

State: GUJARAT

Agriculture Contingency Plan for District: MAHISAGAR

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Central Highlands (Malwa), Gujarat Plain and Kathiwar Peninsular, Semi- Arid Eco- Region (5.2)		
	Agro-Climatic Zone (Planning Commission)	Gujarat Plain and Hill Region (XIII)		
	Agro Climatic Zone (NARP)	North Gujarat Zone (GJ-4)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Sabarkantha, Mehsana, Kheda, Gandhinagar.		
	Geographic coordinates of district headquarters			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		23.1711° N	73.5594° E	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Main Maize Research Station, Godhra -389001 Agriculyura Research Station, Kankapur Agriculyura Research Station, Derol.		
	Mention the KVK located in the district with address	Krishi Vignan Kendra, Panchmahal (CIAH), Vejalpur (Godhra), Panchmahal -389340		

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	-	-	-	-
	NE Monsoon(Oct-Dec):	-	-	-	-
	Winter (Jan- March)	-	-	-	-
	Summer (Apr-May)	-	-	-	-
	Annual	831.8	36.2	-	-

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)	253.087	146.043	63.75	-	-	6.218	-	-	-	30.37

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)	Percent (%) of total
	1. Clay loam, Black soil	-	-
	2. Sandy loam, shallow to medium in depth and low to medium N & P content	-	-
	3. Medium black soil	-	-
	4.	-	-
	5.	-	-
	Others (specify):	-	-

* mention colour, depth and texture (heavy, light, sandy, loamy, clayey etc) and give vernacular name, if any, in brackets (data source: Soil Resource Maps of NBSS & LUP)

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	128.688	123.7%
	Area sown more than once	30.485	
	Gross cropped area	159.173	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	75.742		
	Gross irrigated area	166.563		
	Rainfed area	90.821		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		25.937	76.7
	Tanks			
	Open wells			
	Bore wells		0.297	
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)			
	Total Irrigated Area			
	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			
	Wastewater availability and use			
	Ground water quality			

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

1.7 Area under major field crops & horticulture (as per latest figures) (Specify year eg., 2013-14)

1.7	S. No.	Major field crops cultivated	Area ('000 ha)							
			Kharif			Rabi			Summer	Grand total
			Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
1	Wheat	-	-	-	82.63	-	82.63	-	82.63	
2	Cotton	54.75		54.75	-	-	-	-	54.75	
3	Maize	-	39.4	39.4	-	-	-	-	39.40	
4	Groundnut	-	33.9	33.9	-	-	-	-	33.90	
5	Castor	22.66	-	22.66	-	-	-	-	22.66	
6	Pigeon pea	2.25	1.565	3.82	-	-	-	-	3.82	
7	Pearl millet	-	-	-	-	-	-	3.30	3.30	
8	Groundnut	-	-	-	-	-	-	3.03	3.03	
9	Chickpea	-	-	-	2.43		2.43		2.43	
	Others (specify)	-	-	-	-	-	-	-	-	

	S. No.	Horticulture crops - Fruits	Area ('000 ha)		
			Total	Irrigated	Rainfed
	1	Fruits	11.437		

		Horticulture crops - Vegetables	Total	Irrigated	Rainfed
	1				
	2				
	Others (specify)				
		Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	1				
	2				
	Others (specify)				
		Plantation crops	Total	Irrigated	Rainfed
	1				
	2				
	Others (Specify)	Eg., industrial pulpwood crops etc.			
		Fodder crops	Total	Irrigated	Rainfed
	1				
	2				
	Others (Specify)				

		Total fodder crop area			
		Grazing land			
		Sericulture etc			
		Others (specify)			

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Non descriptive Cattle (local low yielding)	-	98581	98581			
	Improved cattle	-	79437	79437			
	Crossbred cattle	-	-	-			
	Non descriptive Buffaloes (local low yielding)	-	366072	366072			
	Descript Buffaloes	-	165816	165816			
	Goat	-	197465	197465			
	Sheep	-	4967	4967			
	Others (Camel, Pig, Yak etc.) pig	-	35	35			
	Ducks	-	393	393			
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial						
	Backyard						
1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	

	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds	No. of Reservoirs	No. of village tanks
	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)			
	Others			

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

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)							
Major Field crops (Crops to be identified based on total acreage)										
Crop 1	Maize	64.06	1479	-	-	-	-	64.06	1479	-
Crop 2	Wheat	-	-	30.92	2674	-	-	30.92	2674	-
Crop 3	Maize	-	-	17.25	2273	-	-	17.25	2273	-
Crop 4	Sesame	12.97	18505	-	-	-	-	12.97	18505	-
Crop 5	Paddy	8.68	1231	-	-	-	-	8.68	1231	-
Crop 6	Groundnut	-	-	-	-	4.44	1999	4.44	1999	-
Crop 7	Pigeon pea	4.33	1280	-	-	-	-	4.33	1280	-
Crop 8	Guar seed	3.68	8251	-	-	-	-	3.68	8251	-
Crop 9	Chickpea									

Others	-	-	-	-	-	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										
Crop 1	-	-	-	-	-	-	-	-	-	-
Crop 2	-	-	-	-	-	-	-	-	-	-
Crop 3	-	-	-	-	-	-	-	-	-	-
Crop 4	-	-	-	-	-	-	-	-	-	-
Crop 5	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-

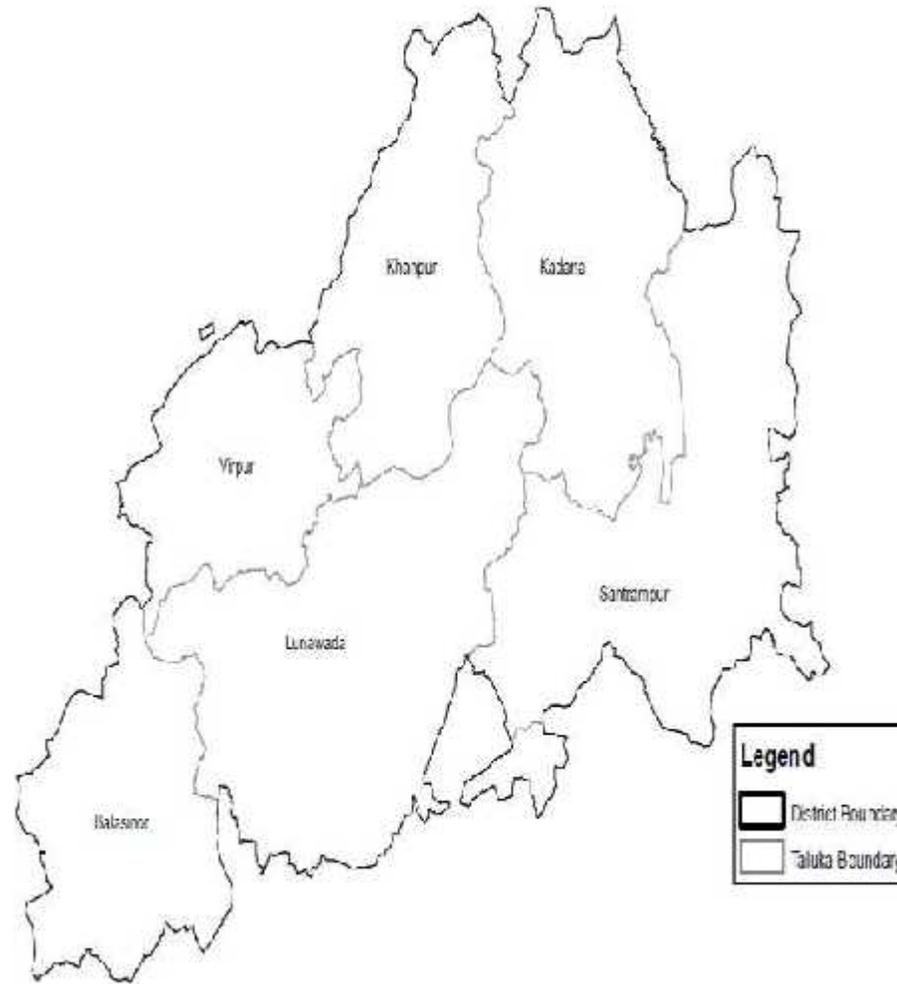
1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Crop 1: _____	2: _____	3: _____	4: _____	5: _____
	Kharif- Rainfed	-	-	-	-	-
	Kharif-Irrigated	-	-	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	-	-	-	-

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: No
		Soil map as Annexure 3	Enclosed: Yes

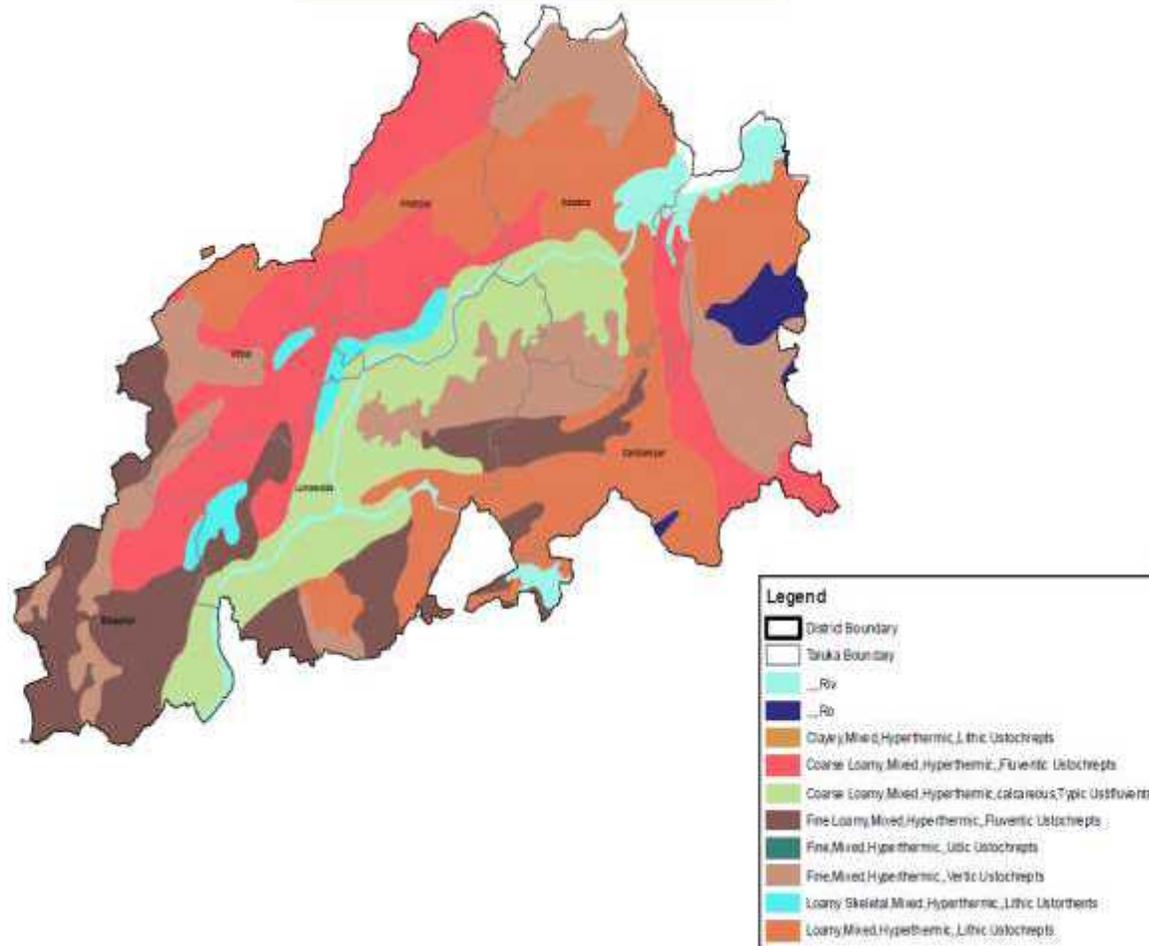
Annexure 1 : Location Map

Map of Mahisagar District



Annexure 3: Soil Map

Map of Soil of Mahisagar District



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 2 (1 st week of July)	Medium black shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	No change	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Pigeonpea (BDN-2)		
		Castor	Castor (GCH-2,GCH-4, GCH-7)		
		Maize + Pigeonea/Greengram/Blackgram	Maize + Pigeonea/Greengram/Blackgram		
	Hilly light soils	Maize	Maize(GM-4,GM-6 & N. Moti)	No change	
		Pigeonpea	Pigeonpea(BDN-2)		
		Castor	Castor (GCH-2,GCH-4, GCH-7)		
		Maize + Pigeonea/Greengram/Blackgram	Maize + Pigeonea/Greengram/Blackgram		
	Sandy loam shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	No change	
		Pigeonpea	Pigeonpea(BDN-2)		

		Maize + Pigeonea/Greengram/Blackgram	Maize + Pigeonea/Greengram/Blackgram		
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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 (3 rd week of July)	Medium black shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	No change	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Pigeonpea(BDN-2)		
		Castor	Castor (GCH-2,GCH-4, GCH-7)		
		Maize + Pigeonea/Greengram/Black gram	Maize + Pigeonea/Greengram/Black gram		
	Hilly light soils	Maize	Maize(GM-4,GM-6 & N. Moti)	No need of contingency plan	Supply of inputs through National food security mission and Tribal Development Board
		Pigeon Pea	Pigeon Pea(BDN-2)		
		Castor	Castor (GCH-2,GCH-4, GCH-7)		
		Maize + Pigeonea/Greengram/Black gram	Maize + Pigeonea/Greengram/Black gram		

	Sandy loam shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	No need of contingency plan	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Pigeonpea(BDN-2)		
		Maize + Pigeonea/Greengram/Black gram	Maize + Pigeonea/Greengram/Black gram		

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 6 weeks (1 st Week of August)	Medium black shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	Tide ridging Apply organic manure before sowing	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Pigeonpea(BDN-2)	Wider spaces 90x30cm	
		Castor	Castor (GCH-2,GCH-4, GCH-7)	Seed soaking in water Dry method of sowing	
		Maize + Pigeonpea/Greengram/Blackgram	Maize + Pigeonpea/Greengram/Blackgram	Tide ridging Apply organic manure before sowing	

	Hilly light soils	Maize	Maize(GM-4,GM-6 & N. Moti)	Tide ridging Apply organic manure before sowing	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Pigeonpea(BDN-2)	Wider spaces (90x30cm)	
		Castor	Castor (GCH-2,GCH-4, GCH-7)	Seed soaking in water Dry method of sowing	
		Maize + Pigeonpea/Greengram/Blackgram	Maize + Pigeonpea/Greengram/Blackgram	Tide ridging Apply organic manure before sowing	
	Sandy loam shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	Tide ridging Apply organic manure before sowing	
		Pigeonpea	Pigeonpea(BDN-2)	Wider spaces (90x30cm)	
Maize + Pigeonpea/Greengram/Blackgram		Maize + Pigeonpea/Greengram/Blackgram	Tide ridging Apply organic manure before sowing		

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 8 weeks (3 rd week of August)	Medium black shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti) Maize+Pigeon pea	Tide ridging Apply organic manure before sowing, Wider spacing (90x30cm)	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Pigeonpea(BDN-2)	Wider spacing (90x30cm)	
		Castor	Castor (GCH-2,GCH-4, GCH-7)	Seed soaking in water Dry method of sowing	
		Maize + Pigeonpea/Greengram/Blackgram	Maize + Pigeonpea/Greengram/Blackgram	Tide ridging Apply organic manure before sowing	
	Hilly light soils	Maize	Maize(GM-4,GM-6 & N. Moti)	Tide ridging Apply organic manure before sowing, Wider spacing (90x30cm)	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Pigeonpea (BDN-2)	Wider spacing (90x30cm)	
		Castor	Castor (GCH-2,GCH-4, GCH-7)	Seed soaking in water Dry method of sowing	
		Maize + Pigeonpea/Greengram/Blackgram	Maize + Pigeonpea/Greengram/Blackgram	Tide ridging Apply organic manure before sowing	
	Sandy loam shallow soils	Maize	Maize(GM-4,GM-6 & N. Moti)	Tide ridging Apply organic manure before sowing, Wider spacing (90x30cm)	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Pigeonpea (BDN-2)	Wider spacing (90x30cm)	

		Maize + Pigeonpea/Greengram/Blackgram	Maize + Pigeonpea/Greengram/Blackgram	Tide ridging Apply organic manure before sowing	
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Condition			Suggested Contingency measures		
Early season drought (delayed 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.	Medium black shallow soils	Maize	Thinning Life saving irrigation	Inter culturing and weeding	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Thinning	Weeding	
		Castor	-		
		Maize + pigeon pea/Greengram/Blackgram	-		
	Hilly light soils	Maize	Thinning Life saving irrigation	Inter culturing and weeding Inter culturing and weeding	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Thinning		
		Castor	-		
		Maize + Pigeonpea/Greengram/Blackgram	-	Weeding	
	Sandy loam shallow soils	Maize	Thinning Life saving irrigation	Inter culturing and weeding	Supply of inputs through National food security mission and Tribal Development Board
		Pigeon Pea	-	Inter culturing and weeding	

		Maize + Pigeonpea/Greengram/ Blackgram	-	Weeding	
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Medium black shallow soils	Maize	Life saving irrigation	Alternate furrow irrigation Interculturing	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Life saving irrigation	Interculturing	
		Castor	Alternate furrow irrigation	Interculturing	
		Maize + Pigeonpea/Greengram/Blackgram	Life saving irrigation	Weeding	
	Hilly light soils	Maize	Life saving irrigation	Alternate furrow irrigation Interculturing	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Life saving irrigation	Interculturing	
		Castor	Life saving irrigation	Alternate furrow irrigation Interculturing	
		Maize + Pigeonpea/Greengram/	Life saving irrigation	Weed free condition	

		Blackgram			
	Sandy loam shallow soils	Maize	Life saving irrigation	Alternate furrow irrigation Interculturing	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Life saving irrigation	Interculturing	
		Maize + Pigeonpea/Greengram/Blackgram	Life saving irrigation	Weed free condition	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell)	Medium black shallow soils	Maize		Alternate furrow irrigation Interculturing and weeding	Seed drill in RKVY project and GSSC supply quantity seed to farmers
		Pigeonpea	Life saving irrigation	Interculturing and weeding	
	Castor		Alternate furrow irrigation Interculturing		
	Maize + pigeon pea/Greengram/Blackgram	Life saving irrigation	-		
At flowering and fruiting stage	Hilly light soils	Maize		Alternate furrow irrigation Interculturing and weeding	Supply of inputs through National food security mission and Tribal Development Board
		Pigeonpea	Life saving irrigation	Interculturing and weeding	

		Castor		Alternate furrow irrigation Interculturing	
		Maize + Pigeonpea/Greengram/ Blackgram	Life saving irrigation		
	Sandy loam shallow soils	Maize		Alternate furrow irrigation Interculturing and weeding	Supply of inputs through National food security mission and Tribal Development Boardo
		Pigeonpea	Life saving irrigation	Weeding	
		Maize + Pigeonpea/Greengram/ Blackgram	Life saving irrigation		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought	Medium black shallow soils	Maize	Harvesting at maturity stage	Gram	Seed drill in RKVY project and GSSC supply quantity seed to farmers

		Pigeonpea	Green pod used as vegetable	Wheat	Supply of inputs through National food security mission and Tribal Development Board
		Castor	Harvesting at physiological maturity stage	Wheat	
		Maize + Pigeonpea/Greengram/Blackgram	Harvesting at maturity stage Green pod used as vegetable	Wheat	
	Hilly light soils	Maize	Harvesting at maturity stage	Gram	
		Pigeonpea	Green pod used as vegetable	Wheat	
		Castor	Harvesting at physiological maturity stage	Wheat	
		Maize + Pigeonpea/Greengram/Blackgram	Harvesting at maturity stage Green pod used as vegetable	Wheat	
	Sandy loam shallow soils	Maize	Harvesting at maturity stage	Gram	
		Pigeon Pea	Harvesting at maturity stage	Gram	
		Maize + Pigeonpea/Greengram/Blackgram	Harvesting at maturity stage Green pod used as vegetable	Wheat	

2.1.2 Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation

Delayed release of water in canals due to low rainfall	NA				
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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	NA				

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

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

onset of monsoon	
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Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall			NA		

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
Maize	Remove excess water from the field (Provision for drainage except paddy)	Remove excess water from the field except paddy field. Spraying of endosulfan (0.07%) in pigeon pea for control of pod borer	Remove excess water from the field.	Produce shift in safer place
Paddy				
Pigeon Pea				
Castor				
Horticulture	Provide proper drainage to remove excess water			
Mango				

Citrus				
Aonla				
Heavy rainfall with high speed winds in a short span				
Maize	Remove excess water from the field. Provision of drainage of water except paddy field.	Drainage of excess water	Harvest at physiological maturity in Maize , Bajra, Nipping of ear head and cob in standing crops	Ear and cobs should be dried in bright sunshine.
Paddy				
Pigeon Pea				
Castor				
Horticulture				
Mango	Remove excess water by providing proper drainage			
Citrus				
Aonla				
Outbreak of pests and diseases due to unseasonal rains				
Crop	Pest	Control measures		
Paddy	Rice stem borer	<ul style="list-style-type: none"> Apply carbofuran 3 G 1.0 kg a.i./ha or Carptap 4 G @ 1.0 kg/100 sq. meter at 5 days after sowing and five days before transplanting in paddy nursery. Application of carbofuran 3 G 1.0 kg a.i./ha or Carptap 4 G @ 1.0 kg/ha or carbosulfan 5 G @ 1.0 kg a.i./ha at 30 and 50 days after transplanting Spray any one of these Phosphamidon 0.03 % or Endosulfan 0.07 % or Quinalfos 0.05 % or Phosalone 0.05 % 		
	Paddy leaf hopper/Jassid	<ul style="list-style-type: none"> Avoid the top dressing of nitrogen application and Drain the water from the field 		

		<ul style="list-style-type: none"> • Later stage of the crop, spray Imidacloprid 0.05 % or Fenobucarb 0.07 %
	Rice hispa and rice blue beetle	<ul style="list-style-type: none"> • Collect the adults and destroy • Summer ploughing • Spray any one of these Endosulfan 0.07 % or Carbaryl 0.02 % or Fenitrothion 0.05 %
	Rice grass hopper	<ul style="list-style-type: none"> • Deep ploughing before rain • Dust any one of these, Carbaryl 10 % or Quinalphos 1.5 % @ 20-25 kg/ha

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
	NA			
Sea water intrusion	NA			

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Grow in polyhouse / Net house	Frequent irrigation to maintain soil moisture and humidity	Frequent irrigation to maintain soil moisture and humidity.	It is better to harvest crop
Maize,	Frequent sprinkler irrigation applied	Irrigation apply at afternoon	Irrigation apply at afternoon	
Drilled Paddy				
Pigeon Pea				

Castor			
Cold wave		NA	
Frost		NA	
Hailstorm		NA	
Cyclone		NA	

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 fodder availability	Development of fodder bank – urea molasses treatment.	Distribution of feed resources for the minimum maintenance requirement	Ample feeding to compensate nutritional losses
Drinking water	Deepings of water body, Water storage.	Supply of minimum requirement and control of wastage and evaporative losses	Local area ponds and recharging ground water
Health and diseases management	Vaccination for HS & FMD Deficiency diseases are likely and hence min. Mix., Vit A and phosphorus inj.	Poor plane of nutrition due to draught can likely to result in stress as well as manifestations of deficiencies which may make animals susceptible to various ailments. Therefore, supplementation with minerals and vitamins besides fodder is essential (1) FMD is common in summer. Treatment of affected	The measures mentioned in the previous column will have to be continued Treatment of affected animals. Precaution against GIT infection.

		animals. (2) Special care of pregnant buffaloes population will be advanced pregnant. (3)Breeding season for goats and hence special care.	Diniffection of areas where dead animal carcass were lying.
Floods			
Feed fodder availability	Make dry hay for future requirement	Protect the fodder from soaking and wastage / drained in flood.	Grow fodder Variety
Drinking water			
Health and diseases management	Vaccination against FMD & HS, untying of animals, taking them to higher places. Routine vaccination for Hoemorrhagic Septicemia (HS) untie animals – move to higher places – avoid tying to electric poles.	Evacuation of animals from flooded areas, drainage of water from and around animal sheds,pasture areas. Deworming of animals. Provision of animals. Provision of clean drinking water as well as feed/fodder	Treatment of animals showing signs of clinical disease, parasitic disease, avoid stagnation of water , parasitic diseases control. Disposition of dead animal carcass. Control of mosquitoes. (1) Treatment of animals for entritis etc. (2) Special care and treatment of young animals for enteric diseases like calf scour, pneumonia
Cyclone			
Feed fodder availability			
Drinking water			
Health and diseases management	Evacuation of animals to safer place particularly from the kuchche dwellings untie animals	Take animals to safe places - free animals	Rehabilitation of animals from affected areas and therapeutic management of injured/diseased. Treatment of injured animals and

			rehabilitation of affected animals.
Heat wave and Cold wave			
Shelter/environment management	Shed/ Tree plantation provision of drinking water	Ample water available	
Health and diseases management	Provision of shed and drinking water In cold season blood protozoan diseases are common and hence control of vectors like ticks etc should be a routine	Animals should be kept under sheds during peak hours with sufficient supply of drinking water. Episodes of heat/sun stroke are common. Feeding during night hours, working during cool hours. Working animals working may show dehydration. Control dehydration and restore electrolyte balances. Provision of ample drinking water for all animals and intravenous fluid infusions should be made. (1)Special intensive care of young growing animals by giving proper parenteral nutrition etc. (2) In cold wave highly specific treatment of all the animals particularly the young ones and efforts to prevent the freezing injury to the extremities of the animal body.	

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<i>Drought</i>			
Feed and fodder availability	As the district is occasionally prone to drought the following measures to be taken to ameliorate the fodder deficiency Avoid burning of wheat/paddy straw	Harvest and use biomass of dried up crops (Maize, Paddy, Wheat, Pigeonpea etc..) material as fodder Utilizing fodder from fodder bank reserves.	Training/educating farmers for feed & fodder storage. Maintenance / repair of silo pits and feed/fodder stores.

	<p>Establishment of fodder bank at village level with available dry fodder (paddy /wheat straw)</p> <p>Increase area under perennial fodder cultivation with high yielding Hybrid Napier varieties.</p> <p>Conservation of maize/bajra green fodder as silage</p> <p>Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during early monsoon under dry land system for fodder production</p> <p>Encourage fodder production with Maize, Jowar, Bajra , Cowpea, Barseem, Lucerne etc.,</p> <p>Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.</p>	<p>Utilizing stored silage/hay.</p> <p>Transporting complete feed/fodder and dry roughages to the affected areas.</p> <p>Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding as supplement for high productive animals during drought</p> <p>Continuous supplementation of mineral mixture to prevent infertility.</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</p>	<p>Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall etc.,</p> <p>Supply of quality fodder seed (multi cut sorghum/bajra/maize varieties) and fodder slips of Napier, guinea grass well before monsoon</p> <p>Replenish the feed and fodder banks</p>
Drinking water	<p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p> <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p> <p>Community drinking water trough can be arranged in shandies /community grazing areas</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water bodies/resources</p> <p>Add alum in stagnated water bodies</p>	<p>Watershed management practices shall be promoted to conserve the rainwater.</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>
Health and disease management	<p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p>	<p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p> <p>Performing ring vaccination (8 km radius) in</p>	<p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p> <p>Keep the animal houses</p>

	<p>Vaccination for HS & FMD</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p> <p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures</p> <p>Procure and stock multivitamins & area specific mineral mixture</p>	<p>case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Drainage of water from and around animal sheds, pasture areas.</p> <p>Tick control measures be undertaken to prevent tick borne diseases in animals</p> <p>Rescue of sick and injured animals and their treatment</p> <p>Organize with community, daily lifting of dung from relief camps</p>	<p>clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer</p>
Floods	Not applicable		
Cyclone	Not applicable		
Cold wave	Not applicable		
Heat wave	<p>Arrangement for protection from heat wave</p> <ul style="list-style-type: none"> i) Plantation around the shed ii) H₂O sprinklers / foggers in the shed iii) Application of white reflector paint on the roof iv) Thatched sheds should be provided as a shelter to animal to minimize heat stress 	<p>Allow the animals early in the morning or late in the evening for grazing during heat waves</p> <p>Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves</p> <p>Put on the foggers / sprinklers/fans during heat waves in case of high yielders (Jersey/HF crosses)</p> <p>In severe cases, vitamin 'C' and electrolytes should be added in H₂O during heat waves.</p>	<p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p>
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	<p>Submission for insurance claim and availing insurance benefit</p> <p>Purchase of new</p>

2.5.2. Poultry

	Suggested contingency measures		
	Before the event*	During the event	After the event
Drought			
Shortage of feed ingredients	<ul style="list-style-type: none"> • Purchase sufficient quantity of ready feed / raw feed ingredients as per storage facilities and requirement. • Identify 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. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Shift over to good quality feed for optimum production performance.
Drinking water	<ul style="list-style-type: none"> • Tube well and water storage facilities should be adequately created. 	<ul style="list-style-type: none"> • Judicious use of water by avoiding spillage/ leaking through waterers. • Use of cooling facilities like sprinklers, foggers, fans etc. for comfort zone and optimum production performance. 	<ul style="list-style-type: none"> • Use water sanitizers (chlorination/Sokrena / Vigrox etc.) and softeners (pH. 6).
Health and disease management	<ul style="list-style-type: none"> • Use of anti-stress vitamins (AD₃ECB₁₂-Vimeral / Famitone / Stressvell etc.) in feed and drinking water. • Use of adaptogenetic herbal medicines 	<ul style="list-style-type: none"> • Use anti-stress, vitamins and adaptogenetic herbal drugs. • Perform vaccination for Ranikhet Disease & Infectious Bronchitis . 	<ul style="list-style-type: none"> • Vaccinate birds as per vaccination schedule. • Perform deworming with Levamisole / Albendazole /

	<p>(Zetress / Zist etc).</p> <ul style="list-style-type: none"> • Use probiotics (Protexin / Biovet-YC) in feed. • Vaccinate birds against important diseases like R.D., IBD, I.B., Fowl pox according to age as per scheduled programme. 	<ul style="list-style-type: none"> • Prophylactic medication for important diseases like E.coli & CRD. • Use of electrolytes in feed and drinking water. 	<p>Piperazine etc) and use antibiotics, vitamins as per monthly health calendar programme</p>
Floods	Not Applicable		
Cyclones	Not Applicable		
Heat and cold wave			
Shelter/environment management	<ul style="list-style-type: none"> • Install foggers inside the house. • Install sprinklers on the roof. • Tree plantation surrounding the shed. • Purchase of electrolyte and anti-stress vitamins and antibiotics 	<ul style="list-style-type: none"> • Try to Keep the house temperature in comfort zone i.e. 70-75° F through use of foggers, sprinklers and air velocity fans. • Reduce protein by 2% in feed. • Use of fat / Vegetable oil (2-5%) in feed as partial replacement to carbohydrates sources i.e. Maize, Wheat, Rice Kani etc. 	<ul style="list-style-type: none"> • Use of cooling mechanisms to maintain house temperature in comfort zone for best production performance.
Health and disease management	<ul style="list-style-type: none"> • Birds should be free from bacterial and mycoplasma infections by using antibiotics/ antimycoplasma drugs (Tiamutin/ Tylosin etc.) as mortality in affected birds is high due to heat stress. • Vaccinate birds for respiratory diseases like Ranikhet disease /Infectious Bronchitis. 	<ul style="list-style-type: none"> • Use anti stress vitamins and electrolytes in drinking water / feed. 	<ul style="list-style-type: none"> • Check titres for respiratory disease and accordingly repeat vaccination against Ranikhet disease / Infectious Bronchitis

2.5.3 Fisheries/ Aquaculture:

	Suggested contingency measures		
	Before the event	During the	After the event

		event	
1) Drought	Connect the all major rivers of state and make network to connect all reservoir and village ponds to defend from drought condition of particular zone.		
A. Capture	Marine sector couldn't effected directly but estuarine biodiversity will effected (some fresh water fish migrate to marine or vice versa for breeding will effected)		
Marine			
Inland	Inland sector will affected most during the drought condition. Indian Major Carp, Exotic Carp, 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. 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	Pre- harvest all the materials (fish and prawns) & preserved by	Sanitize the dead fish biomass.

	culture fishes to abundance water zone	freezing	
(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	Flood are generally predicted and early warning will protect the lives and livelihood		
A. Capture	Change of breeding grounds, migration of fish against and with the water, and increase of fish stock etc, so positive affect on capture fisheries.		
Marine			
Inland	All the fishermen must call back from fishing	No fishing	
(i) Average compensation paid due to loss of human life	<p>1. Recognizing the risk of flood & making the people aware of it</p> <p>2. Migrate the people at safe place</p> <p>3. Collect the details information of swimmers & life savers appliances.</p>	Send the rescue teams to protect the lives of the most vulnerable peoples.	<p>1. Measure social impact of losses risks of diseases, loss of employment.</p> <p>2. The most vulnerable fishermen be taken care of first and fast</p>

(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			
(iv) Loss of stock			
(v) Changes in water quality			
(v) health and diseases	Prepared the medical rescue team	-	<ol style="list-style-type: none"> 1. Proper hygiene & sanitation 2. Send the medical rescue team with drugs.
B. Aquaculture	Flood affects the culture ponds which situated near the river. It demolished the pond dyke, overflows the pond and contaminated the culture.		
(i) Inundation with flood water	<ol style="list-style-type: none"> 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. 		<ol style="list-style-type: none"> 1. Harvest the culture fish & 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		Destroyed the dead fish with disinfectant
(v) Loss of stock and inputs (feed etc)	Transfer the stock and inputs at safe places	-	Demolish the decayed feed
Infrastructure damage(pumps, aerators, huts etc)	Transfer the detachable infrastructure at safe places	-	Measures impact of losses of infrastructure and provide assist for rehabilitation
(vi) Any other			
3. Cyclone / Tsunami	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		
A. Capture	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			
(i) Average compensation paid due to loss of fishermen lives			

(ii) Avg. no. of boats/nets/ damaged			
(iii) Avg. no. of houses damaged			
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. Aquaculture	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) 2. Protect the dykes by putting soil bags. 3. Place the iron screen on inlet and outlet	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)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)	Transfer the stock and inputs at safe	-	Destroy the decomposed feed

	places		
(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			
4. Heat wave and cold wave	This factor will affect indirectly to the fish stock.		
A. Capture	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			
Inland	Assessment of capture fish catch	Study the impact of heat and cold wave on fish capture and biodiversity.	Established the fishery
B. Aquaculture	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	Acclimatize the fish stock in natural condition and reduced the used equipments from the ponds. Maintain the feed ration accordingly.

		dissolve oxygen in pond.	
(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			