

State: GUJARAT

Agriculture Contingency Plan for District: BHARUCH

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	Central (Malva) Highlands, Gujarat Plains and Kathiawar, Peninsula Ecoregion (5.2)			
	Agro-Climatic Zone (Planning Commission)	Gujarat plains and hills region (XIII)			
	Agro Climatic Zone (NARP)	South Gujarat Zone (GJ-2)			
	List all the districts or part thereof falling under the NARP Zone	Surat, Bharuch, Narmada			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		21 ⁰ 42' 57.53" N	72 ⁰ 58' 38.59" E	20.66 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Cotton Research Station, Navsari Agricultural University, Bharuch-393130			
	Mention the KVK located in the district	Krishi Vigyan Kendra , Po-Chaswad, Tq.: Valiya, Distt. Bharuch -393130			
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):	1017	51	3 rd week of June	4 th week of September
	NE Monsoon(Oct-Dec):	-	-	-	-
	Winter (Jan- March)	-	-	-	-
	Summer (Apr-May)	-	-	-	-
	Annual	1017	51	-	-

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

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	524	327.2	26.0	73.0	16.0	31.0	-	-	50.8	-
1.4	Major Soils			Area ('000 ha)		Percent (%) of total					
	1. Heavy black Soil (plain)			327.61		62.52					
	2. Heavy black Soil (coastal)			75.25		14.36					
	3. Sandy loam			121.15		23.12					

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	327.2	117.0
	Area sown more than once	55.6	
	Gross cropped area	382.8	

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

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	71.3		
	Gross irrigated area	83.4		
	Rain fed area	255.8		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	-	41.2	
	Tanks	-		
	Open wells	-	50.4	
	Bore wells	-	-	
	Lift irrigation schemes	-	-	
	Micro-irrigation	-	-	
	Other sources (please specify)	-	5.4	
	Total Irrigated Area	-		
	Pump sets	-	95.0	29.1
	No. of Tractors	16846		

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	3	36	saline water
Critical	1	17	semi critical
Semi- critical	-	-	-
Safe	5	19	good
Wastewater availability and use			
Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			
(Source :District Panchayat reports, reports of Agriculture department)			

1.7 Area under major field crops & horticulture

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rain fed	Total	Irrigated	Rain fed	Total		
Cotton	52	60	112	-	-	-	-	112	
Pigeonpea	-	58.9	58.9	-	-	-	-	58.9	
Sugarcane	-	-	-	24.9	-	24.9		24.9	
Paddy	6.3	3.8	10.1	-	-	-	0.8	10.9	
Sorghum	-	3.0	3.0	4.6	-	-	-	7.6	

Horticulture crops – Fruits	Total ('000 ha)
Banana	11.285
Papaya	0.791
Mango	3.027
Sapota	0.544
Horticulture crops – Vegetables	Total ('000 ha)
Okra	2.489
Brinjal	1.692
Cluster bean	0.578
Tomato	0.830
Medicinal and Aromatic crops	
Plantation crops	
Eg., industrial pulpwood crops etc.	-
Fodder crops	-
Total fodder crop area	-
Grazing land	-
Sericulture etc	-
Others (specify)	-

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

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Non descriptive Cattle (local low yielding)			142.3			
	Crossbred cattle			-			
	Non descriptive Buffaloes (local low yielding)			85.8			
	Graded Buffaloes			-			
	Goat			1.3			
	Sheep			7.1			
	Others (Camel, Pig, Yak etc.)			49.2			
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial		1.73				
	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)	
		26640	468	939	-	-	-
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		95		400		400	
	B. Culture						
		Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)			
i) Brackish water (Data Source: MPEDA/ Fisheries Department)		1080.37	Not yet get	Yet to receive from farmers			
ii) Fresh water (Data Source: Fisheries Department)		400	Yet to be received from fish farmers	Yet to be received from fish farmers			
(Source :District Panchayat reports, reports of Agriculture department)							

1.11 Production and Productivity of major crops (Average of last 5 years: 2010-11, 2011-12, 2012-13, 2013-14, 2014-15; 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)	
Major Field crops (Crops to be identified based on total acreage)										
	Cotton	302	388	-	-	-	-	302	388 Lint	
	Pigeon pea	51	873	-	-	-	-	51	873	
	Paddy	17	1731	-	-	2.5	3125	19.5	1788	
	Sorghum	30	1339	56.27	1210	-	-	86.2	1135	
	Sugarcane	-	-	1681	67394	-	-	1681	67394	
Major Horticultural crops (Crops to be identified based on total acreage)										
	Banana	919	67574	-	-	-	-	919	67574	

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

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought	-	√	-

	Floods	-	√	-
	Cyclone	-	-	√
	Hail storm	-	-	√
	Heat wave	-	√	
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water intrusion	-	-	√
	Pests and disease outbreak (specify)	-	√	-
	Others (specify)	-	-	-

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

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

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rain fed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks 1 st week of July	Heavy black Soils (Costal area)	Cotton	No Change	Dry Sowing can be done and Irrigation should be given if available. Select varieties G. Cot. Hy.6 (BG 2), G. Cot. Hy.8 (BG 2), G. Cot. Hy.10 (BG 2), G. Cot. Hy.12 (BG 2), GTHH 49, G.N.Cot. 25, G.Cot.16	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Sowing can be done and prefer short duration varieties Select varieties Vaishali (For grain), GT 1 (For vegetable), GNP 2 (Dual purpose) .	
		Paddy	No Change	Nursery raising. If seedlings are 28-30 days then start transplanting. If seedlings are over aged then follow sprouted seed method. Irrigation should be given if available. Select varieties Jaya, Gurjari, GNR 2 (Fine grain & most suitable under alkali soil), GNR 7, GNR 3 (Bold seeded), GNRH 1 (Hybrid), GNR 6 (For rainfed TP), Purna (For drill purpose)	
		Sorghum	No Change	Sowing can be allowed. Irrigation should be given if available. Select varieties GJ 38, GJ 42, GNJ 1for grain and CSV-21-F (Single cut) for fodder	
		Sugarcane	No Change	Standing crop and irrigate the crop if necessary. Preferred varieties GS 5 (CoN 05071), GS 6 (CoN 05072), GNS 8 (CoN 7072), GNS (CoN 9072), GNS 10 (CoN 13073)	
	Heavy Black Soils (plain area)	Cotton	No Change	Dry Sowing can be done and Irrigation should be given if available. Select varieties G. Cot. Hy.6 (BG 2), G. Cot. Hy.8 (BG 2), G. Cot. Hy.10 (BG 2), G. Cot. Hy.12 (BG 2), GTHH 49, G.N.Cot. 25, G.Cot.16	
		Pigeon pea	No Change	Sowing can be done and prefer short duration varieties	

				Select varieties Vaishali (For grain), GT 1 (For vegetable), GNP 2 (Dual purpose) .	
		Paddy	No Change	Nursery raising. If seedlings are 28-30 days then start transplanting. If seedlings are over aged then follow sprouted seed method. Irrigation should be given if available. Select varieties Jaya, Gurjari, GNR 2 (Fine grain & most suitable under alkali soil), GNR 7, GNR 3 (Bold seeded), GNRH 1 (Hybrid), GNR 6 (For rainfed TP), Purna (For drill purpose)	
		Sorghum	No Change	Sowing can be allowed. Irrigation should be given if available. Select varieties GJ 38, GJ 42, GNJ 1for grain and CSV-21-F (Single cut) for fodder	
		Sugarcane	No Change	Standing crop and irrigate the crop if necessary. Preferred varieties GS 5 (CoN 05071), GS 6 (CoN 05072), GNS 8 (CoN 7072), GNS (CoN 9072), GNS 10 (CoN 13073)	
	Sandy loam (Hilly area)	Cotton	No Change	Dry Sowing can be done and Irrigation should be given if available. Select progenies G. Cot. Hy.6 (BG 2), G. Cot. Hy.8 (BG 2), G. Cot. Hy.10 (BG 2), G. Cot. Hy.12 (BG 2), GTHH 49, G.N.Cot. 25, G.Cot.16	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Sowing can be done and prefer short duration varieties Select varieties Vaishali (For grain), GT 1 (For vegetable), GNP 2 (Dual purpose) .	
		Paddy	No Change	Nursery raising. If seedlings are 28-30 days then start transplanting. If seedlings are over aged then follow sprouted seed method. Irrigation should be given if available. Drilled sowing should be preferred on hilly track. Select varieties Jaya, Gurjari, GNR 2 (Fine grain & most suitable under alkali soil), GNR 7, GNR 3 (Bold seeded), GNRH 1 (Hybrid), GNR 6 (For rainfed TP), Purna (For drill purpose)	
		Sorghum	No Change	Sowing can be allowed. Irrigation should be given if available. Select varieties GJ 38, GJ 42, GNJ 1for grain and CSV-21-F (Single cut) for fodder	

		Sugarcane	No Change	Standing crop and irrigate the crop if necessary. Preferred varieties GS 5 (CoN 05071), GS 6 (CoN 05072), GNS 8 (CoN 7072), GNS (CoN 9072), GNS 10 (CoN 13073)	
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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 July	Heavy black soils (Costal area)	Cotton	No Change	Dry Sowing can be done and Irrigation should be given. Select varieties G. Cot. Hy.6 (BG 2), G. Cot. Hy.8 (BG 2), G. Cot. Hy.10 (BG 2), G. Cot. Hy.12 (BG 2), GTHH 49, G.N.Cot. 25, G.Cot.16	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Sowing can be done and prefer short duration varieties Select varieties Vaishali (For grain), GT 1 (For vegetable), GNP 2 (Dual purpose) .	
		Paddy	No Change	SRI method, Aerobic rice, sprouted seed sowing. Select varieties Jaya, Gurjari, GNR 2 (Fine grain & most suitable under alkali soil), GNR 7, GNR 3 (Bold seeded), GNRH 1 (Hybrid), GNR 6 (For rainfed TP), Purna (For drill purpose)	
		Sorghum	No Change	Sowing with onset of monsoon. Select varieties GJ 38, GJ 42, GNJ 1for grain and CSV-21-F (Single cut) for fodder	
		Sugarcane	No Change	Standing crop and irrigate the crop if necessary. Preferred varieties GS 5 (CoN 05071), GS 6 (CoN 05072), GNS 8 (CoN 7072), GNS (CoN 9072), GNS 10 (CoN 13073)	
	Heavy black soils (plain area) area)	Cotton	No Change	Dry Sowing can be done and Irrigation should be given. Select varieties G. Cot. Hy.6 (BG 2), G. Cot. Hy.8 (BG 2), G. Cot. Hy.10 (BG 2), G. Cot. Hy.12 (BG 2), GTHH 49, G.N.Cot. 25, G.Cot.16	
		Pigeon pea	No Change	Sowing can be done and prefer short duration varieties	

				Select varieties Vaishali (For grain), GT 1 (For vegetable), GNP 2 (Dual purpose) .	
		Paddy	No Change	SRI method, Aerobic rice, sprouted seed sowing. Select varieties Jaya, Gurjari, GNR 2 (Fine grain & most suitable under alkali soil), GNR 7, GNR 3 (Bold seeded), GNRH 1 (Hybrid), GNR 6 (For rainfed TP), Purna (For drill purpose)	
		Sorghum	No Change	Sowing with onset of monsoon. Select varieties GJ 38, GJ 42, GNJ 1 for grain and CSV-21-F (Single cut) for fodder	
		Sugarcane	No Change	Standing crop and irrigate the crop if necessary. Preferred varieties GS 5 (CoN 05071), GS 6 (CoN 05072), GNS 8 (CoN 7072), GNS (CoN 9072), GNS 10 (CoN 13073)	
	Sandy loam soils (Hilly area)	Cotton	No Change	Dry Sowing can be done and Irrigation should be given if available. Select progenies G. Cot. Hy.6 (BG 2), G. Cot. Hy.8 (BG 2), G. Cot. Hy.10 (BG 2), G. Cot. Hy.12 (BG 2), GTHH 49, G.N.Cot. 25, G.Cot.16	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Sowing can be done and prefer short duration varieties Select varieties Vaishali (For grain), GT 1 (For vegetable), GNP 2 (Dual purpose) .	
		Paddy	No Change	SRI method, Aerobic rice, sprouted seed sowing. Select varieties Jaya, Gurjari, GNR 2 (Fine grain & most suitable under alkali soil), GNR 7, GNR 3 (Bold seeded), GNRH 1 (Hybrid), GNR 6 (For rainfed TP), Purna (For drill purpose)	
		Sorghum	No Change	Sowing with onset of monsoon. Select varieties GJ 38, GJ 42, GNJ 1 for grain and CSV-21-F (Single cut) for fodder	
		Sugarcane	No Change	Standing crop and irrigate the crop if necessary. Preferred varieties GS 5 (CoN 05071), GS 6 (CoN 05072), GNS 8 (CoN 7072), GNS (CoN 9072), GNS 10 (CoN 13073)	

Condition			Suggested Contingency measures
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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)	Heavy Black Soils (Costal area)	Cotton	No Change	Protected irrigation should be given	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Protected irrigation should be given	
		Paddy	No Change	Protected irrigation should be given	
		Sorghum	No Change	Protected irrigation should be given	
		Sugarcane	No Change	Protected irrigation should be given	
	Heavy Black Soils (plain area)	Cotton	No Change	Protected irrigation should be given	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Protected irrigation should be given	
		Paddy	No Change	Protected irrigation should be given	
		Sorghum	No Change	Protected irrigation should be given	
		Sugarcane	No Change	Protected irrigation should be given	
	Sandy loam soils(Hilly area)	Cotton	No Change	Protected irrigation should be given	Linkage with RKVY, GSSC and University
		Pigeon pea	No Change	Protected irrigation should be given	
		Paddy	No Change	Protected irrigation should be given	
		Sorghum	No Change	Protected irrigation should be given	
		Sugarcane	No Change	Protected irrigation should be given	

Condition	This is not expected in this district				
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks (Specify month)	----	----	----	----	----

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Heavy Black Soils (Costal area)	Cotton	Gap filling and thinning Protected irrigation should be given if available	Foliar spray of nutrient Applied proper mulching technology	Linkage with RKVY, GSSC and University
		Pigeon pea	-Do-		
		Paddy	-Do-		
		Sorghum	-Do-		
		Sugarcane	Protected irrigation should be given if available		
	Heavy Black Soils (plain area)	Cotton	Gap filling and thinning Protected irrigation should be given if available	Foliar spray of nutrient Applied proper mulching technology	Linkage with RKVY, GSSC and University
		Pigeon pea	-Do-		
		Paddy	-Do-		
		Sorghum	-Do-		
		Sugarcane	Protected irrigation should be given if available		
Sandy loam soils (Hilly area)	Cotton	Gap filling and thinning Protected irrigation should be given if available	Foliar spray of nutrient Applied proper mulching technology mulching technology	Linkage with RKVY, GSSC and University	
	Pigeon pea	-Do-			
	Paddy	-Do-			
	Sorghum	-Do-			
	Sugarcane	Protected irrigation should be given if available			

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	Heavy Black Soils (Costal area)	Cotton	Applied foliar nutrient & anti transparent (before flowering)	<ul style="list-style-type: none"> • Repeated inter culturing • Protective irrigation • Mulching • Use anti evaporates • Weeding 	Linkage with RKVY, GSSC and University
		Pigeon pea	Applied foliar nutrient & anti transparent (before flowering)		
		Paddy	Applied foliar nutrient & anti transparent (before flowering)		
		Sorghum	Applied foliar nutrient & anti transparent (before flowering)		
		Sugarcane	Applied foliar nutrient		
	Heavy Black Soils (plain area)	Cotton	Same as above	Same as above	
		Pigeon pea			
		Paddy			
		Sorghum			
		Sugarcane			
	Sandy loam soils(Hilly area)	Cotton	Same as above	Same as above	
		Pigeon pea			
		Paddy			
		Sorghum			
Sugarcane					

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)					
At flowering/ fruiting stage	Heavy Black Soils (Costal area)	Cotton	Weeding, Protective irrigation, alternate furrow irrigation if available and higher dose of KNO ₃ (before flowering)	-----	Linkage with RKVY, GSSC and University
		Pigeon pea			
		Paddy			
		Sorghum			
		Sugarcane			

	Heavy Black Soils (plain area)	Cotton	Same as above	-----	
		Pigeonpea			
		Paddy			
		Sorghum			
		Sugarcane			
	Sandy loam soils(Hilly area)	Cotton	Same as above	-----	
		Pigeonpea			
		Paddy			
		Sorghum			
		Sugarcane			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Heavy Black Soils (Costal area)	Cotton	Give protective irrigation Harvest the crop at physiological maturity	Prefer short duration crop	Linkage with RKVY, GSSC and University
		Pigeonpea	-Do-		
		Paddy	-Do-		
		Sorghum	-Do-		
		Sugarcane	-Do-		
	Heavy Black Soils (plain area)	Cotton	Give protective irrigation Harvest the crop at physiological maturity	Prefer short duration crop	
		Pigeonpea	-Do-		
		Paddy	-Do-		
		Sorghum	-Do-		
		Sugarcane	-Do-		
	Sandy loam soils(Hilly area)	Cotton	Give protective irrigation Harvest the crop at physiological maturity	Prefer short duration crop	
		Pigeonpea	-Do-		
		Paddy	-Do-		
		Sorghum	-Do-		
		Sugarcane	-Do-		

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
Limited release of water in canals due to low rainfall	Heavy Black Soils (Costal area)	Cotton	No Change	Mulch practices should be applied Alternate furrow irrigation method	Linkage with RKVY, GSSC and University
		Pigeonpea	No Change		
		Paddy	No Change		
		Sorghum	No Change		
		Sugarcane	No Change		
	Heavy Black Soils (Plain area)	Cotton	No Change	Same as above	
		Pigeonpea	No Change		
		Paddy	No Change		
		Sorghum	No Change		
		Sugarcane	No Change		
	Sandy Loam Soils (Hilly area)	Cotton	No Change	Same as above	
		Pigeonpea	No Change		
		Paddy	No Change		
		Sorghum	No Change		
		Sugarcane	No Change		

Condition	Major Farming situation	Normal Crop/cropping system	This is not expected in this district		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Heavy black Soils (Costal area)	----	---	---	----
	Heavy black Soils (plain area)	----	---	---	----
	Sandy Loam Soils (Hilly area)				

Condition	This is not expected in this district				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Heavy Black Soils (Costal area)				
	Heavy Black Soils (plain area)				
	Sandy Loam Soils (Hilly area)				

Condition	This is not expected in this district				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient ground water recharge due to low rainfall	Heavy Black Soils (Costal area)				
	Heavy Black Soils (plain area)				
	Sandy Loam Soils (Hilly area)				

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Cotton	Drain out excess water	Drain out excess water	Harvest at physiological maturity Select suitable rabi crop	Shift to safe place Dry in shade and turn frequently

Pigeon pea	Drain out excess water	Provision of drainage	-Do-	Shift to safer place
Sorghum	-Do-	-Do-	-Do-	Shift to safe place dry in shade and turn frequently
Sugarcane	-Do-	Do-	Remove excess water	-----
Paddy	Drain out excess water	Do-	Harvest at physiological maturity Select suitable rabi crop	Shift to safer place
Horticulture				
Banana	-Do-	Do-	Remove excess water	-
Heavy rainfall with high speed winds in a short span				
Cotton	Remove excess water	Do-	Remove excess water	Shift to safe place dry in shade and turn frequently
Pigeon pea	Remove excess water	Remove excess water	Remove excess water	Shift to safer place
Sorghum	Resowing, Gap filling Provide drainage	Use early maturity variety	Select suitable rabi crop	Shift to safe place dry in shade and turn frequently
Sugarcane	Propping & twisting	Propping & twisting	Propping & twisting	-----
Paddy	Resowing, Gap filling Provide drainage	Drain out the excess water	Select suitable rabi crop	Shift to safe place dry in shade and turn frequently
Horticulture				
Banana	Support the plant with soil ridge	Protect with wind break crop (Shevari, Castor)	Protect with wind break crop (Shevari, Castor)	Shift to safe place dry in shade and turn frequently
Outbreak of pests and diseases due to unseasonal rains				
Cotton	Integrated pest and disease management	Integrated pest and disease management	Integrated pest and disease management	Shift to safe place dry in shade and turn frequently Proper control measures for pest and diseases
Pigeon pea	-Do-	Do-	Do-	Shift to safer place Proper control measures for pest and diseases
Sorghum	-Do-	Do-	Do-	Shift to safe place dry in shade and turn frequently Proper control measures for pest and diseases

Sugarcane	-Do-	Do-	Do-	---
Paddy	-Do-	Do-	Do-	Shift to safe place dry in shade and turn frequently
Horticulture				
Banana	Integrated pest and disease management	Integrated pest and disease management	Integrated pest and disease management	Shift to safe place dry in shade and turn frequently Proper control measures for pest and diseases

2.3 Floods	Suggested contingency measure				
	Condition	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation					
Cotton	Drain out excess water	Drain out excess water	Provide proper drainage	Provide proper drainage	
Pigeon pea	Drain out excess water and re-sowing	Drain out excess water	-Do-	-Do-	
Sorghum	Drain out excess water and re-sowing	Drain out excess water	-Do-	-Do-	
Sugarcane	Drain out excess water	-Do-	-Do-	-Do-	
Paddy	Maintain proper standing water condition	Maintain proper standing water condition	-Do-	-Do-	
Horticulture					
Banana	Provision of drainage	Excess water should be drained by proper drainage	-Do-	Provide proper drainage	
Continuous submergence for more than 2 days					
Cotton	Drainage is most urgent	Excess water should be drained	Excess water should be drained	Provide proper drainage	
Pigeon pea	-Do-	-Do-	-Do-	-Do-	
Sorghum	-Do-	-Do-	-Do-	-Do-	
Sugarcane	Remove excess water	-Do-	-Do-	-Do-	
Paddy	-Do-	-Do-	-Do-	-Do-	
Horticulture BANANA	Drainage is most urgent	Excess water should be drained	Excess water should be drained		
Sea water intrusion	Not applicable				

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	Not applicable			
Horticulture				
Cold wave				
Horticulture				
Frost				
Horticulture				
Hailstorm				
Horticulture				
Cyclone				
Horticulture				

Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	Insurance Encourage perennial fodder on bunds and waste land on community basis Establishing fodder banks, encouraging fodder crops in irrigated area Silage – using excess fodder for silage	Utilizing fodder from perennial trees and Fodder bank reserves Utilizing fodder stored in silos Transporting excess fodder from adjoining districts Use of feed mixtures	Availing Insurance Remove unproductive livestock
Drinking water	Preserving water in the tank for drinking purpose Excavation of Bore wells	Using preserved water in the tanks for drinking Wherever ground water resources are available priority for drinking purpose	
Health and disease management	Veterinary preparedness with medicines and vaccines	Conducting mass animal Health Camps and treating the affected once in Campaign	Remove sick animals
Floods			
Feed and fodder availability	Insurance Encourage perennial fodder on bunds and waste land on community basis Establishing fodder banks, encouraging fodder crops in irrigated area Silage – using excess fodder for silage	Utilizing fodder from perennial trees and Fodder bank reserves Utilizing fodder stored in silos Use of feed mixtures	Availing Insurance Remove unproductive livestock
Drinking water	Preserving water in the tank for drinking purpose Excavation of Bore wells	Using preserved water in the tanks for drinking	
Health and disease management	Veterinary preparedness with medicines and vaccines	Conducting mass animal Health Camps and treating the affected once in Campaign	Remove sick animals
Cyclone			
Feed and fodder availability	Insurance Encourage perennial fodder on bunds and waste land on community basis Establishing fodder banks, encouraging fodder crops in irrigated area Silage – using excess fodder for silage	Utilizing fodder from perennial trees and Fodder bank reserves Utilizing fodder stored in silos Transporting excess fodder from adjoining districts Use of feed mixtures	Availing Insurance
Drinking water	Preserving water in the tank for drinking purpose Excavation of Bore wells	Using preserved water in the tanks for drinking Wherever ground water resources are available priority for drinking purpose	

Health and disease management	Veterinary preparedness with medicines and vaccines	Conducting mass animal Health Camps and treating the affected once in Campaign	Remove sick animals
Heat wave and cold wave			
Shelter/environment management	Insurance Store excess of green fodder in silos Bore well & develop water storage facilities Do enough facilities . Plantation in & around shed Make / Develop housing system for livestock Provision of fan in animal shed	Utilize stored fodder in silos Prevention of night grazing during heat wave Provide cold water Provide shade to animal during heat Keep in enclosures during cold	
Health and disease management	Insurance Go for medical treatment for preventive measure	Treat the affected animals immediately	Remove very sick animals

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Shortage of feed ingredients	Insurance & Integration Establishing feed serve Bank	Utilizing from feed serve banks	Availing insurance Strengthening feed Reserve Banks
Drinking water	Preparing of tank of water	Campaign and Mass Vaccination	Culling of affected birds
Health and disease management	Emergency Veterinary preparedness with medicines vaccination to birds	Campaign and Mass Vaccination	
Floods			
Shortage of feed ingredients	Livestock should be transfer high level area	Shift to other farms	After flood cleaning the farm and replace at original farm.
Drinking water	Water storage at high level		Supply pure drinking water
Health and disease management	Emergency Veterinary preparedness with medicines vaccination to birds	-	Emergency Veterinary preparedness with medicines vaccination to birds
Cyclone			
Shortage of feed ingredients	Insurance & Integration Establishing feed serve Bank	Utilizing from feed serve banks	Availing insurance Strengthening feed Reserve Banks
Drinking water	Provision of tank of water	-	
Health and disease management	Emergency Veterinary preparedness with medicines vaccination to birds	-	Cull affected birds

Heat wave and cold wave			
Shelter/environment management	Provision of well constructed house Plantation in and around the shed	Well enclosed the shed during heat waves Provide fan during heat & heaten during cold	Maintain the facilities
Health and disease management	Emergency Veterinary preparedness with medicines vaccination to birds		Cull the affected birds

2.5.3

Fisheries/ Aquaculture :Not applicable

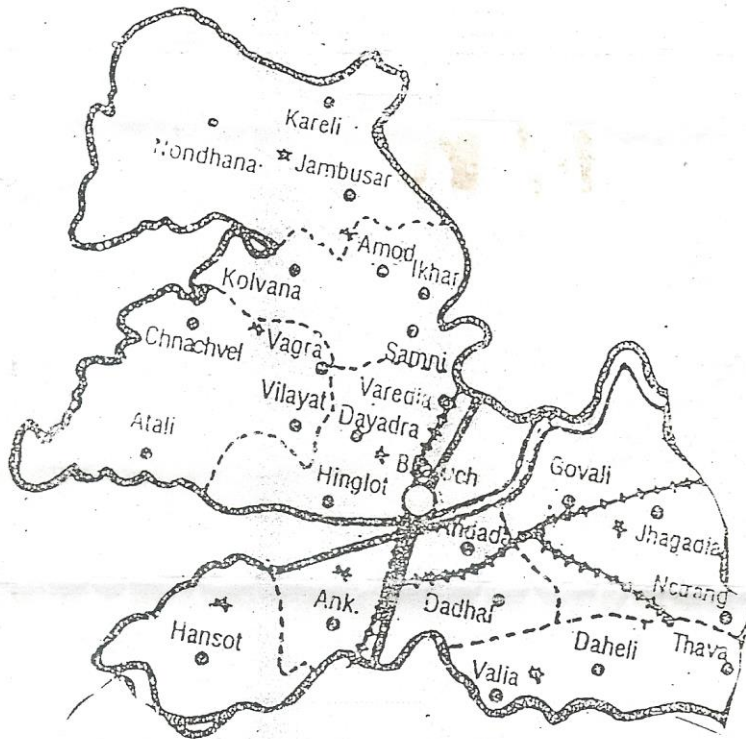
	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	-	-	-
Inland	-	-	-
(i) Shallow water depth due to insufficient rains/inflow	-	-	-
(ii) Changes in water quality	-	-	-
(iii) Any other	-	-	-
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Maintainance of pond water level through tidal water influx (BW). Keeping of enough tidal reserve in Reservoir ponds (BW) Desilting is practiced before pond filling (FW) Stocking of stunted yearlings (FW)	Pond water Exchange to maintain salinity (BW) Harvesting of stock (FW)	Ponds should be drained and dried (FW) Culture of Euryhaline species (BW) Maintain Pond water depth (BW)
(ii) Impact of salt load build up in ponds / change in water quality	Keeping of enough tidal reserve in Reservoir ponds (BW)	Pond water Exchange to maintain salinity (BW) Liming of ponds	Culture of Euryhaline species (BW) Maintain Pond water depth (BW) Continue liming of ponds till favourable parameters are maintained.
(iii) Any other	-	-	-
2) Floods			
A. Capture			
Marine	-	-	-
Inland			
(i) Average compensation paid due to loss of human life	-	-	-
(ii) No. of boats / nets/damaged	-	-	-
(iii) No. of houses damaged	-	-	-
(iv) Loss of stock	-	-	-

(v) Changes in water quality	-	-	-
(vi) Health and diseases	-	-	-
B. Aquaculture			
(i) Inundation with flood water	Keep pond dyke height above the maximum flood level Strengthen the dyke with sand filled bags Provision of overflow drains with proper screens	Application of lime/dolomite on the basis of pH of the pond water	Continue liming of ponds till favourable parameters are maintained Pond water exchange
(ii) Water contamination and changes in water quality	Store adequate quantity of chemicals like lime and zeolite Prophylactic treatment with Formalin-25 to 30 ppm	Water exchange Water probiotic application	Liming of ponds Application of water proiotics and Zeolite Removal of dead animals
(iii) Health and diseases	Prophylactic treatment with Formalin-25 to 30 ppm	Immunostimulant (Shrimp) and gut probiotics (Fish) application through feed	Sampling with cast netting, diagnosis and control disease Removal of dead animals
(iv) Loss of stock and inputs (feed, chemicals etc)	Provision of appropriate size of mesh screens at inlets and outlets Provision of overflow drains with proper screens Storage of feed and chemicals on pallets in dry place	Regular checking the inlets, outlets for damage Replace damaged screens	Dispose off moisture affected lots of feeds Removal of dead animals
(v) Infrastructure damage (pumps, aerators, huts etc)	Check and repair the inferior areas	Maintenance of affected areas	Check and repair the inferior areas
(vi) Any other	-	-	-
3. Cyclone / Tsunami			
A. Capture			
Marine	-	-	-
(i) Average compensation paid due to loss of fishermen lives	-	-	-
(ii) Avg. no. of boats / nets/damaged	-	-	-
(iii) Avg. no. of houses damaged	-	-	-
Inland	-	-	-
B. Aquaculture			
(i) Overflow / flooding of ponds	Keep pond dyke height above the maximum flood level Strengthen the dyke with sand filled bags	Application of lime/dolomite on the basis of pH of the pond water	Continue liming of ponds till favourable parameters are maintained Pond water exchange

	Provision of overflow drains with proper screens		
(ii) Changes in water quality (fresh water / brackish water ratio)	Store adequate quantity of chemicals like Lime, Zeolite and Probiotics Prophylactic treatment with Formalin-25 to 30 ppm	Water exchange Water probiotic application	Liming of ponds Application of water probiotics and Zeolite Removal of dead animals
(iii) Health and diseases	Prophylactic treatment with Formalin-25 to 30 ppm	Immunostimulant (Shrimp) and gut probiotics (Fish) application through feed	Sampling with cast netting, diagnosis and control disease Removal of dead animals
(iv) Loss of stock and inputs (feed, chemicals etc)	Provision of appropriate size of mesh screens at inlets and outlets Provision of overflow drains with proper screens Storage of feed and chemicals on pallets in dry place	Regular checking the inlets, outlets for damage Replace damaged screens	Dispose off moisture affected lots of feeds Removal of dead animals
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Check and repair the inferior areas	Maintenance of affected areas	Check and repair the inferior areas
(vi) Any other	-	-	-
4. Heat wave and cold wave			
A. Capture			
Marine	-	-	-
Inland	-	-	-
B. Aquaculture			
(i) Changes in pond environment (water quality)	Store adequate quantity of chemicals like Lime, Zeolite and Probiotics Aeration device installation	Maintain pond water depth Use aerators, human intervention to break thermal stratification in ponds Lime (100 kg/ha) and Zeolite (25 kg/ha) application	Continue liming of ponds till favourable parameters are maintained
(ii) Health and Disease management	Prophylactic treatment with Formalin-25 to 30 ppm	Immunostimulant (Shrimp) and gut probiotics (Fish) application through feed	Sampling with cast netting, diagnosis and control disease Removal of dead animals
(iii) Any other	-	-	-

^a based on forewarning wherever available

MAP -



DISTRICT : BHARUCH



District map of Bharuch district is attached in separate file named Bharuch map.

Last 10 years rainfall data of bharuch district are furnished in the following table.

Sr.No.	Year	Rainfall(mm)
1	2004	1310.8
2	2005	1336.6
3	2006	1232.0
4	2007	1330.4
5	2008	775.6
6	2009	410.0
7	2010	1411.4
8	2011	936.4
9	2012	604.2
10	2013	1443.4
11	2014	875.5