

# State: GUJARAT

## Agriculture Contingency Plan for District: BOTAD

<b>1.0 District Agriculture profile</b>				
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>			
	Agro Ecological Sub Region (ICAR)	Northern Plain (And Central Highlands) Including Aravallis, Hot Semi- Arid Eco- Region (4.2)		
	Agro-Climatic Zone (Planning Commission)	Gujarat Plain and Hill Region (XIII)		
	Agro Climatic Zone (NARP)	North Saurashtra Zone (GJ-6)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Bhavanagar, Jamnagar, Rajkot		
	Geographic coordinates of district headquarters			
	Geographic coordinates of district headquarters	<b>Latitude</b>	<b>Longitude</b>	<b>Altitude</b>
		22.17° N	71.67° E	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station, Anand Agricultural University, Arnej -382230 Agricultural Research Station, Anand Agricultural University, Dhandhuka -382460 Regional Cotton Research Station, Anand Agricultural University, Viramgam -382150 Agricultural Research Station, Anand Agricultural University, Sanand -382110		
	Mention the KVK located in the district with address	Krishi Vignan Kendra, Village Sansora, Bhavanagar.		

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	655.9	29.4	-	-

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)	266.341	213.397	5.527	14.958	-	7.495	-	-	30.932	-

1.4	Major Soils (common names like red sandy loam deep soils (etc.))*	Area ('000 ha)	Percent (%) of total
	1. Medium black soils (Plain fine texture and shallow to medium depth and leveled)	-	-
	2.		
	3.		
	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)

<b>1.5</b>	<b>Agricultural land use</b>	Area ('000 ha)	Cropping intensity %
	Net sown area	198.497	106.5%
	Area sown more than once	57.1535	
	Gross cropped area	213.397	

<b>1.6</b>	<b>Irrigation</b>	Area ('000 ha)		
	Net irrigated area	-		
	Gross irrigated area	90.278		
	Rainfed area	138.06		
	<b>Sources of Irrigation</b>	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		844.71	
	Tanks			
	Open wells			
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)		29.637 (Reservoirs)	
	Total Irrigated Area			
	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			
	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	Cotton	61.59	105.544	167.134	-	-	-	-	167.134	
2	Wheat	8.266	8.755	17.02	-	-	-	-	17.02	
3	Sorghum	-	3.45	3.45	8.75	-	8.75		12.20	
4	Sesame	-	6.123	6.123	-	-	-	-	6.123	
5	Guar seed	0.06	1.27	1.33					1.33	
6	Pearl millet	-	-	-	0.758	-	-	-	0.758	
	Others (specify)									

	S. No.	Horticulture crops - Fruits	Area ('000 ha)		
			Total	Irrigated	Rainfed
	1	Spices	5.181	5.181	-
	2	Fruits	1.186	1.067	0.119
	3	Flowers	0.036	0.036	-
	Others				

	(specify)				
		<b>Horticulture crops - Vegetables</b>	<b>Total</b>	<b>Irrigated</b>	<b>Rainfed</b>
	1	Vegetable	3.081	3.081	-
	Others (specify)				
		<b>Medicinal and Aromatic crops</b>	<b>Total</b>	<b>Irrigated</b>	<b>Rainfed</b>
	1				
	2				
	Others (specify)				
		<b>Plantation crops</b>	<b>Total</b>	<b>Irrigated</b>	<b>Rainfed</b>
	1				
	2				
	Others (Specify)	Eg., industrial pulpwood crops etc.			
		<b>Fodder crops</b>	<b>Total</b>	<b>Irrigated</b>	<b>Rainfed</b>
	1				
	2				
	Others (Specify)				

		<b>Total fodder crop area</b>			
		<b>Grazing land</b>			
		<b>Sericulture etc</b>			
		<b>Others (specify)</b>			

<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)	-	153.191	153.191			
	Improved cattle	-	5.984	5.984			
	Crossbred cattle	-	-	-			
	Non descriptive Buffaloes (local low yielding)	-	71.315	71.315			
	Descript Buffaloes	-	-	-			
	Goat	-	54.296	54.296			
	Sheep	-	19.606	19.606			
	Others (Camel, Pig, Yak etc.)	-	-	-			
	Commercial dairy farms (Number)						
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>				
	Commercial	-	2.267				
	Backyard	-	-				
<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>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)	

	<b>ii) Inland</b> (Data Source: Fisheries Department)	<b>No. Farmer owned ponds</b>	<b>No. of Reservoirs</b>	<b>No. of village tanks</b>
	<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>			

### 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)	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>										
Crop 1	Cotton	64.366	385.11	-	-	-	-	64.366	385.11	
Crop 2	Wheat	-	-	31.895	1873.89	-	-	31.895	1873.89	
Crop 3	Sorghum	-	-	6.881	786.00	-	-	6.881	786.00	
Crop 4	Sorghum	4.599	1333.00	-	-	-	-	4.599	1333.00	
Crop 5	Sesame	2.993	488.87	-	-	-	-	2.993	488.87	
Crop 6	Pearl millet	1.465	1932.46	-	-	-	-	1.465	1932.46	
Others										
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
Crop 1	-	-	-	-	-	-	-	-	-	-
Crop 2	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-

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

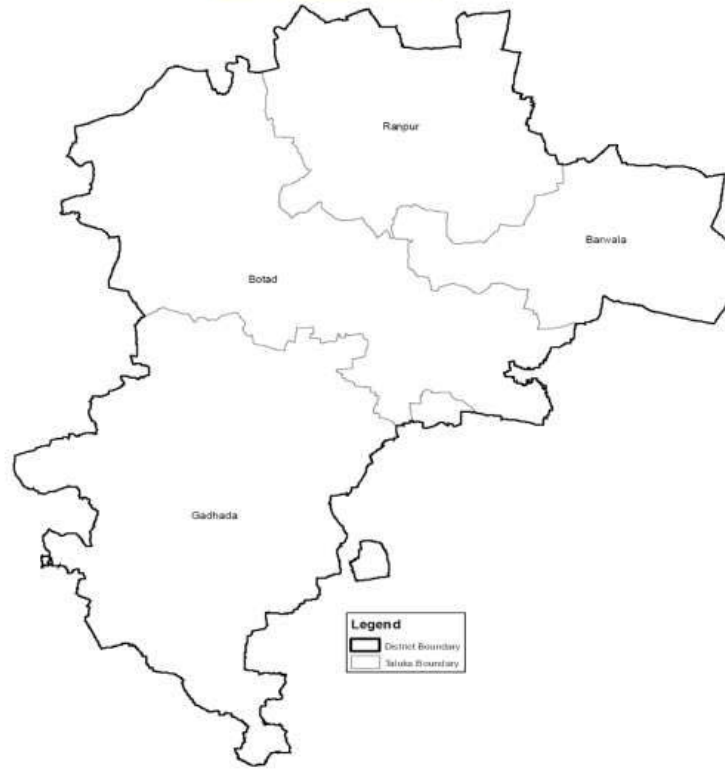
<b>1.13</b>	<b>What is the major contingency the district is prone to? (Tick mark)</b>	<b>Regular</b>	<b>Occasional</b>	<b>None</b>
	Drought			
	Flood			
	Cyclone			
	Hail storm			
	Heat wave			
	Cold wave			
	Frost			
	Sea water intrusion			
	Pests and disease outbreak (specify)			
	Others (specify)			

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



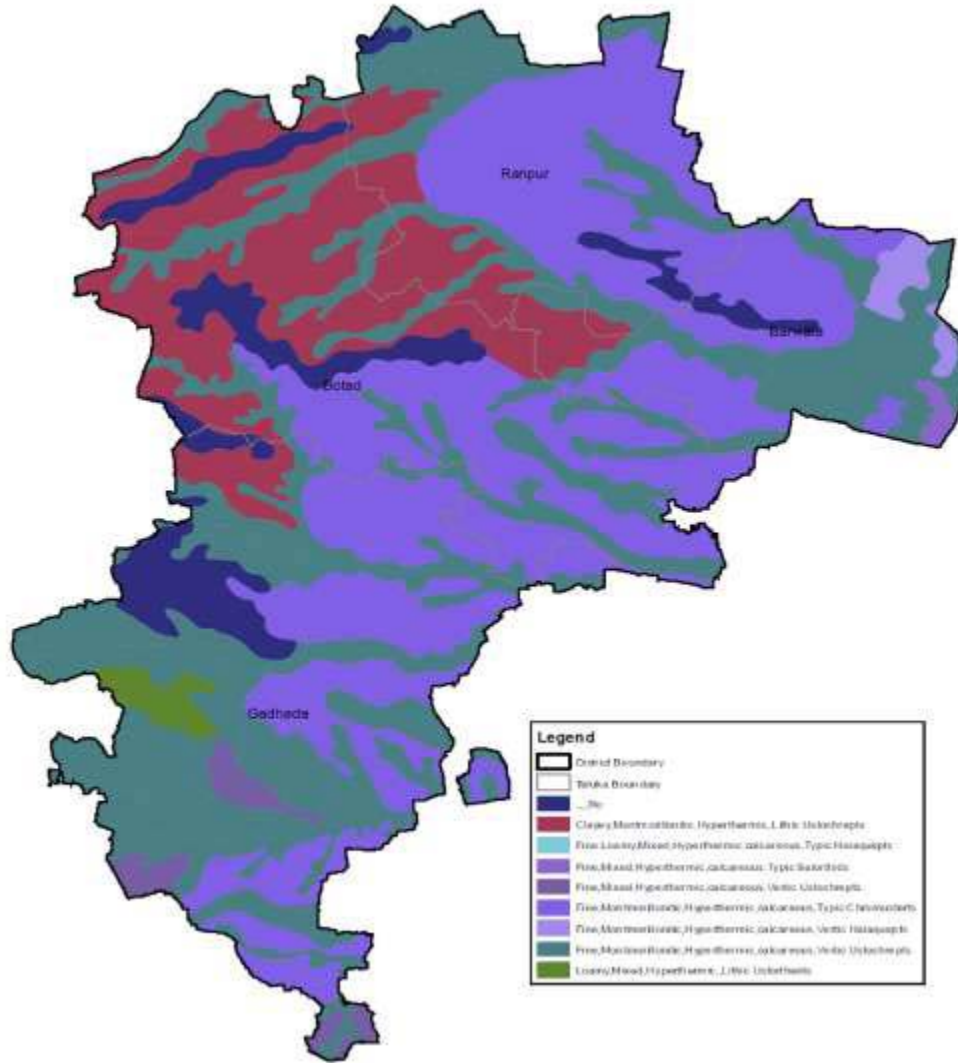
## Annexure-I

Map of Botad District



### Annexure-III

Map of Soil of Botad District



## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Change in crop cropping system	Agronomic measures	Remarks on implementation
Early season drought (delayed onset)	1. Medium rainfall medium black upland soil	<b>Cotton</b> (G.Cot-13, G.Cot-21 and ADC-1)+Green gram(GM-4')	No change	Apply K@20 kg/ha at 6cm depth at the time of sowing	COTTON MISION,ISOPOM RKVY,NFSM NFSM
		<b>Pearl millet</b> (GHB-526,GHB-528, GHB-538, GHB-732)	No change	No change	
	2. Medium rainfall medium black low land saline soil (unirrigated)	<b>Fallow–Wheat</b> (durum), GW-1 (under conserve moisture)	No change	No change	
		Fallow –Gram, GG-2 (under conserve moisture)	No change	No change	
	3. Medium rainfall medium black upland saline soil	<b>Cotton</b> (G.Cot-13, 21 and ADC-1)+Sesamume(GT--2) or Bt Cotton	No change	No change	
		Sesamume(GT--2)		• No need of contingency	

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures			
			Change in crop cropping system	Agronomic measures	Remarks on implementation	
Early season drought (delayed onset)	Delay by 4 weeks (July 3 <sup>rd</sup> week)	Medium rainfall medium black upland soil	<b>Cotton</b> (G.Cot-13 , 21 and ADC-1)+Green gram(GM-4)	No change	<ul style="list-style-type: none"> <li>• Dry sowing with 15 -20 % higher seed rate.</li> <li>• Apply K @ 20kg /ha at 6cm depth at the time of sowing</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM
			<b>Pearl millet</b> (GHB-526, GHB-528)	No change	<ul style="list-style-type: none"> <li>• No need of contingency</li> </ul>	
	Medium rainfall medium black low land saline soil (unirrigated)	<b>Fallow–Wheat</b> (durum), GW-1 (under conserve moisture)	No change	<ul style="list-style-type: none"> <li>• ---</li> </ul>		
	Medium rainfall medium black upland saline soil	<b>Cotton</b> (G.Cot-13 , 21 and ADC-1)+ <b>Sesamum</b> (GT--2)	No change	<ul style="list-style-type: none"> <li>• Dry sowing with 15 -20 % higher seed rate.</li> </ul>		
		<b>Sesamum</b> (GT--2)	No change	<ul style="list-style-type: none"> <li>• No need of contingency</li> </ul>		

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures			
			Change in crop cropping system	Agronomic measures	Remarks on implementation	
Early season drought ( delayed onset)	Delay by 6 weeks (August 1 <sup>st</sup> week)	Medium rainfall medium black upland soil	Cotton	Cotton(G.Cot-13 , 21 and ADC-1)Green gram(GM-4)	<ul style="list-style-type: none"> <li>• Dry sowing with 15 -20 % higher seed rate.</li> <li>• Apply K @ 20kg /ha at 6cm depth at the time of sowing</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM

		Pearl millet	Shift on Fodder sorghum (S 1049) or Safflower (Tara ) inoculated with Azospirillum + 30 kg Sulphur/ha through gypsum	---	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow–Wheat (durum)	Durum Wheat, GW-1	-	
	Medium rainfall medium black upland saline soil	Cotton (rainfed)	Cotton(G.Cot-13 , 21 and ADC-1)	• Dry sowing with 20 % higher seed rate.	
		Sesamume	Sesamum(GT-2)	---	

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Change in crop cropping system	Agonomic measures	Remarks on implementation
Early season drought (delayed onset)	Medium rainfall medium black upland soil	Cotton (rainfed)	Cotton (G.Cot-13, 21 and ADC-1) Apply K @ 20kg /ha at 6cm depth at the time of sowing	<ul style="list-style-type: none"> <li>• Dry sowing with 20 % higher seed rate.</li> <li>• Apply K @ 20kg /ha at 6cm depth at the time of sowing</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM
		Pearl millet	Shift on Fodder sorghum (S - 1049) or Safflower (Tara ) inoculated with Azospirillum + 30 kg Sulphur/ha through gypsum	---	
		Fallow –Wheat (durum)	Durum Wheat, GW-1 (under conserve moisture)	-	
Delay by 8 weeks (August 3 <sup>rd</sup> week)	Medium rainfall medium black upland soil	Cotton (rainfed)	Cotton (G.Cot-13, 21 and ADC-1) Apply K @ 20kg /ha at 6cm depth at the time of sowing	<ul style="list-style-type: none"> <li>• Dry sowing with 20 % higher seed rate.</li> <li>• Apply K @ 20kg /ha at 6cm depth at the time of sowing</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM
	Pearl millet	Shift on Fodder sorghum (S - 1049) or Safflower (Tara ) inoculated with Azospirillum + 30 kg Sulphur/ha through gypsum	---		
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (durum)	Durum Wheat, GW-1 (under conserve moisture)	-	

	Medium rainfall medium black upland saline soil	Cotton (rainfed)	Cotton (G.Cot-13 , 21 and ADC-1)	• Dry sowing with 15 -20 % higher seed rate.	
		Sesamum	Sesamum (Purva-1)	-	

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient and moisture conservation measure	Remarks on implementation
Early season drought (Normal onset)	Medium rainfall medium black upland soil	Cotton Deshi	Gap filling	• Intercultivation, Weeding	COTTON MISSION,ISOPOM RKVY,NFSM NFSM
		Pearl millet	Gap filling	• Intercultivation, Weeding	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (durum)	-	-	
	Medium rainfall medium black upland saline soil	Cotton Deshi	Gap filling	• Intercultivation, Weeding	
		Sesamum	Gap filling Thinning	• Intercultivation, Weeding	

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient and moisture conservation measure	Remarks on implementation
Mid season drought (long dry spell , consecutive 2 weeks rain less (<2.5 mm) period)					

At vegetative stage	Medium rainfall medium black upland soil	Cotton Deshi	Topping	<ul style="list-style-type: none"> <li>• Intercultivation,</li> <li>• Weeding,</li> <li>• Delay top dressing of N till occurrence of next rain</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM
		Pearl millet	Thinning	<ul style="list-style-type: none"> <li>• Intercultivation</li> <li>• Weeding,</li> <li>• Delay top dressing of N till occurrence of next rain</li> </ul>	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (durum)	-	-	
	Medium rainfall medium black upland saline soil	Cotton Deshi	Topping	<ul style="list-style-type: none"> <li>• Intercultivation</li> <li>• Weeding,</li> <li>• Delay top dressing of N till occurrence of next rain</li> <li>• Spray 2% Urea</li> <li>• Spray 2% KNO<sub>3</sub>, 2 times when crop shows reddening symptoms</li> </ul>	
		Sesame	Thinning	<ul style="list-style-type: none"> <li>• Intercultivation&amp;Weeding,</li> </ul>	ISOPOM

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient and moisture conservation measure	Remarks on implementation
Mid season drought (long dryspell)					
At reproductive stage	Medium rainfall medium black upland soil	Cotton Deshi	Spray 2% urea	<ul style="list-style-type: none"> <li>• Follow frequent Intercultivation (soil mulch) to avoid cracks in the soil</li> <li>• Weeding,</li> <li>• Delay top dressing of N till occurrence of next rain</li> <li>• Alternate furrow irrigation if available</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM

		Pearl millet	No need of contingency	--	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (durum)	---		
	Medium rainfall medium black upland saline soil	Cotton Deshi	---	<ul style="list-style-type: none"> <li>• Intercultivation</li> <li>• Weeding</li> <li>• Delay top dressing of N till occurrence of next rain, Alternate furrow irrigation if require</li> </ul>	
		Sesamum	No need of contingency	<ul style="list-style-type: none"> <li>• Weeding</li> </ul>	

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Crop management	Rabi crop planning	Remarks on implementation
Terminal drought	Medium rainfall medium black upland soil	Cotton Deshi	Picking mature balls	<ul style="list-style-type: none"> <li>• Apply irrigation if require in alternate furrow</li> </ul>	COTTON MISION,ISOPOM RKVY,NFSM NFSM
		Pearl millet	Harvest as a fodder	---	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (durum)	---	<ul style="list-style-type: none"> <li>• Wheat (GW-1) sown in conserve moisture</li> </ul>	
	Medium rainfall medium black upland saline soil	Cotton Deshi	---	<ul style="list-style-type: none"> <li>• Apply irrigation if require in alternate furrow</li> </ul>	
		Sesamum	Harvest at physiological maturity	<ul style="list-style-type: none"> <li>• Cumin (GC-4)</li> </ul>	



## 2.1.2 Irrigated situation

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Change in crop cropping system	Agronomic measures	Remarks on implementation
Delayed/limited release of water in canals due to low rainfall	Medium rainfall medium black upland soil	Cotton	Cotton Deshi (ADC-1, G.Cot.21)	<ul style="list-style-type: none"> <li>Use other source of water for irrigation</li> <li>Apply one irrigation if require at the time of long dry spell</li> <li>Apply irrigation in alternate furrow if require</li> </ul>	COTTON MISION ISOPOM - 1.Seed drills under RKVY 2.Supply of seeds through GSSC 3.Supply of seeds through NFSM NFSM RKVY
		Pearl millet	No need of contingency	-	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (durum)	--	-	
	Medium rainfall medium black upland saline soil	Cotton	Cotton : Bt cotton	<ul style="list-style-type: none"> <li>Use other source of water for sowing</li> <li>Apply irrigation through drip / furrow for sowing</li> </ul>	
Sesamum		Sesamum : Purva-1			

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Change in crop cropping system	Agronomic measures	Remarks on implementation
Non release of water in canals under delayed onset of monsoon in catchment	Medium rainfall medium black upland soil	Cotton	Cotton Deshi (ADC-1, G.Cot.21)	<ul style="list-style-type: none"> <li>Use of other sources of irrigation (Tubewell&amp; pond) for sowing, if monsoon delayed upto July</li> </ul>	COTTON MISION ISOPOM - 1.Seed drills under RKVY

		Pearl millet	No need of contingency	<ul style="list-style-type: none"> <li>Sowing of pearl millet is possible if rain occur up to the end of July</li> <li>If rain is to be occur after july, sow the sorghum crop as a fodder</li> </ul>	2. Supply of seeds through GSSC 3. Supply of seeds through NFSM
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow–Wheat (GW-1)	--	<ul style="list-style-type: none"> <li>No need of contingency</li> </ul>	
	Medium rainfall medium black upland saline soil	Cotton	Cotton : Bt cotton	<ul style="list-style-type: none"> <li>Apply irrigation through drip or in furrow for sowing through other source of water</li> </ul>	
		Sesamum	--	<ul style="list-style-type: none"> <li>Grow the crop as a semi- rabi (Purva-1)</li> </ul>	

Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Change in crop cropping system	Agronomic measures	Remarks on implementation
Insufficient ground water recharge due to low rainfall	Medium rainfall medium black upland soil	Cotton	Cotton (G.Cot-13, G.Cot-21, ADC-1)	<ul style="list-style-type: none"> <li>Soil mulch through inter culturing</li> </ul>	<ul style="list-style-type: none"> <li>Every year ground water recharging through farm pond/ deepening the village pond and check dam should be implemented through PPP.</li> </ul>
		Pearl millet	Shift on fodder sorghum (S-1049)	<ul style="list-style-type: none"> <li>No need agronomic measures</li> </ul>	
	Medium rainfall medium black low land saline soil (unirrigated)	Fallow –Wheat (GW-1)	Durum Wheat GW-1	-	<ul style="list-style-type: none"> <li>Crops mostly raised under conserve rain water</li> </ul>
	Medium rainfall medium black upland saline soil	Cotton	Cotton (G.Cot-13, G.Cot-21, ADC-1 or Bt Cotton)	-	<ul style="list-style-type: none"> <li>Due to poor ground water</li> </ul>

		Sesamum	Sesamum (GT-2)	-	<p>quality (saline) farmer are not prefer to apply irrigation.</p> <ul style="list-style-type: none"> <li>• Crops mostly raised under conserve rain water</li> <li>• Sesamum crop mostly raised successfully under rainfed condition</li> </ul>
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Condition	Major farming situation	Crop/ Cropping system	Suggested Contingency measures		
			Change in crop cropping system	Agronomic measures	Remarks on implementation
Lack of inflows into tanks due to insufficient / delayed onset of monsoon	<b>This type of irrigation facilities are not available in This District</b>				

## 2.2 Unusual rains (untimely, unseasonal etc.) (for both rainfed and irrigation condition)

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stag	Crop maturity stage	Post harvest
Continyous high rainfall in short span leading to water logging				
Cotton	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spraying of monocrotophos 0.04%</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spraying of monocrotophos 0.04%</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the picking seed cotton</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> <li>• Drying of seed cotton for maintaining the quality of lint</li> </ul>
Wheat	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the harvest</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>

Pearlmillet	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Nipping in standing crop</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> <li>• Cover the plastic sheet on the produce if availabel</li> </ul>
<b>Horticulture</b>				
Ber	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spraywetable sulphur @ 0.02%</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Citrus	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Paste bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Anola	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spray NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Mango	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spraying NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Guava	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Paste bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>

<b>Heavy rainfall with high speed wind in a short span</b>				
Cotton	Drain out excess water Spraying of monocrotophos 0.04%	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spraying of monocrotophos 0.04%</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the picking of seed cotton</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> <li>• Drying of seed cotton for maintaining the quality of lint</li> </ul>
Wheat	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the harvest</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Pearlmillet	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Nipping in standing crop</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
<b>Horticulture</b>				
Ber	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Pl. protection measures should be</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>

		<ul style="list-style-type: none"> <li>taken</li> <li>Spray wettable sulphur @ 0.02 %</li> </ul>		
Citrus	Drain out excess water	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Paste bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Harvest mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>Harvested crop should transfer at safer palace</li> </ul>
Anola	Drain out excess water	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Spray NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>Harvested crop should transfer at safer palace</li> </ul>
Guava	Drain out excess water	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Paste bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>Harvested crop should transfer at safer palace</li> </ul>
Mango	Drain out excess water	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Spray NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>Harvested crop should transfer at safer palace</li> </ul>
<b>Outbreak of pest and diseases due to un seasonal rains</b>	<b>Control measure taken as per recommendations as per Appendix</b>			

### 2.3 Floods

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stag	Crop maturity stage	Post harvest
Continuous high rainfall in short span leading to water logging				
Cotton	Drain out excess water	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Spray monocrotophos @0.04%</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Delay the picking of seed cotton</li> </ul>	<ul style="list-style-type: none"> <li>Harvested crop should transfer at safer palace</li> <li>Drying of seed cotton for maintaining in quality of lint</li> </ul>
Wheat	Drain out excess water	<ul style="list-style-type: none"> <li>Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>Drain out excess water</li> <li>Delay the harvest the crop</li> </ul>	<ul style="list-style-type: none"> <li>Harvested crop should transfer at safer palace</li> </ul>

Pearlmillet	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the harvest the crop</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
<b>Horticulture</b>				
Ber	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Pl. protection measures</li> <li>• Spray wetable sulphur @0.02%</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Citrus	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Paste the bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Anola	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spray NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Mango	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Pl. protection measures should be taken</li> <li>• Spray NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Guava	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Paste the bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>

<b>Continuous submergence for more than 2 days<sup>2</sup></b>				
Cotton	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the picking of seed cotton</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Wheat	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Delay the harvest of crop</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Pearlmillet	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Nipping in standing crop</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
<b>Horticulture</b>				
Ber	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Pl. protection measures should be taken</li> <li>• Spray wetable sulphur @0.02%</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Citrus	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spray the bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>

Anola	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spray NAA@20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Guava	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Pl. protection measures should be taken</li> <li>• Spray the bordo mixture on stem</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
Mango	Drain out excess water	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Spray NAA @20 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Harvest the mature fruits</li> </ul>	<ul style="list-style-type: none"> <li>• Harvested crop should transfer at safer palace</li> </ul>
<b>Sea water induction</b>	<b>Such situation not arise in this district</b>			

#### 2.4 extreme events: Heat wave/ Cold wave/Frost/ Hailstorm / Cyclone

Condition	Suggested contingency measure <sup>f</sup>			
	Seedling/ nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat wave <sup>p</sup>	<b>Apply frequent irrigation with low depth of water</b>			
Cotton				
Wheat				
Pearlmillet	<b>Apply frequent irrigation with low depth of water</b>			
<b>Horticulture</b>				
Ber				
Citrus	<b>Apply frequent irrigation with low depth of water</b>			
Anola				
Mango				
Guava	<b>Apply frequent irrigation with low depth of water</b> <i>Make the smoke in the field by burning of organic waste</i>			
<b>Cold wave,Cyclone</b>				
<b>Hailstorm, Frost</b>				

## 2.5 Contingent strategies for livestock, poultry & fisheries Poultry

### 2.5.1 Livestock

	Suggested contingency measures		
Drought	Before the event	During the event	After the event
Feed 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, encouraging fodders in irrigated area</li> <li>• Silage – using excess fodder for silage</li> </ul>	<ul style="list-style-type: none"> <li>• Utilizing fodder from perennial trees and Fodder bank reserves</li> <li>• Utilizing fodder stored in silos</li> <li>• Transporting excess fodder from adjoining districts</li> <li>• Use of feed mixtures</li> </ul>	<ul style="list-style-type: none"> <li>• Availing Insurance</li> <li>• Culling unproductive livestock</li> </ul>
Drinking water	<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</li> <li>• Wherever ground water resources are available priority for drinking purpose</li> </ul>	
Health and diseases management	<ul style="list-style-type: none"> <li>• Veterinary preparedness with medicines and vaccines</li> </ul>	<ul style="list-style-type: none"> <li>• Conducting mass animal Health Camps and treating the affected once in Campaign</li> </ul>	<ul style="list-style-type: none"> <li>• Culling sick animals</li> </ul>
<b>Floods</b>			
Feed fodder availability			
Drinking water			
Health and diseases management			
<b>Cyclone</b>			
Feed fodder availability			
Drinking water			
Health and diseases management			
<b>Heat wave and Cold wave</b>			
Shelter/environment management			
Health and diseases management			

<sup>s</sup> Based on flowering wherever available



## 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> <li>• Take insurance of poultry sheds, equipments and feed factory well in advance may be in the starting phase of opening the farm.</li> </ul>	<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	<ul style="list-style-type: none"> <li>• Tube well and water storage facilities should be adequately created.</li> </ul>	<ul style="list-style-type: none"> <li>• Judicious use of water by avoiding spillage/ leaking through waterers.</li> <li>• Use of cooling facilities like sprinklers, foggers, fans etc. for comfort zone and optimum production performance.</li> </ul>	<ul style="list-style-type: none"> <li>• Use water sanitizers (chlorination/Sokrena / Vigrox etc.) and softeners (pH. 6).</li> </ul>
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 / Zistetc).</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 / Piperazineetc) 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 dampness.</li> <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>	<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 be in good condition to avoid shock and accident.</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>
Drinking water	<ul style="list-style-type: none"> <li>• Drinking water should be stored in over head tanks.</li> <li>• Underground water tanks should be repaired and closed properly to avoid contamination.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of water sanitizers and softeners.</li> </ul>	<ul style="list-style-type: none"> <li>• Check water quality and accordingly use water sanitizers and water softeners for optimum pH.</li> </ul>
Health and disease management/construction of poultry shed	<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. (conceptual 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>Cyclones</b>			
Shortage of feed ingredients	<ul style="list-style-type: none"> <li>• Store feed ingredients / ready feed as per need.</li> <li>• Use curtains to avoid splashing of water in feed stores and poultry houses.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid direct splashing of water and wind draft on the birds by using proper curtains.</li> </ul>	<ul style="list-style-type: none"> <li>• Use good quality and balanced feed for optimum production performance.</li> </ul>
Drinking water	<ul style="list-style-type: none"> <li>• Keep ready stock of water sanitizers and softeners.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of water sanitizers and softeners in drinking water.</li> <li>• Use Toxin binders in feed.</li> <li>• Mixing of lime in the litter to avoid wet litter problems and ammonia production.</li> </ul>	<ul style="list-style-type: none"> <li>• Repair damages to watering systems, if any.</li> </ul>
Health and disease management	<ul style="list-style-type: none"> <li>• Keep stock of probiotics / antibiotics and anti-stress vitamins.</li> </ul>	<ul style="list-style-type: none"> <li>• Use probiotics and anti stress vitamins in feed and water.</li> </ul>	<ul style="list-style-type: none"> <li>• Use antibiotics / coccidiostate and anti-mycoplasma drugs in feed / drinking water.</li> </ul>

<b>Heat and cold wave</b>			
Shelter/environment management	<ul style="list-style-type: none"> <li>• Install foggers inside the house.</li> <li>• Install sprinklers on the roof.</li> <li>• Tree plantation surrounding the shed.</li> <li>• Purchase of electrolyte and anti-stress vitamins and antibiotics</li> </ul>	<ul style="list-style-type: none"> <li>• Try to Keep the house temperature in comfort zone i.e. 70-75° F through use of foggers, sprinklers and air velocity fans.</li> <li>• Reduce protein by 2% in feed.</li> <li>• Use of fat / Vegetable oil (2-5%) in feed as partial replacement to carbohydrates sources i.e. Maize, Wheat, Rice Kani etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of cooling mechanisms to maintain house temperature in comfort zone for best production performance.</li> </ul>
Health and disease management	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Vaccinate birds for respiratory diseases like Ranikhet disease /Infectious Bronchitis.</li> </ul>	<ul style="list-style-type: none"> <li>• Use anti stress vitamins and electrolytes in drinking water / feed.</li> </ul>	<ul style="list-style-type: none"> <li>• Check titres for respiratory disease and accordingly repeat vaccination against Ranikhet disease / Infectious Bronchitis</li> </ul>

\* based on forewarning wherever available.

Remarks : Name of only few drugs have been given on example basis. For details poultry specialists should be consulted.

### 2.5.3 Fisheries

#### Fisheries / Aquaculture: (Ahmedabad & Marine and Inland)

#### Contingencies strategies for fisheries

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>1) Drought</b>	<ul style="list-style-type: none"> <li>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.</li> </ul>		
<b>A. Capture</b>	<ul style="list-style-type: none"> <li>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)</li> </ul>		
Marine	<ul style="list-style-type: none"> <li>Prepare fish database of particular zone</li> </ul>	<ul style="list-style-type: none"> <li>Catadromus fish stock affected due to scarcity of river water.</li> </ul>	<ul style="list-style-type: none"> <li>Developed the stock by stocking of fishes during favorable condition, it will auto stock fish in natural condition</li> </ul>
Inland	<ul style="list-style-type: none"> <li>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.</li> </ul>		
(i) Shallow water depth due to insufficient rains/ inflow	<ul style="list-style-type: none"> <li>Provide water through cannel and pipeline from major reservoirs to maintain sufficient water depth</li> <li>Taxonomic fish data collection &amp; Preserved fish stock (gene)</li> </ul>	<ul style="list-style-type: none"> <li>Migration of fish stock</li> <li>Conservation of breeders/ fish stock at unaffected area</li> </ul>	<ul style="list-style-type: none"> <li>Transplant the fish stock and breed the fish in hatchery to stock the fish seed in affected area</li> </ul>
(ii) Changes in water quality	<ul style="list-style-type: none"> <li>Migration of fish due to change of water quality</li> </ul>	-	-
(iii) Any other	-	-	-
<b>B. Aquaculture</b>	<ul style="list-style-type: none"> <li>"Culture of aquatic organisms in confined water body", so this sector will affected most incase of either non availability of water or mismanagement.</li> </ul>		
(i) Shallow water in ponds due to insufficient rains/ inflow	<ul style="list-style-type: none"> <li>Lower the stocking density by harvest the big size (500 gm) fish and place in market.</li> <li>Transfer of under culture fishes to abundance water zone</li> </ul>	<ul style="list-style-type: none"> <li>Pre- harvest all the materials (fish and prawns) &amp; preserved by freezing</li> </ul>	<ul style="list-style-type: none"> <li>Sanitize the dead fish biomass.</li> </ul>
(ii) Impact of salt load build up in ponds /	<ul style="list-style-type: none"> <li>Protect the water and use of lime and other</li> </ul>	<ul style="list-style-type: none"> <li>Cover the pond with plants (duckweed etc) to protect from evaporation.</li> </ul>	<ul style="list-style-type: none"> <li>Flush the pond with fresh water and manure before the next</li> </ul>

	Suggested contingency measures		
	Before the event	During the event	After the event
change in water quality	probiotics		stocking of fish to maintain the food chain
(iii) Any other	-	-	-

<b>2) Floods</b>	<ul style="list-style-type: none"> <li>Flood are generally predicted and early warning will protect the lives and livelihood</li> </ul>		
<b>A. Capture</b>	<ul style="list-style-type: none"> <li>Change of breeding grounds, migration of fish against and with the water, and increase of fish stock etc, so positive affect on capture fisheries.</li> </ul>		
Marine	<ul style="list-style-type: none"> <li>All the fishermen must call back from fishing</li> </ul>	<ul style="list-style-type: none"> <li>No fishing</li> </ul>	
Inland	<ul style="list-style-type: none"> <li>All the fishermen must call back from fishing</li> </ul>	<ul style="list-style-type: none"> <li>No fishing</li> </ul>	
(i) Average compensation paid due to loss of human life	<ul style="list-style-type: none"> <li>Recognizing the risk of flood &amp; making the people aware of it</li> <li>Migrate the people at safe place</li> <li>Collect the details information of swimmers &amp; life savers appliances.</li> </ul>	<ul style="list-style-type: none"> <li>Send the rescue teams to protect the lives of the most vulnerable peoples.</li> </ul>	<ul style="list-style-type: none"> <li>Measure social impact of losses risks of diseases, loss of employment.</li> <li>The most vulnerable fishermen be taken care of first and fast</li> </ul>
(ii) No. of boats/ nets/ damaged	<ul style="list-style-type: none"> <li>Transfer boats/nets at safe places</li> </ul>	<ul style="list-style-type: none"> <li>If possible protect boats during rescue operation</li> </ul>	<ul style="list-style-type: none"> <li>Identify the damages according to assessment &amp; compensate</li> </ul>
(iii) No. of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(v) health and diseases	<ul style="list-style-type: none"> <li>Prepared the medical rescue team</li> </ul>	-	<ul style="list-style-type: none"> <li>Proper hygiene &amp; sanitation</li> <li>Send the medical rescue team with drugs.</li> </ul>
<b>B. Aquaculture</b>	<ul style="list-style-type: none"> <li>Flood affects the culture ponds which situated near the river. It demolished the pond dyke, overflows the pond and contaminated the culture.</li> </ul>		
(i) Inundation with flood water	<ul style="list-style-type: none"> <li>Transfer of aquaculture farmers to protected places</li> <li>Harvest fish from culture ponds and preserved or sale at market</li> <li>Protect the pond dykes with sand bags.</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Harvest the culture fish &amp; wild fish which came with flood water.</li> <li>Disinfect the ponds with chemicals</li> </ul>
(ii) Water continuation	<ul style="list-style-type: none"> <li>Reduced water level of culture pond.</li> </ul>	<ul style="list-style-type: none"> <li>Flood water fills the pond if empty or</li> </ul>	<ul style="list-style-type: none"> <li>Exchange water with fresh</li> </ul>

and changes in water quality		reduced before the flood.	water to maintain the water quality.
(iii) health and diseases	<ul style="list-style-type: none"> <li>Take preventive measures</li> </ul>		<ul style="list-style-type: none"> <li>Destroyed the dead fish with disinfectant</li> </ul>
(v) Loss of stock and inputs(feed etc)	<ul style="list-style-type: none"> <li>Transfer the stock and inputs at safe places</li> </ul>	-	<ul style="list-style-type: none"> <li>Demolish the decayed feed</li> </ul>
Infrastructure damage(pumps, aerators, huts etc)	<ul style="list-style-type: none"> <li>Transfer the detachable infrastructure at safe places</li> </ul>	-	<ul style="list-style-type: none"> <li>Measures impact of losses of infrastructure and provide assist for rehabilitation</li> </ul>
(vi) Any other			

<b>3. Cyclone / Tsunami</b>	<ul style="list-style-type: none"> <li>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</li> </ul>		
<b>A. Capture</b>	<ul style="list-style-type: none"> <li>Capture fishery affected due to cyclone, as current pattern change &amp; upwelling cause the migration of some fish species, so it will either affect to stock or species variation.</li> </ul>		
Marine	<ul style="list-style-type: none"> <li>On the costal region, fishermen staying away from the vulnerable zone is one way of prevention</li> </ul>		
(i) Average compensation paid due to loss of fishermen lives	<ul style="list-style-type: none"> <li>Recognizing the risk of cyclone and making the people aware of risk</li> <li>Migrate the fishermen at safe place</li> </ul>	<ul style="list-style-type: none"> <li>Protecting the lives and livelihood of the most vulnerable fishermen</li> </ul>	<ul style="list-style-type: none"> <li>Measure social impact of losses risks of diseases, loss of employment.</li> <li>The most vulnerable fishermen be taken care of first and fast</li> </ul>
(ii) Avg. no. of boats/nets/ damaged	<ul style="list-style-type: none"> <li>Identify the boats and convey messages of disaster in the sea.</li> <li>Birthing the boats at safe place</li> </ul>	<ul style="list-style-type: none"> <li>Warning signals, use of flares, seeking help by attracting attention.</li> <li>Prevent the lives among damaged boats</li> </ul>	<ul style="list-style-type: none"> <li>Compensation of damages should be provide after real assessment of damages (boat/net)</li> </ul>
(iii) Avg. no. of houses damaged			As above
Inland	<ul style="list-style-type: none"> <li>Recognizing the risk of cyclone and making the people aware of risk</li> <li>Migrate the fishermen at safe place</li> </ul>	<ul style="list-style-type: none"> <li>Protecting the lives and livelihood of the most vulnerable fishermen</li> </ul>	<ul style="list-style-type: none"> <li>Measure social impact of losses risks of diseases, loss of employment.</li> <li>The most vulnerable fishermen be taken care of first and fast</li> </ul>
<b>B. Aquaculture</b>	<ul style="list-style-type: none"> <li>Most of coastal aquaculture farms (shrimp culture) will affect most due to cyclone &amp; tsunami, as sea water intrusion, high current &amp; tide &amp; high wind velocity will affect the dyke and infrastructure of aquaculture units.</li> </ul>		
(i) Overflow/ flooding of ponds	<ul style="list-style-type: none"> <li>Pre- harvest the materials (fish and prawns)</li> </ul>	<ul style="list-style-type: none"> <li>In case of over flooding open outlet of the pond</li> </ul>	<ul style="list-style-type: none"> <li>Measure impact of losses and risks of diseases</li> </ul>
(ii) Changes in water quality (fresh water/	<ul style="list-style-type: none"> <li>Protect the dykes by putting soil</li> </ul>		<ul style="list-style-type: none"> <li>Provide better hygienic</li> </ul>

brackish water ratio)	bags.		sanitation, disinfected the ponds.
(iii) Health and diseases	<ul style="list-style-type: none"> <li>Place the iron screen on inlet and outlet</li> </ul>		
(iv) Loss of stock and inputs (feed, chemicals etc)	<ul style="list-style-type: none"> <li>Transfer the stock and inputs at safe places</li> </ul>	-	<ul style="list-style-type: none"> <li>Destroy the decomposed feed</li> </ul>
(v) Infrastructure damage(pumps, aerators, shelters/ huts etc)	<ul style="list-style-type: none"> <li>Transfer the detachable infrastructure at safe places</li> </ul>	-	<ul style="list-style-type: none"> <li>Measures impact of losses of infrastructure and provide assist for rehabilitation</li> </ul>
(vi) Any other	-	-	-

<b>4. Heat wave and cold wave</b>	<ul style="list-style-type: none"> <li>This factor will affect indirectly to the fish stock.</li> </ul>		
<b>A. Capture</b>	<ul style="list-style-type: none"> <li>Due to heat and cold wave some fishes migrate to offshore as well as non affected area so, it will affect the fish catch.</li> </ul>		
Marine	<ul style="list-style-type: none"> <li>Assessment of capture fish catch</li> </ul>	<ul style="list-style-type: none"> <li>Study the impact of heat and cold wave on fish capture and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Established the fishery</li> </ul>
Inland	<ul style="list-style-type: none"> <li>Assessment of capture fish catch</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>
<b>B. Aquaculture</b>	<ul style="list-style-type: none"> <li>Due to these factor, fish growth will affect, change in feeding, breeding and rearing of fish larvae.</li> </ul>		
(i) Changes in pond environment (water quality)	<ul style="list-style-type: none"> <li>Exchange of water to maintain the water temperature and water parameter</li> </ul>	<ul style="list-style-type: none"> <li>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 &amp; use of aerator to maintain dissolve oxygen in pond.</li> </ul>	<ul style="list-style-type: none"> <li>Acclimatize the fish stock in natural condition and reduced the used equipments from the ponds. Maintain the feed ration accordingly.</li> </ul>
(ii) Health and Disease management	<ul style="list-style-type: none"> <li>Take some preventive measures to protect from disease</li> </ul>	<ul style="list-style-type: none"> <li>Use of probiotics as well as fresh and live feed</li> </ul>	
(iii) Any other	-	-	-