

**State: GUJARAT**

**Agriculture Contingency Plan for District: NARMADA**

<b>1.0 District Agriculture profile</b>					
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>				
	Agro Ecological Sub Region (ICAR)	Central highlands, Malwa, Gujarat Plain (5.2)			
	Agro-Climatic Zone (Planning Commission)	Gujarat Plains and hills region (XIII)			
	Agro Climatic Zone (NARP)	South Gujarat Zone (GJ-2)			
	List all the districts or part thereof falling under the NARP Zone	Surat, Bharuch, Narmada			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		22 <sup>o</sup> 22'08.72" N	76 <sup>o</sup> 16'25.05" E	417 m MSL	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Navsari Agricultural University, Tower Road, Navsari, Gujarat- 396450			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Navasari Agricultural University, Dediapada, Narmada , Gujarat- 396450			
<b>1.2</b>	<b>Rainfall</b>	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	1068	52	1 <sup>st</sup> week of June	4 <sup>th</sup> week of September
	NE Monsoon(Oct-Dec)	--	--	-	-
	Winter (Jan- March)	--	--	-	-
	Summer (Apr-May)	--	--	-	-
	Annual	1068	52	-	-

*(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>	275.5	111.1	121.2	3.2	8.3	16.5	--	--	13.0	--

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

<b>1.4</b>	<b>Major Soils (common names like red sandy loam deep soils (etc.,))</b>	<b>Area ('000 ha)</b>
	Hilly : well drain soil	
	Plain : Sandy loam soil	

<b>1.5</b>	<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>
	Net sown area	111.1	143.33
	Area sown more than once	48.1	
	Gross cropped area	159.2	

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

<b>1.6</b>	<b>Irrigation</b>	<b>Area ('000 ha)</b>		
	Net irrigated area	76.6		
	Gross irrigated area	109.8		
	Rain fed area	34.4		
	<b>Sources of Irrigation</b>	<b>Number</b>	<b>Area ('000 ha)</b>	<b>Percentage of total irrigated area</b>
	Canals		28.4	59.1
	Tanks			
	Open wells		11.6	24.3
	Bore wells / Tube well		8.0	16.6
	Lift irrigation schemes			

Micro-irrigation			
Other sources (please specify)			
Total Irrigated Area		48.1	100.0
Pump sets			
No. of Tractors			
<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
Over exploited			
Critical			
Semi- critical			
Safe	4	100	
Wastewater availability and use			
Ground water quality	Good		

\*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%  
 (Source :District Panchayat reports, reports of Agriculture department)

### 1.7 Area under major field crops & horticulture (Year : 2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rain fed	Total	Irrigated	Rain fed	Total	Summer	
	Cotton	11.6	29.3	40.9	-	-	-	-	40.9
	Pigeon pea	0	21.2	21.2	-	-	-	-	21.2
	Rice	0.9	14.3	15.2	-	-	-	-	15.2
	Sorghum	0	6.3	6.3	0	3.4	3.4	-	9.7
	Sugarcane	-	-	-	4.7	-	4.7	-	4.7

Horticulture crops - Fruits	Area ('000 ha)		
	Total	Irrigated	Rain fed
Banana	5.5	5.5	-
Mango	2.9	-	2.9
Papaya	0.3	0.3	-
Horticulture crops - Vegetables	Total	Irrigated	Rain fed
Cucurbits	1.8	-	-
Cluster bean	0.8	-	-
Chilli	0.7	-	-
Okra	0.7	0.7	-
Cow pea	0.7	-	-
Brinjal	0.7	0.7	-
Onion	0.4	0.4	-
Medicinal and Aromatic crops	Total	Irrigated	Rain fed
Plantation crops	Total	Irrigated	Rain fed
	-	-	-
Eg., industrial pulpwood crops etc.			
Fodder crops	Total	Irrigated	Rain fed

	<b>Total fodder crop area</b>			
	<b>Grazing land</b>			
	<b>Sericulture etc</b>			

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

<b>1.8</b>	<b>Livestock</b>	<b>Male ('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>			
	Non descriptive Cattle (local low yielding)	23.2	14.7	37.9			
	Crossbred cattle	2.3	1.9	4.3			
	Non descriptive Buffaloes (local low yielding)	1.2	9.1	10.3			
	Graded Buffaloes	10.7	76.4	87.0			
	Goat	16.8	55.1	71.9			
	Sheep	0.1	0.1	0.2			
	Others (Camel, Pig, Yak etc.)	-	-	0.07			
	Commercial dairy farms (Number)						
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>				
	Commercial	-					
	Backyard	-	123.8				
<b>1.10</b>	<b>Fisheries</b> (Data source: Chief Planning Officer)						
	<b>A. Capture</b>						
	<b>i) Marine</b> (Data Source: Fisheries Department)						
	<b>ii) Inland</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)	
		8236	4	394	-	24091	

		No. Farmer owned ponds	No. of Reservoirs	No. of village tanks
		3	3	18
<b>B. Culture</b>				
		Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)
	i) <b>Brackish water</b> (Data Source: MPEDA/ Fisheries Department)	-	-	-
	ii) <b>Fresh water</b> (Data Source: Fisheries Department)	18.09 ha.	200 kg/ha.	-

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

### 1.11 Production and Productivity of major crops (Average of last 5 years: 2004-05, 05-06, 06-07, 07-08, 08-09)

1.11	Name of crop	<i>Kharif</i>		<i>Rabi</i>		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Cotton	54.3	436(lint)	-	-	-	-	54.3	436(lint)	
	Pigeon pea	16.9	797	-	-	-	-	16.9	797	
	Rice	21.9	1439	-	-	-	-	21.9	1439	
	Sorghum	10.1	1604	2.9	874	-	-	13.1	1347	
	Sugarcane	-	-	337.2	71740	-	-	337.2	71740	
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
	Banana							213.51	39176	
	Mango							12.54	4385	
	Papaya							4.78	17382	

1.12	Sowing window for 5 major field crops	Paddy	Cotton	Pigeon pea	Sorghum	Sugarcane
	Kharif- Rain fed	1 <sup>st</sup> week of June to 4 <sup>th</sup> week of July	1 <sup>st</sup> week of June to 4 <sup>th</sup> week of July	1 <sup>st</sup> week of June to 4 <sup>th</sup> week of July	1 <sup>st</sup> week of June to 4 <sup>th</sup> week of July	-
	Kharif-Irrigated	1 <sup>st</sup> week of June to 4 <sup>th</sup> week of July	1 <sup>st</sup> week of May to 4 <sup>th</sup> week of June	-	-	-
	Rabi- Rain fed	-	-	1 <sup>st</sup> week of October-4 <sup>th</sup> week of November.	1 <sup>st</sup> week of October-4 <sup>th</sup> week of November.	-
	Rabi-Irrigated	-	-	-	-	1 <sup>st</sup> week of October-4 <sup>th</sup> week of November.

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

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		√	
	Flood			√
	Cyclone			√
	Hail storm			√
	Heat wave			√
	Cold wave			√
	Frost			√
	Sea water intrusion			√
	Pests and disease outbreak (specify)		√	
	Others (specify)			

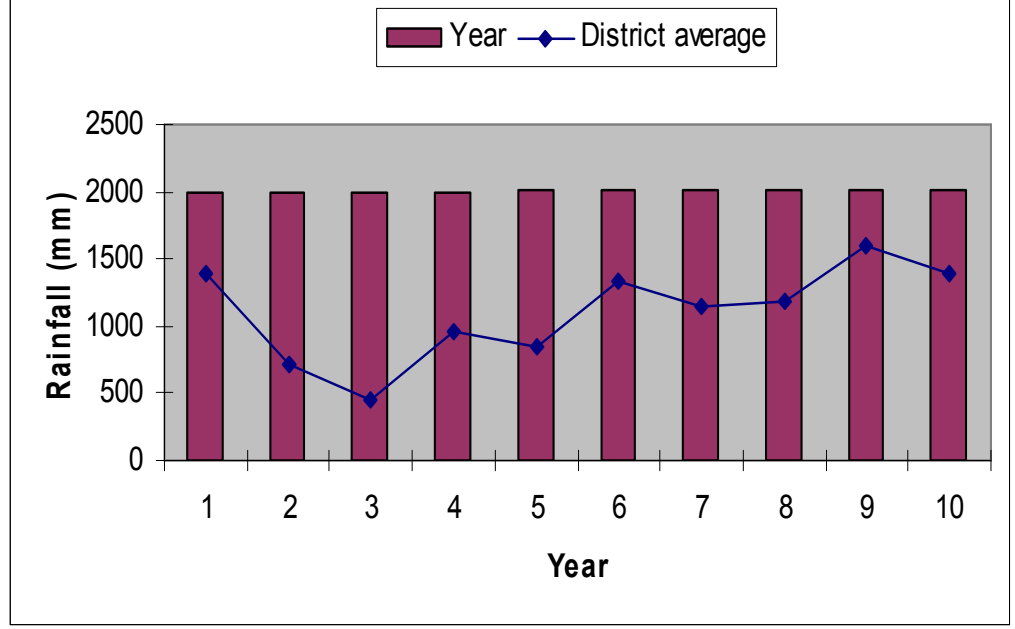
1.14	Include Digital maps of the district for		
		Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: <b>No</b>

LOCATION MAP OF NARMADA DISTRICT





### Average Rainfall in Narmada district



## 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 including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (3 <sup>rd</sup> week of June)	Well drain soil (Hilly)	Cotton	No Change	Protective irrigation sprouted seed method for aerobic rice.	Supply of seeds through NFSM Seed drills under RKVY Supply of seeds through GSSC
		Pigeonpea			
		Rice			
		Sorghum			
		Sugarcane			
	Sandy loam soil (Plain )	Cotton	No Change	Mulching, alternate furrow irrigation, micro irrigation method	Seed drills under RKVY Supply of seeds through GSSC Supply of seeds through NFSM
		Pigeon pea			
		Rice			
		Sorghum			
		Sugarcane			

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (July 2 <sup>nd</sup> week)	Well drain soil (Hilly)	Cotton	No Change	In transplanted paddy - sprouted seed method may be adopt	<ul style="list-style-type: none"> <li>•GSSC</li> <li>•NSC</li> <li>•RKVY</li> <li>•NHM</li> </ul>
		Pigeon pea			
		Rice			
		Sorghum			

		Sugarcane	No Change	Mulching, alternate furrow irrigation, micro irrigation method	<ul style="list-style-type: none"> <li>•GSSC</li> <li>•NSC</li> <li>•RKVY</li> <li>•NHM</li> </ul>
		Cotton			
	Sandy loam soil (Plain )	Pigeon pea			
		Rice			
		Sorghum			
		Sugarcane			
Cotton					

Condition	This situation is not expected in this district				
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 6 weeks (Specify month)	Not Applicable				

Condition	This situation is not expected in this district				
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks (Specify month)	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.	Well drain soil (Hilly)	Pigeon pea	Gap filling and thinning. Avoid intercultivation. Protective irrigation should be made if available	Foliar spray of nutrient	Interculturing implements through RKVY  Seeds from NSC
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

	Sandy loam soil (Plain )	Pigeon pea	-do-	Foliar spray of nutrient	Supply of inter cultural implements through RKVY  Seeds supply through NFSM
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition	Suggested Contingency measures				
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	Well drain soil (Hilly)	Pigeon pea	<ul style="list-style-type: none"> <li>Applied foliar nutrient</li> <li>Spray anti transpirant chemical</li> </ul>	<ul style="list-style-type: none"> <li>Repeated inter cultivation</li> <li>Give protective irrigation</li> <li>Mulching</li> </ul>	As above
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil (Plain )	Pigeon pea	-do-	-do-	As above
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition	Suggested Contingency measures				
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	Well drain soil (Hilly)	Pigeon pea	Weeding, Protective irrigation, alternate furrow irrigation. Applied higher dose of KNO <sub>3</sub>	-----	Farm ponds through IW SM programme
		Rice			

		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil (Plain )	Pigeon pea	-do-	-----	Farm ponds through IW SM programme
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Well drain soil (Hilly)	Pigeon pea	Protective irrigation Harvest the crop at physiological maturity	Plan for short duration crops i.e. Greengram, Mothbean	Farm ponds through IWSM programme Threshing implements through RKVY
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil (Plain )	Pigeon pea	Protective irrigation Harvest the crop at physiological maturity	Plan for short duration crops i.e. Greengram, Mothbean	-do-
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

### 2.1.2 Drought - Irrigated situation

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Well drain soil (Hilly)	Pigeon pea	Fodder crop & pulses like Chickpea (rabi) should be sown if required irrigation is available	Mulching	Seeds through GSSC and NFSM
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil (Plain )	Pigeon pea	-do-	Mulching	-do-
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Well drain soil (Hilly)	Pigeon pea	Fodder crop & pulses like chickpea (rabi) should be sown if required irrigation is available	Mulching	Seeds through GSSC and NFSM
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil (Plain )	Pigeon pea	-do-	-do-	-do-
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition	This is not expected in this district				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Well drain soil (Hilly)	This is not expected in this district			
	Sandy loam soil (Plain )				

Condition	This is not expected in this district				
	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	Well drain soil (Hilly)	This is not expected in this district			
	Sandy loam soil (Plain )				

Condition	This is not expected in this district				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Well drain soil (Hilly)	This is not expected in this district			
	Sandy loam soil (Plain )				

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

Condition	Suggested contingency measure			
<b>Continuous high rainfall in a short span leading to water logging</b>	<b>Vegetative stage</b>	<b>Flowering stage</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Cotton	Ridge sowing should be done	Drainage	Ridge sowing should be done	Shift to safer place
Pigeon pea	Drainage of excess Water through drainage system	Provision of drainage	Remove Excess water	-do-
Rice	Standing water is more then drain out properly	Use early maturity variety	-do-	-do-
Sorghum	-do-	-do-	-do-	-do-
Sugarcane	-do-	-do-	-do-	Provide drainage
<b>Horticulture</b>				
Banana	Provide drainage	Provide drainage	Remove excess water	Shift to safe place dry in shade and turn frequently
Mango	-do-	-do-	-do-	-do-
Papaya	-do-	-do-	-do-	-do-
<b>Heavy rainfall with high speed winds in a short span</b>				
Cotton	Ridge sowing should be applied before sowing and support the plant with soil ridge	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
Pigeon pea				
Rice				
Sorghum				
Sugarcane				
<b>Horticulture</b>	Provide drainage	-do-	-do-	-do-
Banana				



Mango				
Papaya				
<b>Outbreak of pests and diseases due to unseasonal rains</b>				
Cotton	Use proper insecticide Follow proper IPM	Use proper insecticide Follow proper IPM	Use proper insecticide Follow proper IPM	Use proper insecticide Follow proper IPM
Pigeon pea				
Rice				
Sorghum				
Sugarcane				
<b>Horticulture</b>				
Banana	-do-	-do-	-do-	-do-
Mango				
Papaya				

\* need based plant protection measures to be adopted in each crop.

### 2.3 Floods: - Not observed

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
-NA-				
Horticulture				
-NA-				
Continuous submergence for more than 2 days	Not observed			
-NA-				
Horticulture				
-NA-				

Sea water intrusion	Not observed			
-NA-				

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Not observed			
Horticulture				
Cold wave	Not observed			
Horticulture				
Frost	Not observed			
Horticulture				
Hailstorm	Not observed			
Horticulture				
Cyclone	Not observed			
Horticulture				

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Feed and fodder availability	Store fodder in advance Stabilize crop production	Purchase of fodder Contingency crop planning	Follow up of the feeding management
Drinking water	Conservation of water	Provide minimum quantity of water	-
Health and disease management	Vaccination, proper nutrition	Proper care and treatment	-
<b>Floods</b>	<b>Not observed</b>		
Feed and fodder availability			
Drinking water			
Health and disease management			
<b>Cyclone</b>	<b>Not observed</b>		
Feed and fodder availability			
Drinking water			
Health and disease management			
<b>Heat wave and cold wave</b>	<b>Not observed</b>		
Shelter/environment management			
Health and disease management			

## 2.5.2 Poultry:-

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event	During the event	After the event	
<b>Drought</b>				
Shortage of feed ingredients	Insurance Encourage perennial fodder on bunds and waste land on community basis Establishing fodder banks, encouraging fodder crops in irrigated area Silage – using excess fodder for silage	- Utilizing fodder from perennial trees and Fodder bank reserves Utilizing fodder stored in silos Transporting excess fodder from adjoining districts Use of feed mixtures	--	Awareness programme for nutritious feed
Drinking water	If available from well, Bore well	If available from well, Bore well	If available from well, Bore well	--
Health and disease management	Disease resistant Vaccination required	Disease resistant Vaccination required	Disease resistant Vaccination required	Awareness programme for health and disease
<b>Floods</b>	Not observed			
Shortage of feed ingredients				
Drinking water				
Health and disease management				
<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>			
<b>A. Capture</b>			
Marine			
Inland	Ponds are filled with breaks water Liming treatment is done	Live stock removed from the ponds	Ponds should be dried and refilled with fresh water and maintain breeding material/live stock.
(i) Shallow water depth due to insufficient rains/inflow			
(ii) Changes in water quality			
<b>B. Aquaculture</b>			
(i) Shallow water in ponds due to insufficient rains/inflow	Mixing of water Desilting is practiced	Live stock is removed/sold	Ponds should be drained and refilled with fresh water
(ii) Impact of salt load build up in ponds / change in water quality			
<b>2) Floods</b>			

<b>A. Capture</b>			
Marine			
Inland			
(i) Average compensation paid due to loss of human life			
(ii) No. of boats / nets/damaged			
(iii) No. of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(vi) Health and diseases			
<b>B. Aquaculture</b>			
(i) Inundation with flood water			
(ii) Water contamination and changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
<b>3. Cyclone / Tsunami</b>			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			

(i) Overflow / flooding of ponds			
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			
<b>4. Heat wave and cold wave</b>			
<b>A. Capture</b>			
Marine			
Inland			
<b>B. Aquaculture</b>			
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			