State: GUJARAT

Agriculture Contingency Plan for District: ANAND

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Western plane and hill region (5.2)		
	Agro-Climatic Region (Planning Commission)	Gujarat Plains and Hills region (XIII)		
	Agro Climatic Zone (NARP)	Bhal and Coastal area (GJ-8)		
	List all the districts or part thereof falling under the NARP Zone	Anand, Kheda		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		$22^0$3'40.53"N	$72^0$57'16.41" E	43 m above MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Anand Agriculture University, Anand; Main Vegetable Research Station, Anand; Main Forage Research Station, Anand; Bidi Tobacco Research Station, Anand; Regional Research Station, Anand; M&AP, Anand; Bidi Tobacco Research Station, Dharmaj; Agricultural Research Station, Khambholaj;		
	Mention the KVK located in the district	Krushi Vigyan Kendra,, Anand Agriculture University, Devataj (Sojitra) Ph. No: 02697-233353		

1.2	**Rainfall**	Normal RF(mm)	Normal Rainy	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	687	40	3rd week of June	September 4th week
	NE Monsoon(Oct-Dec)	Nil			
	Winter (Jan-February)	Nil			-
	Summer (Apr-May)	Nil			-
	Annual	687	40	-	-

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)	291	205	NIL	27	93	20	NIL	27	0.1	1

1. 4	**Major Soils (common names like shallow red soils etc.,)**	**Area ('000 ha)**
	Clay loam soil	81.0
	Sandy loam soil	124.0
	Others (specify):	

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	221.9	154%
	Area sown more than once	171.4	
	Gross cropped area	333.4	

1.6	**Irrigation**	Area ('000 ha)
	Net irrigated area	171.4
	Gross irrigated area	208.6
	Rainfed area	83.0

1.6	**Sources of Irrigation**	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		83.7	40.1
	Tanks	-	2.2	1.1
	Open wells	10209	122.6	58.8
	Bore wells	599		
	Lift irrigation	-	-	
	Micro-irrigation		1.36	

	Other sources		
	Check dam	150	
	Farm pond	175	
	Recharged wells	100	
	Total Irrigated Area	208.61	
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area
	Over exploited	Nil	
	Critical	Nil	
	Semi- critical	2	10%
	Safe	7	90%
	Wastewater availability and use	Nil	
	Ground water quality	Good	

1.7 Area under major field crops & horticulture etc. (2008-09)

1.7	**Major Field Crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***			**Summer**	**Total Area**
		Irrigated	***Rainfed***	**Total**	***Irrigated***	***Rainfed***	***Total***		
	Rice	88.2	-	88.2				2.20	90.40
	Wheat	-	-	-	50.9	2.80	53.70	-	53.70
	Pearlmillet	28.6	-	28.6	-	-	-	19.6	48.2
	Tobacco	15.6	-	15.6	-	-	-	-	-
	Cotton	3.1	-	3.1	-	-	-	-	-
	Horticulture crops - Fruits	**Irrigated**	**Rainfed**						**Total**
	Banana	13.5	-	-	-	-	-	-	13.5
	Citrus	5.2	-	-	-	-	-	-	5.2
	Papaya	2.4	-	-	-	-	-	-	2.4
	Mango	2.3	-	-	-	-	-	-	2.3
	Aonla	-	1.5	-	-	-	-	-	1.5
	Horticultural crops - Vegetables	**Irrigated**	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Total**

	Potato	-	-	-	5.8	-	-	-	5.8
	Brinjal	-	-	-	3.4	-	-	-	3.4
	Tomato	-	-	-	1.8	-	-	-	1.8
	Cabbage	-	-	-	1.5	-	-	-	1.5
	Cucumber	-	-	-	-	-	-	1.3	1.3
	Medicinal and Aromatic crops	**Irrigated**	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Total**
	Palmarosa	0.010	-	-	-	-	-	-	0.010
	Ashwagandha	0.030	-	-	-	-	-	-	0.030

	Fodder crops	**Kharif**	**Rabi**	**Summer**	**Total area**
	Jowar	4.4	2.8	3.3	10.5
	Maize	2.6	3.5	1.6	7.8
	Lucerne	-	2.6	-	2.6
	Other	2.6	-	0.4	3.0
	Total fodder crop area	**9.7**	**8.9**	**5.4**	**24.1**
	Grazing land	9.30	-	-	9.3
	Sericulture etc	-	-	-	
	Others (Specify)	-	-	-	

Source: Directorate of Agriculture, Gandhinagar

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Cattle	-	-	147.0
	Buffaloes	-	-	407.0
	Goat	-	-	76.0
	Sheep	-	-	10.0
	Others (Camel, Pig, Yak etc.)	Horse-0.13, Donkey-6.19, Camel-1.63, Pig-2.33		
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	-	4593.1	
	Backyard	-	-	

Source: Directorate of Animal Husbandry, Gandhinagar

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)	
		2434	-	168	-	5644	-
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		3		2		282	
	B. Culture						
		Water Spread Area (ha)		**Yield (t/ha)**		**Production ('000 tons)**	
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	-		-			
	ii) **Fresh water** (Data Source: Fisheries Department)	-		4.0		5.2	
	Others Marine water	51 km costal line		-		2.4	

Source: Dept. of Fisheries, Gandhinagar

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

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)										
	Rice	201	2012	-	-	12	2821	179	2054	270
	Wheat	-	-	115	2093			115	2093	172

	Bajra	38	1297	-	-	54	2620	93	1839	140
	Tobacco	30	1792	-	-	-	-	-	-	60
	Cotton	12	594	-	-	-	-	-	-	24
Major Horticultural crops (Crops to be identified based on total acreage)										
	Banana	-	-	-	-	-	-	13.5	79650	-
	Citrus	-	-	-	-	-	-	5.2	5200	-
	Papaya	-	-	-	-	-	-	2.4	9580	-
	Mango	-	-	-	-	-	-	2.3	3400	-
	Aonla	-	-	-	-	-	-	1.5	1550	-

Source : Directorate of Agriculture & Horticulture, Gandhinagar

1.12	**Sowing window for 5 major field crops**	**Rice**	**Wheat**	**Bajra**	**Tobacco**	**Cotton**
	Kharif- Rainfed	-	-	3rd week June – 4th week of July	-	-
	Kharif-Irrigated	3rd week June – 4th week of July	-	-	2nd of August – 4th week October	4th week of May – 4th week of July
	Rabi- Rainfed	-	3rd week November –2nd week of December	-	-	-
	Rabi-Irrigated	-	-	-	-	-
	Summer	2nd week of February - 2nd week of March	-	2nd week of February –4th week of March	-	-

1.13	**What is the major contingency the district is prone to?** (Tick mark and mention years if known during the last 10 year period)	**Regular**	**Occasional**	**None**
	Drought	-	√	-
	Flood	-	√	-
	Cyclone	-	√	-
	Hail storm	-	-	√
	Heat wave	-	√	-
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water intrusion	-	-	√
	Pests and diseases	-	√ BLB, WBPH, Aphid,	-

			Jassid, Spodoptera	

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: **Yes**

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation (Only 15% Area under rain fed situation)

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks	Medium rainfall, low land, clay loam soils	Paddy	No change	-	Seed drills under RKVY
(1st Week of July)	Medium rainfall, up land, sandy loam soils	Pearl millet	-do-	-	Supply of seeds through GSSC
		Tobacco	-do-	-	
		Cotton	-do-	-	Supply of seeds through NFSM

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 (3rd Week of July)	Medium rainfall, low land, clay loam soils	Paddy	No Change Prefer varieties like GR-8, GR-9, Ashoka-200F	Promotion of community nurseries for meeting demand and short duration variety seedlings	Seed drills under RKVY Supply of seeds through

				Use SRI technique	GSSC
	Medium rainfall, up land, sandy loam soils	Pearl millet	Adopt short duration varieties like GHB 538, GHB 732	-	Supply of seeds through NFSM
			Inter cropping : Pearlmillet + Pigeon Pea (2:1)	-	
		Tobacco	No Change Prefer varieties like MRGTH - 1, GT – 7, GTH 1, A-119	-	
		Cotton	No Change Prefer varieties like G.Hy.C -8, G. Hy.C - 10, 12 Early maturing Bt. hybrids	-	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks **(1st Week of August)**	Medium rainfall, low land, clay loam soils	Paddy	No Change Prefer varieties like GR-12, GR-101, GR-104, Masuri, Gurjari	If irrigation facility is available, give irrigation and then transplant paddy Use SRI technique	Seed drills under RKVY Supply of seeds through GSSC Supply of seeds through NFSM
	Medium rainfall, up land, sandy loam soils	Pearl millet	Switch over to varieties like Fodder Pearlmillet **:** GFB 1		
			Replace with PigeonPea **:** BDN 2, ICPL 87, AGT-2	Use 20% higher seed rate	
		Tobacco	Adopt GTH 1, A-119, GT- 5, GT-7, GT-9		
		Cotton	Switch over to Castor **:** GCH 4,GCH 7		
			Green gram **:** Meha, GG 4		
			Black gram : T 9, GUB 1		
			Vegetable Cowpea **:** AVCP 1,	In shortage of water, use as a fodder	
			Inter cropping : Pigeon Pea + Blackgram (1:2)		
			Cluster bean : Gujarat Guar -1, HG-75		

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks **(3rd Week of August)**	Medium rainfall, low land, clay loam soils	Paddy	Shift to fodder Sorghum (S 1049,GFS-1) or fodder maize (African tall)	---	Seed drills under RKVY Supply of seeds through GSSC Supply of seeds through NFSM Farm ponds through IWSM
	Medium rainfall, up land , sandy loam soils	Pearl millet	Fodder Pearlmillet :GFB-1 or Pigeon pea : BDN-2, ICPL- 87, AVT-1, AGT-2, Vaishali	---	
		Tobacco	GTH 1, A-119, GT- 5, GT-7, GT-9	--	
		Cotton	Replace with Castor **:** GCH- 4, GCH-7 or Green gram Meha, GG-4, Black gram **:** T-9, GUB-1 Cowpea **:** GC-1, GC-2, GC-3, GC-4, AVCP 1 Clusterbean **:** Guj.Guar-1, HG-75	In shortage of water, plant cowpea for fodder	

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.	Medium rainfall, low land, clay loam soils	Paddy	**-**	Apply irrigation if facility is available Weeding Delay top dressing of N till occurrence of next rain	Seed drills under RKVY Supply of seeds through GSSC Farm ponds through IWSM
	Medium rainfall, up land, sandy loam soils	Pearl millet	Thinning	Weeding and intercultivation	
		Tobacco	---	---	
		Cotton	---	Intercultivation, keep crop weed free	

Condition	Suggested Contingency measures				
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm)period)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Medium rainfall, low land, clay loam soils	Paddy	---	• Apply irrigation • Weeding • Delay top dressing of N till occurrence of next rain	Seed drills under RKVY Supply of seeds through GSSC Farm ponds through IWSM
	Medium rainfall, up land, sandy loam soils	Pearl millet	Thinning	• Intercultivation • Keep crop weed free • Delay top dressing of N till occurrence of next rain	
		Tobacco	Remove suckers	• Harrowing and earthing up • Apply irrigation in alternate furrow	
				Use organic mulch	
		Cotton	---	• Harrowing and earthing up • Keep crop weed free • Delay top dressing of N till occurrence of next rain • If irrigation facility available, apply irrigation in alternate furrows	

				• Use organic mulch	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Medium rainfall, low land, clay loam soils	Paddy	---	• Spraying thiourea (0.2%) • Postpone the top dressing of N • If irrigation facility is available, apply irrigation • Weeding	
	Medium rainfall, up land, sandy loam soils	Pearl millet	---	• Postpone the top dressing of N • Inter culturing • Spraying thiourea (0.2%) • Apply irrigation in furrow	
		Tobacco	Topping and desuckering	• Use organic mulch (paddy straw) • Apply irrigation in alternate furrow, Weeding	
		Cotton	Topping of terminal bud	• Postpone the top dressing of N • Use organic mulch (paddy straw) • Keep crop weed free	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
Flowering to maturity (Terminal dry spell)	Medium rainfall, low land, clay loam soils	Paddy	Harvesting at physiological maturity stage	Gram: GG 2,Wheat : like GW1139	• Seed drills under RKVY • Supply of seeds through GSSC • Farm ponds through IWSM
	Medium rainfall, up land, sandy loam soils	Pearl millet	Use as fodder	Fodder Maize : African Tall	
		Tobacco	Remove suckers Harvesting of mature leaves	--	
		Cotton	Apply irrigation in alternate furrow Keep crop weed free	Wheat : GW173, GW405, Sonalika, Lok-1	

2.1.2 Irrigated situation (85 % area under irrigation through canal and tube wells)

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canal due to low rainfall	Medium rainfall, low land, clay loam soils	Paddy	No change, Prefer varieties like GR-12, GR-101, GR-104, Masuri, Gurjari	Use SRI or SIRA technique. Grow early and mid early variety under aerobic condition. Conjunctive use of water	Seed drills under RKVY Supply of seeds through GSSC Supply of seeds through NFSM
	Medium rainfall, up land, sandy loam soils	Pearl millet	No change, Prefer varieties like GHB- 558, GHB 732, GHB-538	Keep crop weed free & inter-culturing, Open the conservation furrow at every 8 lines	
		Tobacco	--	Tobacco nursery raising in month of July	
		Cotton	Prefer Bt. Hybrids	Conjunctive use of water and apply irrigation in alternate furrow in cotton	
			Green gram : Meha, GM- 4		
			Black gram : T- 9, GUB -1		
			Castor : GCH- 4, GCH-7		

Condition	Suggested Contingency measures				
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	Medium rainfall, low land,clay loam soil	Paddy	No change, Prefer varieties like GR-12, GR-101, GR-104, Masuri, Gurjari	• Conjunctive use of water • Use SRI technique concept for application of irrigation	Seed drills under RKVY Supply of seeds through GSSC Supply of seeds through NFSM
	Medium rainfall, up land, sandy loam soil	Pearl millet	No change, Prefer varieties like GHB-558, GHB-577, GHB-526, GHB -732, GHB-235, MH-169, MH-179	Keep crop weed free and inter culturing, Open the conservation furrow at every 8 lines	
		Tobacco	No change, Prefer varieties like GTH 1, A-119, GT- 5, GT-7, GT-9	---	
		Cotton	No change, Prefer varieties like Bt. Hybrids	Apply irrigation in alternate furrow. Conjunctive use of water. Use drip irrigation system	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of monsoon in catchment	Medium rainfall, low land,clay loam soil	Paddy	No change, Prefer varieties like GR-12, GR-101, GR-104, Masuri, Gurjari	• Conjunctive use of water. • Use SRI technique concept for application of irrigation	Seed drills under RKVY Supply of seeds through GSSC
	Medium rainfall, up	Pearl millet	No change, Prefer varieties like	• Thinning 20% plants	Supply of seeds through

	land, sandy loam soil		GHB-558**,** GHB-577, GHB-526, GHB -732, GHB-235, MH-169, MH-179	• Keep crop weed free. • Inter culturing	NFSM
		Tobacco	No change, Prefer varieties like GTH 1, A-119, GT- 5, GT-7, GT-9	Conjunctive use of water	
		Cotton	No change, Prefer Bt. Hybrids	Conjunctive use of water. Use drip irrigation system	

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Lack of inflows into tanks due to insufficient low rainfall /delayed onset of monsoon	**Not applicable**				
Insufficient groundwater recharge due to low rainfall	**No such situation is prevailed in Anand district**				

2.2 Unusual rains (untimely, unseasonal etc.) (for both rainfed and irrigated situations)

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Rice	---	Drain out excess water from field	- Drain out excess water and harvest the crop at physiological maturity stage	Shift the produce at safer place
Pearl millet	Drain out excess water from field	Drain out excess water from field	- Drain out excess water - Nipping of ear head in standing crop	
Tobacco	Drain out excess water from field and followed the interculturing to remove the access moisture	Drain out excess water from field and followed the interculturing to remove the access moisture	- Drain out excess water - Harvest the mature leaf	Turn the produce frequently

Cotton (Bt)	Drain out excess water from field and use the insecticide to control the sucking pest (aphid, jassid)	Drain out excess water from field and use the insecticide (0.04% monocrotophos or 0.03% dimethoate) to control the sucking pest (aphid, jassid)	- Drain out excess water - Use the insecticide (0.04% monocrotophos or 0.03% dimethoate) - Picking seed cotton from mature balls	Drying of seed cotton
Horticulture				
Banana	Drain out the excess water As a preventive measure provide shelter belt of shevary surrounding of the field at the time of planting , Spraying of copper oxychloride (0.25%) for control of sigatoka disease	Drain out the excess water Spraying of copper oxychloride (0.25%) for control of sigatoka disease	- Drain out the excess water - Provide the support to plant	Shift the produce at safer place
Papaya	As a preventive measure provide shelter belt of shevary in surrounding of the field at the time of planting , Use BM paste (100:3:3) on stem for damping off disease	Drain out the excess water Use Bordeaux paste (100:3:3) on stem for damping off disease	- Drain out the excess water - Provide the support to plant	
Citrus Mango Aonla	Drain out excess water from field		- Drain out excess water from orchard - Harvest mature fruits	
Heavy rainfall with high speed winds in a short span				
Rice	---	Drain out excess water from field	- Drain out excess water and harvest the crop at physiological maturity stage	Drying of seed cotton
Pearl millet	Drain out excess water from field	Drain out excess water from field	- Drain out excess water - Nipping of ear head in standing crop	
Tobacco	Drain out excess water	Drain out excess water from field and followed	- Drain out excess water	Shift the produce at safer place

	from field and followed the intercultivation to remove the access moisture	interculture to remove the excess moisture	- Harvest the mature leaf	
Cotton	Drain out excess water from field and use the insecticide to control the sucking pest (aphid, jassid)	Drain out excess water from field and use the insecticide (0.03% dimethoate) to control the sucking pest (aphid, jassid)	- Drain out excess water - Use the insecticide (0.03% dimethoate) - Picking seed cotton from mature balls	
Horticulture				
Banana	Drain out the excess water As a preventive measure provide shelter belt of shevary in surrounding of the field at the time of planting , Spraying of copper oxychloride (0.20%) for control of sigatoka disease	Drain out the excess water Spraying of copper oxychloride (0.25%) for control of sigatoka disease	- Drain out the excess water - Provide the support to plant	Shift the produce at safer place
Papaya	As a preventive measure provide shelter belt of shevary in surrounding of the field at the time of planting , Use BM paste (100:3:3) on stem for damping off disease	Drain out the excess water Use Bordeaux paste (100:3:3) on stem for damping off disease	- Drain out the excess water - Provide the support to plant	
Citrus Mango Aonla	Drain out excess water from field	- Drain out excess water from orchard - Harvest mature fruits		

Outbreak of pests and diseases due to unseasonal rains	**Take Preventive measure and control measure as per annexure IV**

APPENDIX –IV Important insect pest/disease on each crop and their control measure in details

A. Pest of major crops of the State and their control measures

No	Crop	Pest	Control measures
1.	Rice	**Rice stem borer**	• Apply carbofuran 3 G 1.0 kg a.i./ha or Carptap 4 G @ 1.0 kg/100 sq. meter at 5 days after sowing and five days before transplanting in paddy nursery. • Application of carbofuran 3 G 1.0 kg a.i./ha or Carptap 4 G @ 1.0 kg/ha or carbosulfan 5 G @ 1.0 kg a.i//ha at 30 and 50 days after transplanting • Spray any one of these Phosphomedon 0.03 % or Endosulfan 0.07 % or Quinalfos 0.05 % or Phosalone 0.05 %
		Paddy leaf hopper/Jassid	• Avoid the top dressing of nitrogen application and Drain the water from the field • Later stage of the crop, spray Imidacloprid 0.05 % or Fenobucarb 0.07 %
		Rice hispa and rice blue bittle	• Collect the adults and destroy • Summer ploughing • Spray any one of these Endosulfan 0.07 % or Carbaryl 0.02 % or Fenitrothion 0.05 %
		Rice grass hopper	• Deep ploughing before rain • Dust any one of these, Carbaryl 10 % or Quinalphos 1.5 % @ 20-25 kg/ha
		Rice root Weevil	• Apply 100 kg P_2O_5/ha which may help to decrease the incidence of this pest
2.	**Pearlmillet**	**Shoot Fly**	• Early sowing • Higher seed rate i.e. 5 kg/ha • Phorate 10 G or Carbofuran 3 G @ 2 gram/meter row length • Spray Endosulfan 0.07 %
		Blister beetle	• Carbaryl 10 % dust @ 20 kg/ha
		Stem borer	• Spray Endosulfan 0.07 %
3.	**Cotton**	**Spotted boll worm** **/pink boll worm**	• Avoid summer cotton / ratoon crop • Timely removal of cotton stocks and deep ploughing • Use delinted seeds

		/Spodoptera/ **Heliothis**	• Treat the seed with Imidacloprid 70 WS or Thiamethoxam 70 WS • Grow trap crop like Okra, Marigold, Maize etc. • Installed the sticky trap or light trap or Pheromone trap in the field • Spray any one of these, Monocrotophos 0.04 % or Endosulfan 0.07 % or Phosalone 0.07 % or Prophenofos 0.05 %
		Whitefly	• Spray any one of Acephate 0.1 % or Triazophos 0.1 % or Quinalphos 0.05 %
		Mites/Aphid/ **Jassid/Thrips**	• Spray any one of Dicofol 0.05 % or Carbofenithion 0.03 % or Methyl –O-Dematone 0.025 % or Phosphomedon 0.03 % or Dimethoate 0.03 %
4.	Tobacco	**White fly**	• Spray any one of these, Dimethoate 0.03 % or Methyl-O-Dematone 0.025 %
		Cut worm	• Dusting of any one of these Endosulfan 4 % or Quinalphos 1.5 % should be dusted @ 25 kg/ha at evening time
		Stem borer	• Destruction of crop residues after harvest • Select and use healthy pest free seedlings • Spray any one of these, Quinalphos 0.05 % or Endosulphan 0.07 % or Carbaryl 0.2 % at an interval of 10 days in Nursery and transplanted crop • Inject DDVP 0.05 % in to the gall

B. Diseases and Nematodes of major crops of the State and their control measures

Crop Name	Major disease	Control Measures
Bajra	Downy mildew	• Crop rotation with non host crop • Destroy diseased plants • Early sowing of bajra on onset of monsoon • Seed treatment with Apron 35SD @6g/kg seed or fosetyle @5g/kg seed • 2-3 sprays of Metalaxyl Compound @ 4 g/10 lit water • Spray of Mancozeb @1 kg /ha 30 DAS • Use resistant varieties GHB-15, PHB-10, 14, MH-169, 179, HB-1, 5 CO-7

	Ergot	• Removal of Collateral hosts • Use disease free seed • Sowing crop just after on onset of monsoon • Seed treatment with 20 % NaCl solution • Spraying of carbendazime 300 g or mancozeb 1.25 kg /ha • Long crop rotation
	Smut	• Remove smutted ear heads and destroy them • Use clean healthy disease free seeds • Follow crop rotation with one host crop • Growing Bajra in summer season

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	Drain out excess water	Drain out excess water	Drain out excess water	Drain out excess water, harvesting at physiological maturity stage
Pearl millet	-do-	-do-	-do-	Drain out excess water, nipping of ear head
Tobacco	-do-	-do-	-do-	Drain out excess water, harvest mature leaves
Cotton	-do-	Drain out excess water, Drenching of ridomil	-do-	Drain out excess water, picking seed cotton and dry in sun light
Horticulture				
Banana	Drain out excess water, drenching of fungicide (copper oxychloride 0.025%)	Drain out excess water, drenching of fungicide (copper oxychloride 0.03%)	Drain out excess water, propping the plant	Drain out excess water, harvest the physiologically mature fruits
Citrus	-do-	Drain out excess water, apply Bordeaux Mixture (0.03%) on stem	Drain out excess water, drenching of fungicide	-do-
Papaya	Drain out excess water, drenching of fungicide (BM 0.03%)	-do-	Drain out excess water, propping the plant	-do-

Continuous submergence for more than 2 days				
Rice	Drain out excess water	Drain out excess water	Drain out excess water	Drain out excess water, harvesting at physiological maturity stage
Pearl millet	-do-	-do-	-do-	Drain out excess water, nipping of ear head
Tobacco	-do-	-do-	-do-	Drain out excess water, harvest mature leaves
Cotton	Drain out excess water	Drain out excess water, Drenching of ridomil	Drain out excess water	Drain out excess water, picking seed cotton and dry in sun light
Horticulture				
Banana	Drain out excess water, drenching of fungicide (copper oxychloride 0.025%)	Drain out excess water, drenching of fungicide (copper oxychloride 0.03%)	Drain out excess water, propping the plant	Drain out excess water, harvest the physiologically mature fruits
Citrus	-do-	Drain out excess water, apply BM (0.03%) on stem	Drain out excess water, drenching of fungicide	-do-
Papaya	Drain out excess water, drenching of fungicide (BM 0.03%)	-do-	Drain out excess water, propping the plant	-do-
Sea water intrusion	**Such type of situation not arise in this district**			

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				
Rice	-	Apply irrigation in morning or at after noon	Apply irrigation in morning or at after noon	Apply irrigation in morning or at after noon
Pearl millet	-			
Tobacco	-			
Cotton	-			
Horticulture				
Banana	-	-do-	-do-	-do-
Citrus	-			
Papaya	-			
Cold wave[q]				

Rice	---	---	---	---
Wheat	Apply irrigation	Apply irrigation	Apply irrigation	Apply irrigation
Pearl millet	----	----	---	---
Tobacco	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Horticulture				
Banana	-do-	-do-	-do-	-do-
Citrus				
Papaya				
Frost				
Wheat	- Make smoke in the field by burning of organic waste - Irrigate the crop	- Make smoke in the field by burning of organic waste - Irrigate the crop	- Make smoke in the field by burning of organic waste - Irrigate the crop	
Tobacco				
Cotton				
Horticulture				
Banana				-
Citrus				
Papaya				
Hailstorm	**Doest not prevail in Anand district**			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

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

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

	in the district Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures Procure and stock multivitamins & area specific mineral mixture	epidemic Drainage of water from and around animal sheds, pasture areas. Tick control measures be undertaken to prevent tick borne diseases in animals Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	production does not coincide with mid summer
Floods			
Feed and fodder availability	In case of early forewarning (EFW), harvest all the crops (paddy/wheat/barley/maize/mungbean etc.) that can be useful as feed/fodder in future (store properly) Keeping sufficient of dry fodder to transport to the flood affected villages Don't allow the animals for grazing if severe floods are forewarned Keep stock of bleaching powder and lime Carry out Butax spray for control of external parasites Identify the Clinical staff and trained paravets and indent for their services as per schedules Identify the volunteers who can serve in need of emergency Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in	Transportation of animals to elevated areas Proper hygiene and sanitation of the animal shed In severe storms, un-tether or let loose the animals Use of unconventional and locally available cheap feed ingredients for feeding of livestock. Avoid soaked and mould infected feeds / fodders to livestock Emergency outlet establishment for required medicines or feed in each village Spraying of fly repellants in animal sheds Control of mosquitoes (1) Treatment of animals for entritis etc. (2) Special care and treatment of young animals for enteric diseases like calf scour, pneumonia	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Encouraging farmers to cultivate short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,. Deworming with broad spectrum dewormers Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Drying the harvested crop material and proper storage for

	rescue operations		use as fodder.
Cyclone	In case of early forewarning (EFW), harvest all the crops (paddy/wheat/bajra/maize/mungbean etc.) that can be useful as feed/fodder in future (store properly) Keeping sufficient of dry fodder to transport to the flood affected villages Don't allow the animals for grazing if severe floods are forewarned Keep stock of bleaching powder and lime Carry out Butax spray for control of external parasites Identify the Clinical staff and trained paravets and indent for their services as per schedules Identify the volunteers who can serve in need of emergency Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations	Transportation of animals to elevated areas Proper hygiene and sanitation of the animal shed In severe storms, un-tether or let loose the animals Use of unconventional and locally available cheap feed ingredients for feeding of livestock. Avoid soaked and mould infected feeds / fodders to livestock Emergency outlet establishment for required medicines or feed in each village Spraying of fly repellants in animal sheds	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Encouraging farmers to cultivate short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,. Deworming with broad spectrum dewormers Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Drying the harvested crop material and proper storage for use as fodder.
Cold wave	Not applicable		
Heat wave	Arrangement for protection from heat wave i) Plantation around the shed ii) H_2O sprinklers / foggers in the shed iii) Application of white reflector paint on the roof iv) Thatched sheds should be provided as a shelter	Allow the animals early in the morning or late in the evening for grazing during heat waves Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves Put on the foggers / sprinkerlers/fans during heat weaves in case of high yielders (Jersey/HF crosses)	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)

	to animal to minimize heat stress	In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves.	
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals

2.5.2. Poultry

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	• Purchase sufficient quantity of ready feed / raw feed ingredients as per storage facilities and requirement. • Indentify and test available alternative low cost feed resources in feed testing laboratories for their exact composition for formulating balanced feed. • Prepare balanced feed formulation using available feed resources. • Create alternative power generating facilities i.e. Generator set. • Take insurance of poultry sheds, equipments and feed factory well in advance may be in the starting phase of opening the farm.	• Feed formulations using low cost feed ingredients in case of non-availability of high priced conventional ingredients. • Keep check on production performance and modify ration consulting poultry specialist. • Nutrient density should be increased in proportion to feed consumption. • Avoid feed wastage.	• Shift over to good quality feed for optimum production performance.
Drinking water	• Tube well and water storage facilities should be adequately created.	• Judicious use of water by avoiding spillage/ leaking through waterers. • Use of cooling facilities like sprinklers, foggers, fans etc. for comfort zone and optimum	• Use water sanitizers (chlorination/Sokrena / Vigrox etc.) and softeners (pH. 6).

		production performance.	
Health and disease management	• Use of anti-stress vitamins (AD_3ECB_{12}-Vimeral / Famitone / Stressvell etc.) in feed and drinking water. • Use of adaptogenetic herbal medicines (Zetress / Zist etc). • Use probiotics (Protexin / Biovet-YC) in feed. • Vaccinate birds against important diseases like R.D., IBD, I.B., Fowl pox according to age as per scheduled programme.	• Use anti-stress, vitamins and adaptogenetic herbal drugs. • Perform vaccination for Ranikhet Disease & Infectious Bronchitis . • Prophylactic medication for important diseases like E.coli & CRD. • Use of electrolytes in feed and drinking water.	• Vaccinate birds as per vaccination schedule. • Perform deworming with Levamisole / Albendazole / Piperazine etc) and use antibiotics, vitamins as per monthly health calendar programme
Floods			
Shortage of feed ingredients	• Purchase sufficient quantities of ready feed / raw feed ingredients. • Store feeding material in suitable houses which should be leak proof and without dampness. • Store feed on iron stands away from the wall to avoid increase in moisture & mould growth. • Road repairing for transporting feed and farm products. • Take insurance of poultry sheds, equipments, feed factory and mortality of birds due to drowning in flood water well in advance may be in the starting phase of opening the farm.	• Use of toxin binders (Chek–O-Tox/ UTPP etc.) in the feed. • All electric connections should be in good condition to avoid shock and accident.	• Use of Toxin binder should be continued to avoid development of mycotoxins in the feed
Drinking water	• Drinking water should be stored in over head tanks. • Underground water tanks should be repaired	• Use of water sanitizers and softeners.	• Check water quality and accordingly use water sanitizers and water softeners for optimum

	and closed properly to avoid contamination.		pH.
Health and disease management/construction of poultry shed	• Complete vaccination as per the programme for various categories of the birds i.e. Layers & Broilers. • Poultry sheds should be constructed at high raised land/or go for raised platform poultry sheds especially in flood affected areas. (conceptional biosecurity)	• Use of probiotics / or antibiotics in feed to protect birds from bacterial infections like E.coli, CRD, Enteritis etc.	• Use of probiotics should be continued in feed for 10-15 days.
Cyclones			
Shortage of feed ingredients	• Store feed ingredients / ready feed as per need. • Use curtains to avoid splashing of water in feed stores and poultry houses.	• Avoid direct splashing of water and wind draft on the birds by using proper curtains.	• Use good quality and balanced feed for optimum production performance.
Drinking water	• Keep ready stock of water sanitizers and softeners.	• Use of water sanitizers and softeners in drinking water. • Use Toxin binders in feed. • Mixing of lime in the litter to avoid wet litter problems and ammonia production.	• Repair damages to watering systems, if any.
Health and disease management	• Keep stock of probiotics / antibiotics and anti-stress vitamins.	• Use probiotics and anti stress vitamins in feed and water.	• Use antibiotics / coccidiostate and anti-mycoplasma drugs in feed / drinking water.
Heat and cold wave			
Shelter/environment management	• Install foggers inside the house. • Install sprinklers on the roof. • Tree plantation surrounding the shed. • Purchase of electrolyte and anti-stress vitamins and antibiotics	• Try to Keep the house temperature in comfort zone i.e. 70-75° F through use of foggers, sprinklers and air velocity fans. • Reduce protein by 2% in feed. • Use of fat / Vegetable oil (2-5%) in feed as partial replacement to	• Use of cooling mechanisms to maintain house temperature in comfort zone for best production performance.

		carbohydrates sources i.e. Maize, Wheat, Rice Kani etc.	
Health and disease management	• Birds should be free from bacterial and mycoplasma infections by using antibiotics/ antimycoplasma drugs (Tiamutin/ Tylosin etc.) as mortality in affected birds is high due to heat stress. • Vaccinate birds for respiratory diseases like Ranikhet disease /Infectious Bronchitis.	• Use anti stress vitamins and electrolytes in drinking water / feed.	• Check titres for respiratory disease and accordingly repeat vaccination against Ranikhet disease / Infectious Bronchitis.

2.5.3 Fisheries

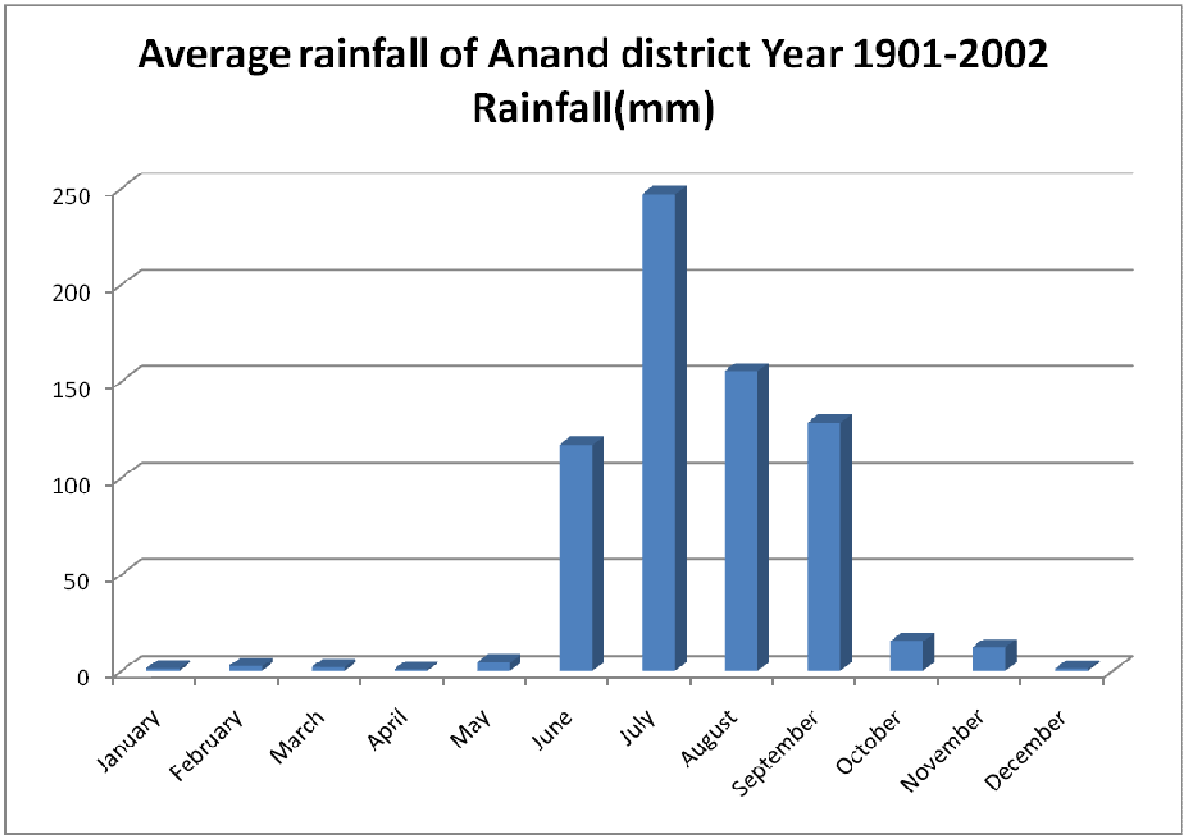
Fisheries / Aquaculture: (Anand – Marine and Inland) Contingencies strategies for fisheries

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought	Connect the all major rivers of state and make network to connect all reservoir and village ponds to defend from drought condition of particular zone.		
A. Capture	Marine sector couldn't effected directly but estuarine biodiversity will effected (some fresh water fish migrate to marine or vice versa for breeding will effected)		
Marine	Prepare fish database of particular zone	Catadromus fish stock affected due to scarcity of river water.	Developed the stock by stocking of fishes during favorable condition, it will auto stock fish in natural condition
Inland	Inland sector will affected most during the drought condition. Indian Major Carp, Exotic Carp, Cat fish and other biodiversity will either migrate or not survive.		
(i) Shallow water depth due to insufficient rains/ inflow	Provide water through cannel and pipeline from major reservoirs to maintain sufficient water depth	Migration of fish stock Conservation of breeders/ fish stock at unaffected area	Transplant the fish stock and breed the fish in hatchery to stock the fish seed in affected area

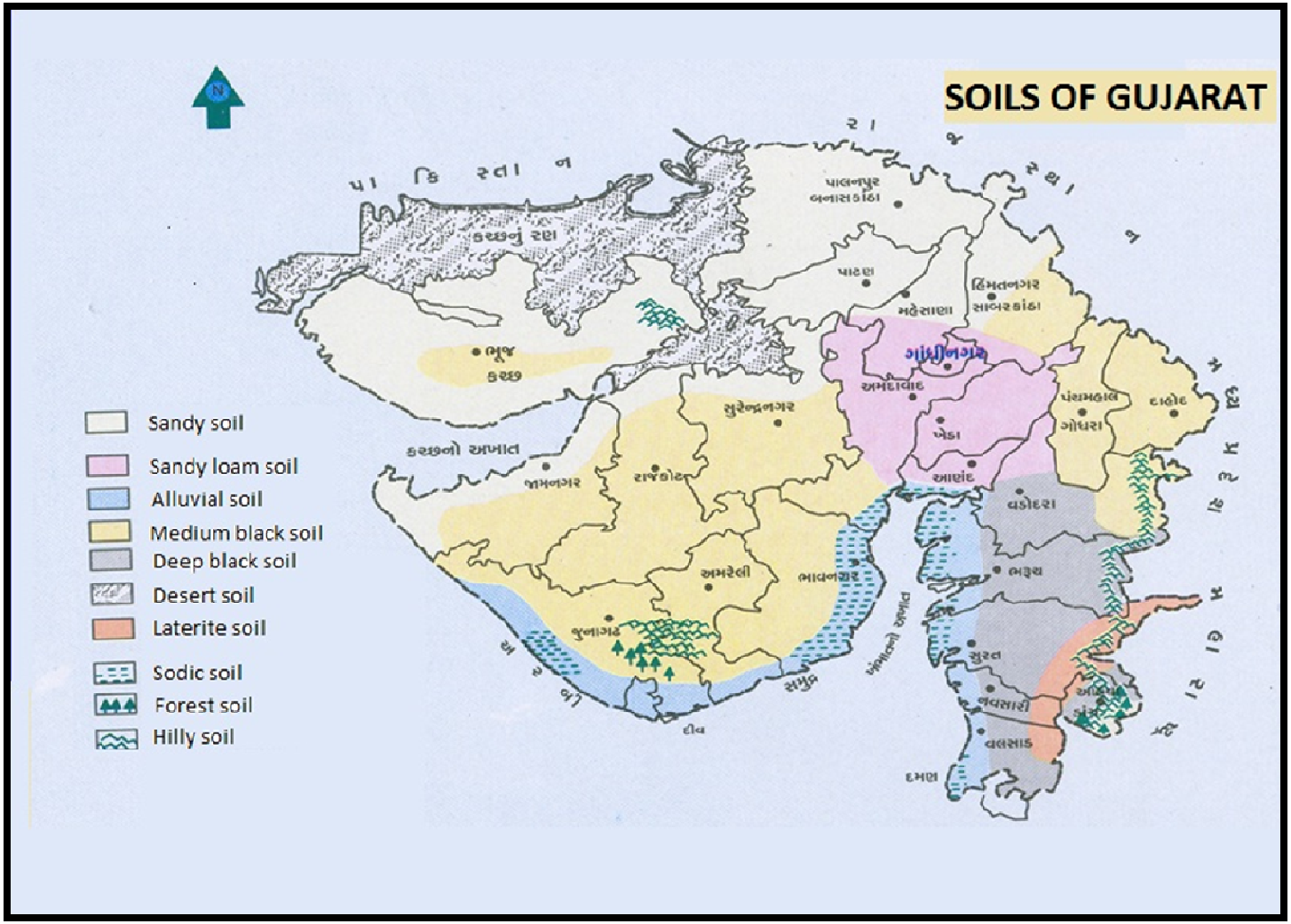
	Taxonomic fish data collection & Preserved fish stock (gene)		
(ii) Changes in water quality	Migration of fish due to change of water quality	-	-
(iii) Any other			
B. Aquaculture	"Culture of aquatic organisms in confined water body", so this sector will affected most incase of either non availability of water or mismanagement.		
(i) Shallow water in ponds due to insufficient rains/ inflow	Lower the stocking density by harvest the big size (500 gm) fish and place in market. Transfer of under culture fishes to abundance water zone	Pre- harvest all the materials (fish and prawns) & preserved by freezing	Sanitize the dead fish biomass.
(ii) Impact of salt load build up in ponds / change in water quality	Protect the water and use of lime and other probiotics	Cover the pond with plants (duckweed etc) to protect from evaporation.	Flush the pond with fresh water and manure before the next stocking of fish to maintain the food chain
(iii) Any other			
2) Floods	Flood are generally predicted and early warning will protect the lives and livelihood		
A. Capture	Change of breeding grounds, migration of fish against and with the water, and increase of fish stock etc, so positive affect on capture fisheries.		
Marine	All the fishermen must call back from fishing	No fishing	
Inland	All the fishermen must call back from fishing	No fishing	
(i) Average compensation paid due to loss of human life	Recognizing the risk of flood & making the people aware of it Migrate the people at safe placeCollect the details information of swimmers & life savers appliances.	Send the rescue teams to protect the lives of the most vulnerable peoples.	Measure social impact of losses risks of diseases, loss of employment. The most vulnerable fishermen be taken care of first and fast
(ii) No. of boats/ nets/ damaged	Transfer boats/nets at safe places	If possible protect boats during rescue operation	Identify the damages according to assessment & compensate
(iii) No. of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(v) health and diseases	Prepared the medical rescue team	-	Proper hygiene & sanitation Send the medical rescue team with drugs.

B. Aquaculture	Flood affects the culture ponds which situated near the river. It demolished the pond dyke, overflows the pond and contaminated the culture.		
(i) Inundation with flood water	Transfer of aquaculture farmers to protected places Harvest fish from culture ponds and preserved or sale at market Protect the pond dykes with sand bags.		Harvest the culture fish & wild fish which came with flood water. Disinfect the ponds with chemicals
(ii) Water continuation and changes in water quality	Reduced water level of culture pond.	Flood water fills the pond if empty or reduced before the flood.	Exchange water with fresh water to maintain the water quality.
(iii) health and diseases	Take preventive measures		Destroyed the dead fish with disinfectant
(v) Loss of stock and inputs (feed etc)	Transfer the stock and inputs at safe places	-	Demolish the decayed feed
Infrastructure damage(pumps, aerators, huts etc)	Transfer the detachable infrastructure at safe places	-	Measures impact of losses of infrastructure and provide assist for rehabilitation
(vi) Any other			
3. Cyclone / Tsunami	Cyclone, heavy rain and flooding are generally predicted and early warning are issued by the concern agencies, while Tsunami, Oil spill etc. cannot be forewarned		
A. Capture	Capture fishery affected due to cyclone, as current pattern change & upwelling cause the migration of some fish species, so it will either affect to stock or species variation.		
Marine	On the costal region, fishermen staying away from the vulnerable zone is one way of prevention		
(i) Average compensation paid due to loss of fishermen lives	Recognizing the risk of cyclone and making the people aware of risk Migrate the fishermen at safe place	Protecting the lives and livelihood of the most vulnerable fishermen	Measure social impact of losses risks of diseases, loss of employment. The most vulnerable fishermen be taken care of first and fast
(ii) Avg. no. of boats/nets/ damaged	Identify the boats and convey messages of disaster in the sea. Birthing the boats at safe place	Warning signals, use of flares, seeking help by attracting attention. Prevent the lives among damaged boats	Compensation of damages should be provide after real assessment of damages (boat/net)
(iii) Avg. no. of houses damaged			As above

Inland	Recognizing the risk of cyclone and making the people aware of risk Migrate the fishermen at safe place	Protecting the lives and livelihood of the most vulnerable fishermen	Measure social impact of losses risks of diseases, loss of employment. The most vulnerable fishermen be taken care of first and fast
B. Aquaculture	Most of coastal aquaculture farms (shrimp culture) will affect most due to cyclone & tsunami, as sea water intrusion, high current & tide & high wind velocity will affect the dyke and infrastructure of aquaculture units.		
(i) Overflow/ flooding of ponds	Pre- harvest the materials (fish and prawns) Protect the dykes by putting soil bags. Place the iron screen on inlet and outlet	In case of over flooding open outlet of the pond	Measure impact of losses and risks of diseases Provide better hygienic sanitation, disinfected the ponds.
(ii) Changes in water quality (fresh water/ brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)	Transfer the stock and inputs at safe places	-	Destroy the decomposed feed
(v) Infrastructure damage(pumps, aerators, shelters/ huts etc)	Transfer the detachable infrastructure at safe places	-	Measures impact of losses of infrastructure and provide assist for rehabilitation
4. Heat wave and cold wave	This factor will affect indirectly to the fish stock.		
A. Capture	Due to heat and cold wave some fishes migrate to offshore as well as non affected area so, it will affect the fish catch.		
Marine	Assessment of capture fish catch	Study the impact of heat and cold wave on fish capture and biodiversity.	Established the fishery
Inland	As above	As above	As above
B. Aquaculture	Due to these factor, fish growth will affect, change in feeding, breeding and rearing of fish larvae.		
(i) Changes in pond environment (water quality)	Exchange of water to maintain the water temperature and water parameter	Use equipment to protect the fish from drastic change in temperature as well as depletion of oxygen, i.e. use of thermostat heater to maintain constant pond temperature & use of aerator to maintain dissolve oxygen in pond.	Acclimatize the fish stock in natural condition and reduced the used equipments from the ponds. Maintain the feed ration accordingly.
(ii) Health and Disease management	Take some preventive measures to protect from disease	Use of probiotics as well as fresh and live feed	


Average rainfall of Anand district Year 1901-2002
Rainfall(mm)
250
200
150
100
50
0
January
February
March
April
May
June
July
August
September
October
November
December


ANAND
DISTRICT
To Nadiad
N
Kheda
Ahmedabad
Umreth
Bhalej
Boriavi
Sarsa
Vadtal
ANAND
Sojitra
Sunav
Vidhyanagar
Petlad
Vasad
Vadodra
Tarapur
Golana
Dharmaj
Borsad
Nar
NH-8
To Vadodra
Bochasan
Bhadran
Lunej
Ras
Wadgam
Khambhat
Undel
Kathana
Dhuwaran
Map not to Scale
Copyright © 2010 www.mapsofindia.com
(Updated on 2nd November 2010)
Rann of Kuchchh
LEGEND
National Highway
Major Road
District Boundary
Railway
District Headquaters
Major Town
Other Town
River


SOILS OF GUJARAT
Sandy soil
Sandy loam soil
Alluvial soil
Medium black soil
Deep black soil
Desert soil
Laterite soil
Sodic soil
Forest soil
Hilly soil
કચ્છનું રણ
ભૂજ
કચ્છ
પાલનપુર
બનાસકાંઠા
પાટણ
મહેસાણા
હિંમતનગર
સાબરકાંઠા
ગાંધીનગર
અમદાવાદ
સુરેન્દ્રનગર
કચ્છનો અખાત
જામનગર
રાજકોટ
અમરેલી
જુનાગઢ
ભાવનગર
ખેડા
આણંદ
પંચમહાલ
ગોધરા
દાહોદ
વડોદરા
ભરૂચ
સુરત
નવસારી
વલસાડ
દમણ
દીવ