State: GUJARAT

Agriculture Contingency Plan for District: NARMADA

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	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
		$22^0$22'08.72" N		$76^0$16'25.05" E	1241 feet above MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Navsari Agricultural University, Navsari			
	Mention the KVK located in the district	Krushi Vigyan Kendra, NAUDediapada in Narmada district			
1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	865.4	61.1	1st week of June	4th week of September
	NE Monsoon(Oct-Dec)	--	--	-	-
	Winter (Jan- March)	--	--	-	-
	Summer (Apr-May)	--	--	-	-
	Annual	865.4	61.1	-	-

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

1.3	**Land use pattern of the district** (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	275.5	111.1	121.2	3.2	8.3	16.5	--	--	13.0	--

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

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)**	**Area ('000 ha)**	**Percent (%) of total**
	Hilly : well drain soil	64.79	58.32
	Plain : Sandy loam soil	42.33	38.10
	Others (specify):	3.98	3.58

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	111.1	143
	Area sown more than once	48.1	
	Gross cropped area	159.2	

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

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	76.6		
	Gross irrigated area	109.8		
	Rain fed area	34.4		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		28.4	59.1
	Tanks			

	Open wells		11.69	24.30
	Bore wells / Tube well		8.0	16.62
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)			
	Total Irrigated Area		48.122	100.0
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	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

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***			**Summer**	**Grand total**
		Irrigated	**Rain fed**	**Total**	**Irrigated**	**Rain fed**	**Total**	**Summer**	
	Cotton	42.7	00	42.7	-	-	-	-	42.7
	Pigeon pea	00	20.6	20.6	-	-	-	-	20.6
	Rice	2.2	10.3	12.5	-	-	-	-	12.5
	Sorghum	00	5.7	5.7	-	-	-	-	5.7

	Sugarcane	-	-	-	5.3	-	5.3	-	5.3

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rain fed**
	Banana	6.0	6.0	
	Mango	3.3		3.3
	Papaya	3.6	3.6	
	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	0.028	0.028	0.0
	Plantation crops	0.050	0.050	0.0
		-	-	-

	Eg., industrial pulpwood crops etc.			
	Fodder crops	**Total**	**Irrigated**	**Rain fed**
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

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

1.8	**Livestock**	**Male (‘000)**	**Female (‘000)**	**Total (‘000)**
	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)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds (‘000)**	
	Commercial	-		
	Backyard	-	123.8	
1.10	**Fisheries** (Data source: Chief Planning Officer)			
	A. Capture			
	i) Marine (Data Source: Fisheries Department)			
	ii) Inland (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**	**Nets**	**Storage facilities**

			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	**(Ice plants etc.)**
		8236	4	394	-	24091	
		No. Farmer owned ponds		**No. of Reservoirs**		**No. of village tanks**	
		3		3		18	

	B. Culture			
		Water Spread Area (ha)	**Yield (t/ha)**	**Production ('000 tons)**
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	-	-	-
	ii) **Fresh water** (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)

1.11	Name of crop	***Kharif***		***Rabi***		**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)	
Major Field crops (Crops to be identified based on total acreage)										
	Cotton	67	1576	-	-	-	-	67	1576	180.0
	Pigeon pea	25	1292	-	-	-	-	25	1292	15.0
	Rice	29	2913	-	-	-	-	29	2913	45.0
	Sorghum	9	1727	-	-	-	-	9	1727	22.5
	Sugarcane	-	-	371	68000	-	-	371	68000	90.0
Major Horticultural crops (Crops to be identified based on total acreage)										
	Banana							288	47466	
	Mango							17	5193	
	Papaya							20	55333	

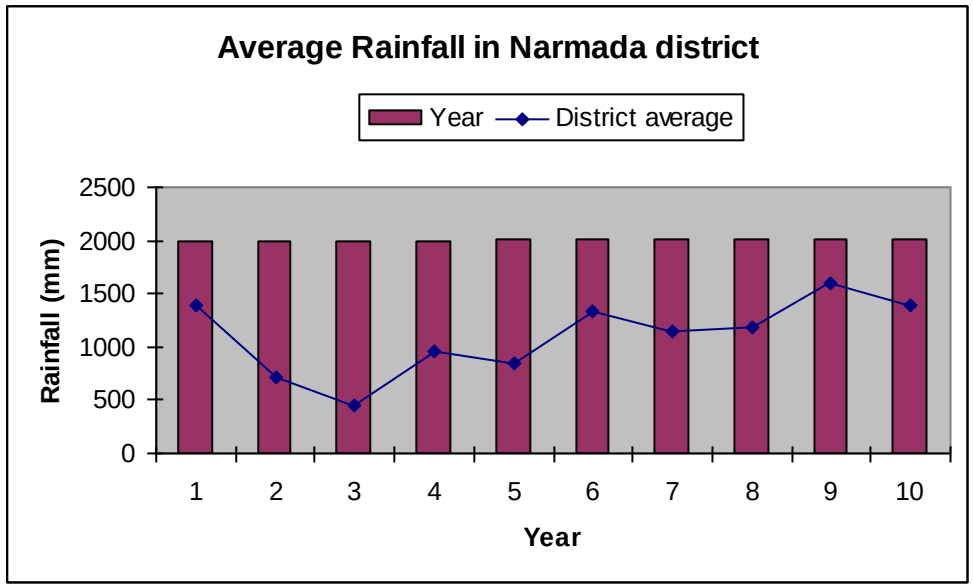
1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Paddy	Cotton	Pigeon pea	Sorghum	Sugarcane
	Kharif- Rain fed	1st week of June to 4th week of July	1st week of June to 4th week of July	1st week of June to 4th week of July	1st week of June to 4th week of July	-
	Kharif-Irrigated	1st week of June to 4th week of July	1st week of May to 4th week of June	-	-	-
	Rabi- Rain fed	-	-	1st week of October to 4th week of November	1st week of October to 4th week of November	
	Rabi-Irrigated	-	-	-		1st week of October to 4th week of February

(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: **No**

LOCATION MAP OF NARMADA DISTRICT


Average Rainfall in Narmada district
Year
District average
Rainfall (mm)
2500
2000
1500
1000
500
0
1
2
3
4
5
6
7
8
9
10
Year

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 (3rd 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
		Pigeon pea			
		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 2nd week)	Well drain soil (Hilly)	Cotton	No Change	In transplanted paddy - sprouted seed method may adopt - - -	• GSSC • NSC • RKVY • NHM
		Pigeon pea			
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil	Pigeon pea	No Change	Mulching, alternate	• GSSC

	(Plain)	Rice		furrow irrigation, micro irrigation method	• NSC • RKVY • NHM
		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)	Other crop like Indian bean, caster				

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)	Other crop like Indian bean, caster				

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	Gap filling and thinning. Avoid intercultivation. Protective irrigation should	Foliar spray of nutrient	Supply of inter cultural implements through RKVY
		Rice			

		Sorghum	be made if available		Seeds supply through NFSM
		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	• Applied foliar nutrient • Spray anti transpirant chemical	• Repeated inter cultivation • Give protective irrigation • Mulching	Supply of inter cultural implements through RKVY Seeds supply through NFSM
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			
	Sandy loam soil (Plain)	Pigeon pea	• Applied foliar nutrient Spray anti transpirant chemical	• Repeated inter cultivation • Give protective irrigation Mulching	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)	**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_3	-------	Farm ponds through IW SM programme
		Rice			
		Sorghum			

		Sugarcane			
		Cotton			
	Sandy loam soil (Plain)	Pigeon pea	Weeding, Protective irrigation, alternate furrow irrigation. Applied higher dose of KNO_3	-------	Farm ponds through IW SM programme
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition	**Suggested Contingency measures**				
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Well drain soil (Hilly)	Pigeon pea	Protective irrigation Harvest the crop at physiological maturity	Plan for short duration crops i.e. mung bean, moth bean	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. mung bean, moth bean	Farm ponds through IWSM programme Threshing implements through RKVY
		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	Fodder crop &pulses like chickpea (rabi) should be sown if required irrigation is available	Mulching	- Seeds through GSSC and NFSM
		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	Fodder crop &pulses like chickpea (rabi) should be sown if required irrigation is available	Mulching	Seeds through GSSC and NFSM
		Rice			
		Sorghum			
		Sugarcane			
		Cotton			

Condition					
	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					
	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**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
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	Shift to safer place
Rice	Standing water is more then drain out properly	Use early maturity variety	Remove Excess water	Shift to safer place
Sorghum	Standing water is more then	Use early maturity variety	Remove Excess water	Shift to safer place
Sugarcane	drain out properly	Use early maturity variety	Remove Excess water	Provide drainage
Horticulture				
Banana	Provide drainage	Provide drainage	Remove excess water	Shift to safe place dry in shade and turn frequently
Mango	Provide drainage	Provide drainage	Remove excess water	Shift to safe place dry in shade and turn frequently

Papaya	Provide drainage	Provide drainage	Remove excess water	Shift to safe place dry in shade and turn frequently
Heavy rainfall with high speed winds in a short span				
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				
Horticulture	Provide drainage	Provide drainage	Wind break and shelter belt	Shift to safe place dry in shade and turn frequently
Banana				
Mango				
Papaya				
Outbreak of pests and diseases due to unseasonal rains				
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				
Horticulture				
Banana	Use proper insecticide Follow proper IPM	Use proper insecticide Follow proper IPM	Use proper insecticide Follow proper IPM	Use proper insecticide Follow proper IPM
Mango				
Papaya				

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

2.3 Floods :- Not observed

Condition	Suggested contingency measure			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
-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[q]	**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 contingent measures		
Drought	**Before the event**	**During the event**	**After the event**
Feed and fodder availability	• Insurance • Encourage perennial fodder on bunds and waste land on community basis • Establishing fodder banks, • Encouraging fodder crop in irrigated area • Silage-using excess fodder for silage	• Utilization of perennial tree and fodder bank reserves • Utilizing stored silos • Transporting excess fodder from adjoining districts • Use of feed mixture	• Availing insurance • Culling unproductive livestock
Drinking waters	• Preserving water in the tank for drinking purpose • Excavation of bore wells	• Using preserved water in the tanks for drinking wherever ground water resources are available priority for drinking purpose	
Health and disease management	Veterinary preparedness with medicines and vaccine	• Mass animal heath camp and treatment of affected animals once in campaign	• Culling of sick animals
Floods			
	•	•	•
	•	•	•
	•	•	•
	•	•	•
	•		•
	•	•	•

	•	•	•
		•	
	•	•	

based on forewarning wherever available

2.5.2 Poultry :-

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	• Purchase sufficient quantity of ready feed /raw feed ingredients as per storage facilities and requirement. • Indentify and test available alternative low cost feed resources in feed testing laboratories for their exact composition for formulating balanced feed. • Prepare balanced feed formulation using available feed resources. • Create alternative power generating facilities i.e. Generator set. Take insurance of poultry sheds, equipments and feed factory well in advance may be in the starting phase of opening the farm.	• Feed formulations using low cost feed ingredients in case of non- availability of high priced conventional ingredients. • Keep check on production performance and modify ration consulting poultry specialist. • Nutrient density should be increased in proportion to feed consumption. • Avoid feed wastage	• Shift over to good quality feed for optimum production performance.
Drinking water	-	-	-
Health and disease management	• Use of anti-stress vitamins (AD_3ECB_{12}-Vimeral / Famitone / Stressvell etc.) in feed and drinking water. • Use of adaptogenetic herbal medicines (Zetress / Zist etc). • Use probiotics (Protexin / Biovet-YC) in feed.	• Use anti-stress, vitamins and adaptogenetic herbal drugs. • Perform vaccination for Ranikhet Disease & Infectious Bronchitis . • Prophylactic medication for important diseases like	• Vaccinate birds as per vaccination schedule. • Perform deworming with Levamisole / Albendazole / Piperazine etc) and use antibiotics, vitamins as per monthly health calendar programme

	• Vaccinate birds against important diseases like R.D., IBD, I.B., Fowl pox according to age as per scheduled programme.	E.coli & CRD. • Use of electrolytes in feed and drinking water.	
Floods			
Shortage of feed ingredients	• Purchase sufficient quantities of ready feed / raw feed ingredients. • Store feeding material in suitable houses which should be leak proof and without dampness. • Store feed on iron stands away from the wall to avoid increase in moisture & mould growth. • Road repairing for transporting feed and farm products. • 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.	• Use of toxin binders (Chek–O-Tox/ UTPP etc.) in the feed. • All electric connections should be in good condition to avoid shock and accident.	• Use of Toxin binder should be continued to avoid development of mycotoxins in the feed
Drinking water	-	-	-
Health and disease management	• Complete vaccination as per the programme for various categories of the birds i.e. Layers & Broilers. • Poultry sheds should be constructed at high raised land/or go for raised platform poultry sheds especially in flood affected areas. (conceptional biosecurity)	• Use of probiotics / or antibiotics in feed to protect birds from bacterial infections like E.coli, CRD, Enteritis etc.	• Use of probiotics should be continued in feed for 10-15 days.
Cyclone	Not Observed		
Shortage of feed ingredients			
Drinking water			
Health and disease management			
Heat wave and cold wave	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**
1) Drought	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.		
A. Capture			
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	-	-	-

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
B. Aquaculture	"Culture of aquatic organisms in confined water body", so this sector will affected most incase of either non availability of water or mismanagement.		
(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	-	-	-
2) Floods			

[a] based on forewarning wherever available