

<b>1.6</b>	<b>Irrigation</b>	<b>Area ('000 ha)</b>		
	Net irrigated area	98.212		
	Gross irrigated area	131.117		
	Rain fed area	38.194		
	<b>Sources of Irrigation</b>	<b>Number</b>	<b>Area ('000 ha)</b>	<b>% of total irrigated area</b>
	Canals		<b>65.307</b>	66.50
	Tanks		1.161	1.18
	Open wells		18.213	18.54
	Bore wells			
	Lift irrigation schemes			
	Other sources		13.531	13.78
	Total irrigated area		<b>98.212</b>	100.00
	Pump sets	15060		
	Micro-irrigation	13920	<b>19280</b>	
	<b>Groundwater availability and use (Data source: State/Central Ground Water Department/Board)</b>	<b>No. of blocks</b>	<b>% area</b>	<b>Quality of water</b>
	Over exploited			
	Critical			
	Semi- critical			
	Safe	6		Safe
Wastewater availability and use				
Ground water quality				

**\*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%**

( Source :District Panchayat reports, reports of Agriculture department)

**Area under major field crops & horticulture etc.**

**\*If break-up data (irrigated, Rain fed) is not available, give total area**

1.7	Major Field Crops cultivated Last Five year For agricultural crops	Area ('000 ha)*					
		<i>Khariif</i>		<i>Rabi</i>		<b>Summer</b>	<b>Total</b>
		<i>Irrigated</i>	<i>Rain fed</i>	<i>Irrigated</i>	<i>Rain fed</i>		
	Paddy	32.044	17.336			7.05	56.828
	Sugarcane			16.7			16.70
	sorghum		0.614	0.523			1.137
	Indian bean		0.41		0.51		0.92
	Pigeon pea	1.32					1.32
	Ragi		0.11				0.11
	<b>Horticulture crops – Fruits Last one year for Horticultural crops</b>	<b>Total area</b>					
	Mango	29.250					
	Sapota	7.746					
	Banana	2.960					
	<b>Horticultural crops – Vegetables</b>	<b>Total area</b>					
	Vegetable	22.031					
	Flowers	2.200					
	<b>Medicinal and Aromatic crops</b>	<b>Total area</b>	<b>Irrigated</b>		<b>Rain fed</b>		
	Medicinal and Aromatic crops	0.103					
	<b>Plantation crops</b>	<b>Total area</b>	<b>Irrigated</b>		<b>Rain fed</b>		
	coconut	0.55					
	cashew nut	0.324					
	<b>Fodder crops</b>	<b>Total area</b>	<b>Irrigated</b>		<b>Rain fed</b>		
	Sorghum	3.690					
	<b>Total fodder crop area</b>	5.28	-	-	-	-	-
	<b>Grazing land</b>	--	-	-	-	-	-
	<b>Others (Specify)</b>	-	--	-	-	-	-

<b>1.8</b>	<b>Livestock</b>	<b>Male ('000)</b>	<b>Female Total ('000)</b>	<b>Total ('000)</b>			
	Non descriptive cattle(local non yielding)			45.914			
	Cross breed cattle			145.470			
	Non descriptive buffalo (local non yielding)						
	Cross breed buffalo			-			
	Buffaloes			95.89			
	Goat			74.47			
	Sheep			2.06			
	Others (Camel, Pig, Yak etc.)						
Commercial dairy farms (Number)			Total Livestock =363.804				
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total number of birds</b>				
	Commercial		249.0				
	Backyard	-	437.25				
<b>1.10</b>	<b>Fisheries</b> (Data source: Chief Planning Officer)						
	<b>A. Capture</b>						
	i) <b>Marine</b> (Data Source: Fisheries Department)	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>		<b>Storage facilities (Ice plants etc.)</b>
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
			-----				
	ii) <b>Inland</b> (Data Source: Fisheries Department)	<b>No. Farmer owned ponds</b>		<b>No. of Reservoirs</b>		<b>No. of village tanks</b>	
17		3		15			
	<b>B. Culture</b>						
		<b>Water Spread Area (ha)</b>		<b>Yield (t/ha)</b>		<b>Production ('000 tons)</b>	
	i) <b>Brackish water</b> (Data Source: MPEDA/ Fisheries Department)						
	ii) <b>Fresh water</b> (Data Source: Fisheries Department)						
	<b>Others</b>						

( Source :District Panchayat reports, reports of Agriculture department)

1.11	Production and Productivity of major crops (Average of last 5 years: 2010-11 to 2015-16)	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)
<b>Major field crops</b> (Crops to be identified based on total acreage)									
	Paddy	134.894	2700			25.268	3583	160.162	3141.5
	Sorghum(grain)	0.784	1277	0.709	1356			1.493	1361.5
	Indian bean	0.33	800					0.33	800
	Sugarcane			1152.30	69 Ton			1152.30	69
	Ragi	0.890	890					0.890	890
	Pigeonpea	1126	853					1126	853
<b>Major Horticultural crops</b> (Crops to be identified based on total acreage)									
	Mango	261.40	9100					261.40	9100
	Sapota	96.91	12910					96.91	12910
	Banana	141.86	51400					141.86	51400

1.12	Sowing window for 5 major crops	Paddy	Sorghum(grain)	Indian bean	Sugarcane	Ragi
	Kharif- Rain fed	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July	-	-	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July
	Kharif-Irrigated	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July	-	-	2 <sup>nd</sup> week of June to 2 <sup>nd</sup> week of July
	Rabi- Rain fed	-	-	2 <sup>nd</sup> week of November to 4 <sup>th</sup> week November	-	-
	Rabi-Irrigated	-	-		1 <sup>st</sup> week of October to 4 <sup>th</sup> week of January.	-

1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought			√
	Flood		√	
	Cyclone			√
	Hail storm			√
	Heat wave			√
	Cold wave			√
	Frost			√
	Sea water inundation			√
	Pests and diseases (specify) (specify the pests and diseases in the major crops)		√	

1.14	Include Digital maps of the district for		
		Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed Yes
		Soil map as Annexure 3	Enclosed: Not

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rain fed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
<b>Delay by 2 weeks</b>  <b>June 4<sup>th</sup> week</b>	Heavy black soil with poor drainage (Plain area)	Paddy	<b>No Change</b>	Irrigation through canal and well	Linkage with RKVY, GSSC and University
		Sorghum(grain)	<b>No Change</b>	Sowing with irrigation	
		Indian bean	<b>No Change</b>	This crop is taken in reserve moisture	
		Sugarcane	<b>No Change</b>	Irrigate the crop if necessary	
		Pigeon pea	<b>No Change</b>	Sowing the crop with normal practices	
		Ragi	<b>No Change</b>	Sowing with irrigation	
	Sandy loam soils with shallow depth (Hilly area)	Paddy	<b>No Change</b>	SRI method, Aerobic rice, sprouted seed	
		Sorghum(grain)	<b>No Change</b>	Sowing the crop with available irri.	
		Indian bean	<b>No Change</b>	No suggestion	
		Sugarcane	<b>No Change</b>	Irrigate the crop if necessary	
		Pigeon pea	<b>No Change</b>	Sowing the crop with normal practices	
		Ragi	<b>No Change</b>	Sowing the crop with available irri.	
	Heavy black soil with water logging and problematic soils (Coastal area)	Paddy	<b>No Change</b>	Sprouted seed	
		Sorghum(grain)	<b>No Change</b>	Sowing with own irrigation facility	
		Indian bean	<b>No Change</b>	No suggestion	
		Pigeon pea	<b>No Change</b>	Sowing the crop with normal practices	
		Sugarcane	<b>No Change</b>	Irrigation through canal and well	
		Ragi	<b>No Change</b>	Sowing the crop with available irri.	



<b>Delay by 4 weeks (Specify month)</b>  <b>July 2<sup>nd</sup> week</b>	Heavy black soil with poor drainage (Plain area)	Paddy	<b>No Change</b>	Irrigation through canal and well	Linkage with RKVY, GSSC and University
		Sorghum(grain)	<b>No Change</b>	Sowing with irrigation	
		Indian bean	<b>No Change</b>	No suggestion	
		Sugarcane	<b>No Change</b>	Irrigate the crop if necessary	
		Pigeon pea	<b>No Change</b>	Sowing the crop with normal practices	
		Ragi	<b>No Change</b>	Sowing the crop with available irri.	
	Sandy loam soils with shallow depth (Hilly area)	Paddy	<b>No Change</b>	SRI method, Aerobic rice, sprouted seed	
		Sorghum(grain)	<b>No Change</b>	Sowing the crop with available irri.	
		Indian bean	<b>No Change</b>	No suggestion	
		Sugarcane	<b>No Change</b>	Irrigate the crop if necessary	
		Pigeon pea	<b>No Change</b>	Sowing the crop with normal practices	
		Ragi	<b>No Change</b>	Sowing the crop with available irri.	
	Heavy black soil with water logging and problematic soils (Coastal area)	Paddy	<b>No Change</b>	No suggestion	
		Sorghum(grain)	<b>No Change</b>	Sowing with own irri. facility	
		Indian bean	<b>No Change</b>	No suggestion	
		Sugarcane	<b>No Change</b>	Irrigation through canal and well	
		Pigeon pea	<b>No Change</b>	Sowing the crop with normal practices	
		Ragi	<b>No Change</b>	Sowing the crop with available irri.	

<b>Condition</b>	<b>Not applicable</b>				
<b>Early season drought (delayed onset)</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Change in crop/cropping system</b>	<b>Agronomic measures</b>	<b>Remarks on Implementation</b>
<b>Delay by 6 weeks</b>					
<b>July 4<sup>th</sup> week</b>					

<b>Condition</b>	<b>Not applicable</b>				
<b>Early season drought (delayed onset)</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Change in crop/cropping system</b>	<b>Agronomic measures</b>	<b>Remarks on Implementation</b>
<b>Delay by 8 weeks (Specify month)</b>					
<b>Aug. 2<sup>nd</sup> week</b>					

Condition	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Crop management	Soil & water conservation measures	Remarks on Implementation
<b>Early season drought (Normal onset, followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.)</b>	Heavy black soil with poor drainage (Plain area)	Paddy	Supply irrigation if necessary in nursery	Weeding	
		Sorghum(grain)	Apply irrigation if necessary Thinning	Inter culturing and weeding	
		Indian bean	Thinning	Inter culturing and weeding	
		Sugarcane	Supply irrigation if necessary	Remove the sugarcane trash	
		Pigeon pea	Supply irrigation if necessary in nursery	Inter culturing and weeding	
		Ragi	Supply irrigation if necessary	Inter culturing and weeding	
	Sandy loam soils with shallow depth (Hilly area)	Paddy	Supply irrigation if necessary in nursery	Weeding	
		Sorghum(grain)	Apply irrigation if necessary Thinning	Inter culturing and weeding	
		Indian bean	Thinning	Inter culturing and weeding	
		Sugarcane	Supply irrigation if necessary	Remove the sugarcane trash	
		Pigeon pea	Supply irrigation if necessary in nursery	Inter culturing and weeding	
		Ragi	Supply irrigation if necessary	Inter culturing and weeding	
	Heavy black soil with water logging and problematic soils (Coastal area)	Paddy	Supply irrigation if necessary in nursery	Weeding	
		Sorghum(grain)	Apply irrigation if necessary Thinning	Inter culturing and weeding	
		Indian bean	Thinning	Inter culturing and weeding	
		Sugarcane	Supply irrigation if necessary	Remove the sugarcane trash	
		Pigeon pea	Supply irrigation if necessary in nursery	Inter culturing and weeding	
		Ragi	Supply irrigation if necessary	Inter culturing and weeding	

Condition	Not applicable				
<b>Mid season drought (long dry spell)</b> <b>At vegetative stage</b>	Heavy black soil with poor drainage (Plain area)	Paddy	Supply life saving irrigation if necessary Spray 2% DAP	Weeding	
		Sorghum(grain)	Spply irrigation if necessary Thinning / Spray 2% DAP	Inter culturing and weeding	
		Indian bean	Thinning/ Spray 2% DAP	Inter culturing and weeding	
		Sugarcane	Supply irrigation if necessary	Remove the sugarcane trash	
		Pigeon pea	Spply irrigation if necessary Thinning/ Spray 2% DAP	Inter culturing and weeding	
		Ragi	Supply irrigation if necessary / Spray 2% DAP	Weeding	
	Sandy loam soils with shallow depth (Hilly area)	Paddy	Supply life saving irrigation if necessary Spray 2% DAP	Weeding	
		Sorghum(grain)	Spply irrigation if necessary Thinning / Spray 2% DAP	Inter culturing and weeding	
		Indian bean	Thinning/ Spray 2% DAP	Inter culturing and weeding	
		Sugarcane	Supply irrigation if necessary	Remove the sugarcane trash	
		Pigeon pea	Spply irrigation if necessary Thinning/ Spray 2% DAP	Inter culturing and weeding	
		Ragi	Supply irrigation if necessary / Spray 2% DAP	Weeding	
	Heavy black soil with water logging and problematic soils (Coastal area)	Paddy	Supply life saving irrigation if necessary Spray 2% DAP	Weeding	
		Sorghum(grain)	Spply irrigation if necessary Thinning / Spray 2% DAP	Inter culturing and weeding	
		Indian bean	Thinning/ Spray 2% DAP	Inter culturing and weeding	
		Sugarcane	Supply irrigation if necessary	Remove the sugarcane trash	
		Pigeon pea	Spply irrigation if necessary Thinning/ Spray 2% DAP	Inter culturing and weeding	
		Ragi	Supply irrigation if necessary / Spray 2% DAP	Weeding	

<b>Condition</b>	<b>Not applicable</b>				
<b>Mid season drought (long dry spell)</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Crop management</b>	<b>Soil Nutrient and moisture conservation measures</b>	<b>Remarks on Implementation</b>
<b>At flowering/fruiting stage</b>	Heavy black soil with poor drainage (Plain area)	Normal Crop/cropping system	Inter culturing and weeding De-trashing in sugarcane Spraying 2% DAP Spraying of anti-transparent Remove excess and unwanted leaves	---	Farm ponds through I W SM programme
	Sandy loam soils with shallow depth (Hilly area)	Normal Crop/cropping system	Inter culturing and weeding De-trashing in sugarcane Spraying 2% DAP Spraying of anti-transparent Remove excess and unwanted leaves	---	Farm ponds through I WSM programme
	Heavy black soil with water logging and problematic soils (Coastal area)	Normal Crop/cropping system	Inter culturing and weeding De-trashing in sugarcane Spraying 2% DAP Spraying of anti-transparent Remove excess and unwanted leaves	---	Farm ponds through I WSM programme

<b>Condition</b>	<b>Not applicable</b>				
<b>Terminal drought</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Crop management</b>	<b>Rabi Crop planning</b>	<b>Remarks on Implementation</b>
	Heavy black soil with poor drainage (Plain area)	Normal Crop/cropping system	Supply life saving irrigation Crop harvest at physiological maturity	Early rabi crop sowing with irrigation	
	Sandy loam soils with shallow depth (Hilly area)	Normal Crop/cropping system	Supply life saving irrigation Crop harvest at physiological maturity	Early rabi crop sowing with irrigation	
	Heavy black soil with water logging and problematic soils (Coastal area)	Normal Crop/cropping system	Supply life saving irrigation Crop harvest at physiological maturity	Early rabi crop sowing with irrigation	

**2.1.2 Irrigated situation**

Condition	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Heavy black soil with poor drainage (Plain area)	Normal Crop/cropping system			
	Sandy loam soils with shallow depth (Hilly area)	Normal Crop/cropping system			
	Heavy black soil with water logging and problematic soils (Coastal area)	Normal Crop/cropping system			

Condition	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall					

Condition	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset					

Condition of monsoon in catchment	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation

Condition	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon					

Condition	Not applicable				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Tube well red soil	Paddy			

**2.2 Unusual rains (untimely, unseasonal etc) (for both Rain fed and irrigated situations)**

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Paddy	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological	Shift to safer place

			maturity stage	
Sorghum(grain)	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological maturity stage	Shift to safer place
Indian bean	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological maturity stage	Shift to safer place
Sugarcane	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological maturity stage	Propping should be carried out
Pigeon pea	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological maturity stage	Propping should be carried out
Ragi	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological maturity stage	Shift to safe place dry in shade and turn frequently
<b>Horticulture</b>				
Mango	Provide drainage	Provide drainage	Need base insect pest management	Shift to safe place dry in shade and turn frequently
Sapota	Provide drainage	Provide drainage	Need base insect pest management	Shift to safe place dry in shade and turn frequently
Banana	Provide drainage	Provide drainage	Need base insect pest management	Shift to safe place dry in shade and turn frequently
<b>Heavy rainfall with high speed winds in a short span</b>				
Paddy	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
Sorghum(grain)	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
Indian bean	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in



				shade and turn frequently
Sugarcane	Provide drainage	Provide drainage	Wind break and shelter belt	Propping should be carried out
Pigeon pea	Provide drainage	Provide drainage	Removal excess water Harvesting at physiological maturity stage	Propping should be carried out
Ragi	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
<b>Horticulture</b>				
Mango	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
Sapota	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
Banana	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
<b>Outbreak of pests and diseases due to unseasonal rains</b>				
Paddy	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
Sorghum(grain)	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
Indian bean	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
Sugarcane	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
Pigeon pea	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
Ragi	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
<b>Horticulture</b>				
Mango	Need based plant protection IPDM	Need based plant protection IPDM	Harvest at physiological maturity stage	Safe storage against storage pest and diseases
Sapota				
Banana				

### 2.3 Floods: Some time expected in this district

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Transient water logging/ partial inundation</b>				
<b>Horticulture</b>	Drainage facility Need based plant protection IPDM	Drainage facility Need based plant protection IPDM	Drainage facility Need based plant protection IPDM	Drainage facility Safe storage against storage pest and diseases
<b>Continuous submergence for more than 2 days</b>				
<b>Horticulture</b>	Drainage facility Need based plant protection IPDM	Drainage facility Need based plant protection IPDM	Drainage facility Need based plant protection IPDM	Drainage facility Safe storage against storage pest and diseases
<b>Sea water inundation</b>				

### 2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone: : Not expected in this district

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
<b>Heat Wave</b>				
<b>Horticulture</b>				
<b>Cold wave</b>				
<b>Horticulture</b>				
<b>Frost</b>				
<b>Horticulture</b>				
<b>Hailstorm</b>				
<b>Horticulture</b>				
<b>Cyclone</b>				
<b>Horticulture</b>				

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	Suggested contingent measures		
Drought	Before the event	During the event	After the event
Feed and fodder availability	<ul style="list-style-type: none"> <li>• Insurance</li> <li>• Encourage perennial fodder on bunds and waste land on community basis</li> <li>• Establishing fodder banks,</li> <li>• Encouraging fodder crop in irrigated area</li> <li>• Silage-using excess fodder for silage</li> </ul>	<ul style="list-style-type: none"> <li>• Utilization of perennial tree and fodder bank reserves</li> <li>• Utilizing stored silos</li> <li>• Transporting excess fodder from adjoining districts</li> <li>• Use of feed mixture</li> </ul>	<ul style="list-style-type: none"> <li>• Availing insurance</li> <li>• Culling unproductive livestock</li> </ul>
Drinking waters	<ul style="list-style-type: none"> <li>• Preserving water in the tank for drinking purpose</li> <li>• Excavation of bore wells</li> </ul>	<ul style="list-style-type: none"> <li>• Using preserved water in the tanks for drinking wherever ground water resources are available priority for drinking purpose</li> </ul>	
Health and disease management	Veterinary preparedness with medicines and vaccine	<ul style="list-style-type: none"> <li>• Mass animal health camp and treatment of affected animals once in campaign</li> </ul>	<ul style="list-style-type: none"> <li>• Culling of sick animals</li> </ul>
<b>Floods</b>			
Feed fodder availability	<ul style="list-style-type: none"> <li>• Feeds and fodder should be transported to adjoining well protected areas.</li> <li>• Village or Taluka level feed and fodder bank with facilities like TMR machine/ feed block machine should be developed.</li> <li>• Prepare balanced feed formulations using available feed resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Transportation of fodder especially dry fodder should be done to affected area.</li> <li>• Use of Total Mixed Ration (TMR)/ feed block should be encouraged.</li> <li>• Use of unconventional feed like tree leaves etc. in ration may be incorporated.</li> </ul>	<ul style="list-style-type: none"> <li>• Culling of unproductive animals</li> </ul>
Drinking Water	<ul style="list-style-type: none"> <li>• Preserving water in water tank for drinking purpose.</li> </ul>	<ul style="list-style-type: none"> <li>• Using preserved water for drinking</li> <li>• Avoid wastage of water</li> </ul>	<ul style="list-style-type: none"> <li>• Repair damaged water sources like tank, pond, wells etc.</li> </ul>

Health and disease management	<ul style="list-style-type: none"> <li>• Veterinary preparedness with medicines and vaccine</li> <li>• Availing Insurance of animals and farm equipments</li> </ul>	<ul style="list-style-type: none"> <li>• Mass animal health camp and treatment of animals</li> <li>• Ring vaccinations like FMD, HS should be conducted.</li> </ul>	<ul style="list-style-type: none"> <li>• Culling of sick animals</li> <li>• <b>Proper burial of carcass using disinfection</b></li> </ul>
<b>Cyclone</b>			
Feed and fodder availability	<ul style="list-style-type: none"> <li>• Feed and fodder should transport to safe area.</li> <li>• Use of curtains to avoid splashing of water in feed storage</li> <li>• Prepare balanced feed formulations using available feed resource</li> </ul>	<ul style="list-style-type: none"> <li>• Keep fodder in closed area so it does not get wasted.</li> <li>• Use of <b>toxin binders in feed</b></li> </ul>	<ul style="list-style-type: none"> <li>• Use balanced ration to restore normal production.</li> <li>• Use feed additives like probiotics, prebiotics, enzymes etc. to encourage overall health status.</li> </ul>
Drinking water	<ul style="list-style-type: none"> <li>• Keep eye on water sources/stock</li> </ul>	<ul style="list-style-type: none"> <li>• Use of electrolyte/ coccidiostats/ antidiarrhoeal in water</li> </ul>	<ul style="list-style-type: none"> <li>• Repair damaged water resources.</li> </ul>
Health and disease management	<ul style="list-style-type: none"> <li>• Veterinary preparedness with medicines and vaccine</li> <li>• Insurance of animals</li> </ul>	<ul style="list-style-type: none"> <li>• Isolate affected animals</li> </ul>	<ul style="list-style-type: none"> <li>• Proper burial of carcass using disinfection</li> </ul>
<b>Heat wave and cold wave</b>			
Shelter and environment management <b>(For heat wave)</b>	<ul style="list-style-type: none"> <li>• Install foggers/sprinklers in house having timer to avoid overuse of water</li> <li>• Tree plantation on both the side of shed</li> <li>• Keep drinking water available whenever needed and use electrolytes in water.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of silage feeding encouraged.</li> <li>• Increase feeding frequency and feeding during night hours</li> <li>• Use of water bodies like pond for wallowing of animals</li> <li>• Increase energy density of diet by incorporating <b>bypass fat.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Use of cooling mechanisms to maintain house temperature on comfort zone for better production.</li> </ul>
Shelter and environment management <b>(For cold wave)</b>	<ul style="list-style-type: none"> <li>• Keep calf below 1 year age in separate shed that protects animals from direct cold.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of bedding materials like paddy straw should be done for Calves.</li> <li>• Use of lamp/bulb to increase the temperature of shed during night hours.</li> <li>• Increase use of dry fodder and urea treated straw.</li> </ul>	

Health and disease management	<ul style="list-style-type: none"> <li>• Veterinary preparedness with medicines</li> </ul>	<ul style="list-style-type: none"> <li>• Use of electrolytes in drinking water</li> </ul>	Isolate affected animals and give special concern
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### 2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Shortage of feed ingredients	<ul style="list-style-type: none"> <li>• Purchase sufficient quantity of ready feed /raw feed ingredients as per storage facilities and requirement.</li> <li>• Identify and test available alternative low cost feed resources in feed testing laboratories for their exact composition for formulating balanced feed.</li> <li>• Prepare balanced feed formulation using available feed resources.</li> <li>• Create alternative power generating facilities i.e. Generator set.</li> </ul> <p>Take insurance of poultry sheds, equipments and feed factory well in advance may be in the starting phase of opening the farm.</p>	<ul style="list-style-type: none"> <li>• Feed formulations using low cost feed ingredients in case of non- availability of high priced conventional ingredients.</li> <li>• Keep check on production performance and modify ration consulting poultry specialist.</li> <li>• Nutrient density should be increased in proportion to feed consumption.</li> <li>• Avoid feed wastage</li> </ul>	<ul style="list-style-type: none"> <li>• Shift over to good quality feed for optimum production performance.</li> </ul>
Drinking water	-	-	-
Health and disease management	<ul style="list-style-type: none"> <li>• Use of anti-stress vitamins (AD<sub>3</sub>ECB<sub>12</sub>-Vimeral / Famitone / Stressvell etc.) in feed and drinking water.</li> <li>• Use of adaptogenetic herbal medicines (Zetress / Zist etc).</li> <li>• Use probiotics (Protexin / Biovet-YC) in feed.</li> <li>• Vaccinate birds against important diseases like R.D., IBD, I.B., Fowl pox according to age as per scheduled programme.</li> </ul>	<ul style="list-style-type: none"> <li>• Use anti-stress, vitamins and adaptogenetic herbal drugs.</li> <li>• Perform vaccination for Ranikhet Disease &amp; Infectious Bronchitis .</li> <li>• Prophylactic medication for important diseases like E.coli &amp; CRD.</li> <li>• Use of electrolytes in feed and drinking water.</li> </ul>	<ul style="list-style-type: none"> <li>• Vaccinate birds as per vaccination schedule.</li> <li>• Perform deworming with Levamisole / Albendazole / Piperazine etc) and use antibiotics, vitamins as per monthly health calendar programme</li> </ul>
<b>Floods</b>			
Shortage of feed ingredients	<ul style="list-style-type: none"> <li>• Purchase sufficient quantities of ready feed / raw feed ingredients.</li> <li>• Store feeding material in suitable houses which should be leak proof and without</li> </ul>	<ul style="list-style-type: none"> <li>• Use of toxin binders (Chek-O-Tox/ UTPP etc.) in the feed.</li> <li>• All electric connections should</li> </ul>	<ul style="list-style-type: none"> <li>• Use of Toxin binder should be continued to avoid development of mycotoxins in the feed</li> </ul>

	<p>dampness.</p> <ul style="list-style-type: none"> <li>• Store feed on iron stands away from the wall to avoid increase in moisture &amp; mould growth.</li> <li>• Road repairing for transporting feed and farm products.</li> <li>• Take insurance of poultry sheds, equipments, feed factory and mortality of birds due to drowning in flood water well in advance may be in the starting phase of opening the farm.</li> </ul>	be in good condition to avoid shock and accident.	
Drinking water	-	-	-
Health and disease management	<ul style="list-style-type: none"> <li>• Complete vaccination as per the programme for various categories of the birds i.e. Layers &amp; Broilers.</li> <li>• Poultry sheds should be constructed at high raised land/or go for raised platform poultry sheds especially in flood affected areas. (conceptional biosecurity)</li> </ul>	<ul style="list-style-type: none"> <li>• Use of probiotics / or antibiotics in feed to protect birds from bacterial infections like E.coli, CRD, Enteritis etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of probiotics should be continued in feed for 10-15 days.</li> </ul>
<b>Cyclone</b>	Not Observed		
Shortage of feed ingredients			
Drinking water			
Health and disease management			
<b>Heat wave and cold wave</b>	Not Observed		
Shelter/environment management			
Health and disease management			

2.5.3 Fisheries / Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>1) Drought</b>	When the drought condition arise at that time available irrigation canals can be connected to the affected reservoir and village ponds to defend from drought condition of particular zone.		
<b>A. Capture</b>	Marine sector couldn't effected directly but estuarine biodiversity will effected (some fresh water fish migrate to marine or vice versa for breeding, feeding etc. & it will be effective)		
Marine	Prepare fish database of particular zone	Catadromus fish stock affected due to scarcity of river water (fresh water).	Developed the stock by stocking of fishes during favorable condition, it will auto stock fish in natural condition
Inland	Inland sector will be affected most during the drought condition. Indian Major Carp (Catla, Rou, Mrigal etc.), Exotic Carp (Silver carp, Grass carp, Common carp etc.), Cat fish and other biodiversity will either migrate or not survive.		
(i) Shallow water depth due to insufficient rains/ inflow	1. Provide water through cannel and pipeline from major reservoirs to maintain sufficient water depth  2. Taxonomic fish data collection & Preserved fish stock (gene)	1. Migration of fish stock  2. Conservation of breeders/ fish stock at unaffected area	Transplant the fish stock and breed the fish in hatchery to stock the fish seed in affected area
(ii) Changes in water quality	Migration of fish due to change of water quality	-	-
(iii) Any other	-	-	-
<b>B. Aquaculture</b>	"Culture of aquatic organisms in confined water body", so this sector will affected most incase of either non availability of water or mismanagement.		

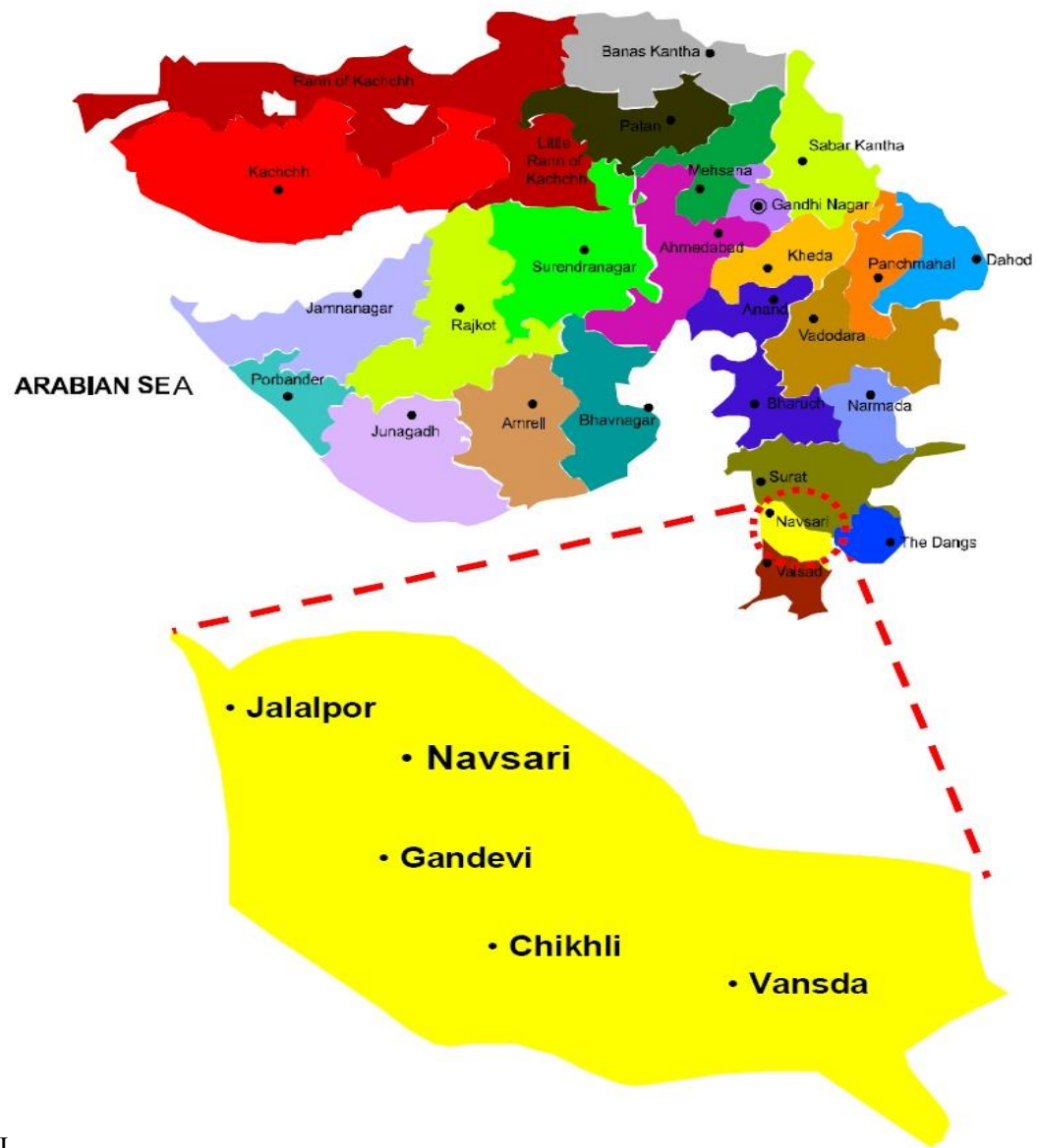
	<b>Suggested contingency measures</b>		
	<b>Before the event</b>	<b>During the event</b>	<b>After the event</b>
(i) Shallow water in ponds due to insufficient rains/ inflow	1. Lower the stocking density by harvest the big size (500 gm) fish and place in market. 2. Transfer of under culture fishes to abundance water zone	Pre- harvest all the materials (fish and prawns) & preserved by freezing	Sanitize the dead fish biomass.
(ii) Impact of salt load build up in ponds / change in water quality	Protect the water and use of lime and other probiotics	Cover the pond with plants (duckweed etc) to protect from evaporation.	Flush the pond with fresh water and manure before the next stocking of fish to maintain the food chain
(iii) Any other	-	-	-
<b>2) Floods</b>	Flood are generally predicted and early warning will protect the lives and livelihood		
<b>A. Capture</b>	Change of breeding grounds, migration of fish against and with the water and increase of fish stock etc, so positive effect on capture fisheries.		
Marine	All the fishermen must call back from fishing	No fishing	
Inland	All the fishermen must call back from fishing	No fishing	
(i) Average compensation paid due to loss of human life	1. Recognizing the risk of flood & making the people aware of it 2. Migrate the people at safe place 3. Collect the details information of swimmers & life savers appliances.	Send the rescue teams to protect the lives of the most vulnerable peoples.	1. Measure social impact of losses risks of diseases, loss of employment. 2. The most vulnerable fishermen be taken care of first and fast
(ii) No. of boats/ nets/ damaged	Transfer boats/nets at safe places	If possible protect boats during rescue operation	Identify the damages according to assessment & compensate
(iii) No. of houses damaged			



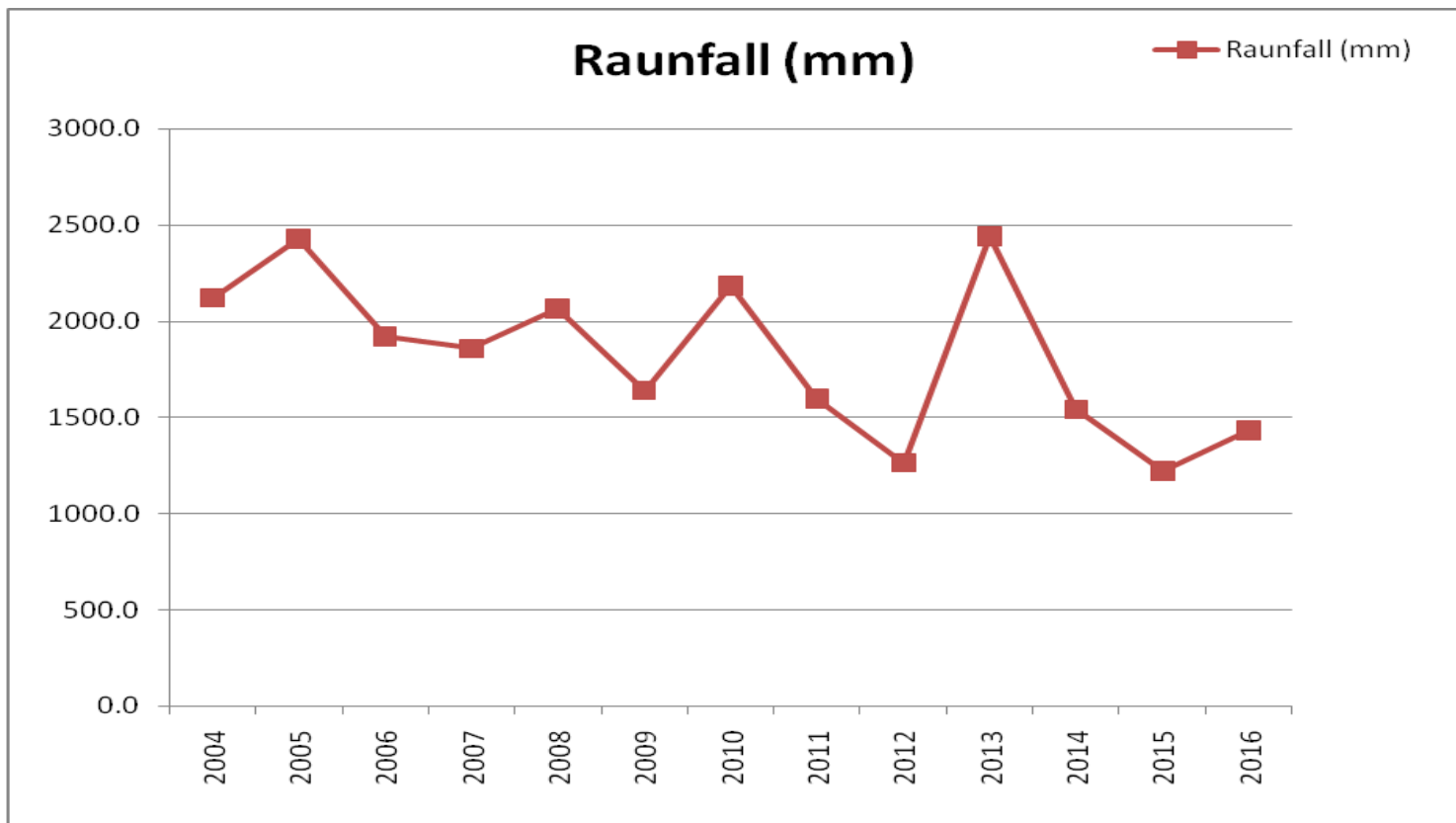
	Suggested contingency measures		
	Before the event	During the event	After the event
(iv) Loss of stock			
(v) Changes in water quality			
(v) health and diseases	Prepared the medical rescue team	-	1. Proper hygiene & sanitation 2. Send the medical rescue team with drugs.
<b>B. Aquaculture</b>	Flood affects the culture ponds which are situated near the river. It demolished the pond dyke, overflows the pond and contaminated the culture.		
(i) Inundation with flood water	1. Transfer of aquaculture farmers to protected places 2. Harvest fish from culture ponds and preserved or sale at market 3. Protect the pond dykes with sand bags.		1. Harvest the culture fish as well as wild fish which came with flood water. 2. Disinfect the ponds with chemicals
(ii) Water continuation and changes in water quality	Reduced water level of culture pond.	Flood water fills the pond if empty or reduced before the flood.	Exchange water with fresh water to maintain the water quality.
(iii) health and diseases	Take preventive measures		Destroy the dead fish with disinfectant
(v) Loss of stock and inputs(feed etc)	Transfer the stock and inputs at safe places	-	Demolish the wet & spoiled feed
Infrastructure damage(pumps, aerators, huts etc)	Transfer the detachable infrastructure at safe places	-	Measure impact of losses of infrastructure and provide assistance for rehabilitation
(vi) Any other			
<b>3. Cyclone / Tsunami</b>	Cyclone, heavy rain and flooding are generally predicted and early warning are issued by the concern agencies, while Tsunami, Oil spill etc. cannot be forewarned		

	<b>Suggested contingency measures</b>		
	<b>Before the event</b>	<b>During the event</b>	<b>After the event</b>
<b>A. Capture</b>	Capture fishery affected due to cyclone, as current pattern change & upwelling cause the migration of some fish species, so it will either affect to stock or species variation.		
Marine	On the costal region, fishermen staying away from the vulnerable zone is one of the way of prevention		
(i) Average compensation paid due to loss of fishermen lives	1. Recognizing the risk of cyclone and making the people aware of risk 2. migrate the fishermen at safe place	Protecting the lives and livelihood of the most vulnerable fishermen	1. Measure social impact of losses risks of diseases, loss of employment. 2. The most vulnerable fishermen be taken care of first and fast
(ii) Avg. no. of boats/nets/ damaged	1. Identify the boats and convey messages of disaster in the sea. 2. Birthing the boats at safe place	1. Warning signals, use of flares, seeking help by attracting attention. 2. Prevent the lives among damaged boats	Compensation of damages should be provide after real assessment of damages (boat/net)
(iii) Avg. no. of houses damaged			As above
Inland	1. Recognizing the risk of cyclone and making the people aware of risk 2. migrate the fishermen at safe place	Protecting the lives and livelihood of the most vulnerable fishermen	1. Measure social impact of losses risks of diseases, loss of employment. 2. The most vulnerable fishermen be taken care of first and fast
<b>B. Aquaculture</b>	Most of coastal aquaculture farms (shrimp culture) will affect most due to cyclone & tsunami, as sea water intrusion, high current & tide & high wind velocity will affect the dyke and infrastructure of aquaculture units.		
(i) Overflow/ flooding of ponds	1.Pre- harvest the materials (fish and prawns)	In case of over flooding open outlet of the pond	1. Measure impact of losses and risks of diseases 2. Provide better hygienic sanitation, disinfected the ponds.
(ii) Changes in water quality (fresh water/ brackish water ratio)	2. Protect the dykes by putting soil bags. 3. Place the iron screen on inlet		

	<b>Suggested contingency measures</b>		
	<b>Before the event</b>	<b>During the event</b>	<b>After the event</b>
(iii) Health and diseases	and outlet		
(iv) Loss of stock and inputs (feed, chemicals etc)	Transfer the stock and inputs at safe places	-	Destroy the decomposed feed
(v) Infrastructure damage(pumps, aerators, shelters/ huts etc)	Transfer the detachable infrastructure at safe places	-	Measures impact of losses of infrastructure and provide assist for rehabilitation
(vi) Any other	-	-	-
<b>4. Heat wave and cold wave</b>	This factor will affect indirectly to the fish stock.		
<b>A. Capture</b>	Due to heat and cold wave some fishes migrate to offshore as well as non affected area so, it will affect the fish catch.		
Marine	Assessment of capture fish catch	Study the impact of heat and cold wave on fish capture and biodiversity.	Established the fishery
Inland	Assessment of capture fish catch	As above	As above
<b>B. Aquaculture</b>	Due to these factor, fish growth will affect, change in feeding, breeding and rearing of fish larvae.		
(i) Changes in pond environment (water quality)	Exchange of water to maintain the water temperature and water parameter	Use equipment to protect the fish from drastic change in temperature as well as depletion of oxygen, i.e. use of thermostat heater to maintain constant pond temperature & use of aerator to maintain dissolve oxygen in pond.	Acclimatize the fish stock in natural condition and reduced the used equipments from the ponds. Maintain the feed ration accordingly.
(ii) Health and Disease management	Take some preventive measures to protect from disease	Use of probiotics as well as fresh and live feed	
(iii) Any other	-	-	-



Location map of NAVSARI



**Rainfall of Navsari District during the 2004-05 to 2016-17**

(Note: ANNEXURE-3: PLZ DRAW SOILS MAP WITH SOURCE OF NBSSLUP)

**Soil map is not available and it was decided that soil map would be collected from NBSSLUP by Nodal Officer, CAZRI, Jodhpur**