State: GUJARAT

Agriculture Contingency Plan for District: AMRELI

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Central Highlands (Malwa), Gujarat Plain And Kathiawar Peninsula, Semi-Arid Eco-Region (5.3)			
	Agro-Climatic Zone (Planning Commission)	Gujrat Plains And Hills Region (XIII)			
	Agro Climatic Zone (NARP)	North Saurashtra (GJ-6) South Saurashtra (GJ-7)			
	List all the districts or part thereof falling under the NARP Zone	Amreli, Rajkot, Jamnagar, Surendranagar, Bhavnagar, Junagad, Porbandar			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		21^0 .3579" N	71^0. 1282" E	130 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station, Junagadh Agricultural University, Keria Road, Amreli-365 601			
	Mention the KVK located in the district	Krishi Vgyan Kendra, Junagadh Agricultural University, Keria Road, Amreli-365 601			
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-September)	580	30	2^{nd} Week of June	2^{nd} Week of September
	NE Monsoon(October-December)	-	-	-	-
	Winter (January-February)	-	-		
	Summer (March-May)	-	-		
	Annual	580	30		

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)	736.5	583.8	44.2	14.4	58.9	7.2	1.1	21.8	4.0	1.1

Source: District Panchayat

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area ('000 ha)**	**Percent (%) of total**
	Medium & shallow Black to Mixed Red & Black soils	497.9	67.5
	Coastal Alluvial & Saline soils	139.2	32.5

* mention colour, depth and texture (heavy, light, sandy, loamy, clayey etc) and give vernacular name, if any, in brackets

Source: ATMA Project Report, Amreli

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	583.8	119
	Area sown more than once	110.0	
	Gross cropped area	693.8	

Source: District Panchayat, Amreli.

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	110.9		
	Gross irrigated area	122.5		
	Rainfed area	472.9		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		39.3	35.5
	Tanks	-	1.9	1.7
	Open wells	103764	25.1	22.6
	Bore wells	110594	40.2	36.3
	Lift irrigation schemes	-	2.2	2.0
	Micro-irrigation	-	-	-
	Other sources, Ponds & Check dams	-	2.2	2.0
	Total Irrigated Area	-	110.9	
	Pump sets	78921		
	No. of Tractors	7499		
	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)GW Develop -69% Safe
	Over exploited	0	0	
	Critical	0	0	
	Semi- critical	5	39.0	Moderate saline
	Safe	6	61.0	-
	Wastewater availability and use			
	Ground water quality	Saline groundwater with higher TDS, Sea water intrusion problem in coastal aquifers		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

Source: District Panchayat Amreli.

1.7 Area under major field crops & horticulture (as per latest figures) (Specify year 2008-09)

1.7	Sr. No.	Major field crops cultivated	Area ('000 ha)							
			Kharif			*Rabi*				
			Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	1	Groundnut	-	248.1	248.1	-	-	-	4.2	252.3
	2	Cotton	158.9	68.2	227.1	-	-	-	-	227.1
	3	Wheat	-	-	-	39.3	-	39.3	-	39.3
	4	Sesame	-	18.6	18.6	-	-	-	-	18.6
	5	Bajra (Pearl Millet)	-	13.4	13.4	-	-	-	1.4	14.8

Source: District Panchayat, Amreli.

	Sr. No.	Horticulture crops	Total
	1	Mango	6.3
	2	Sapota	0.6
	3	Citrus fruit	0.4
	4	Guava	0.2
	Others (specify)	Ber	0.2

	Sr. No.	Vegetables	Total
	1	Onion	3.1
	2	Brinjal	2.8
	3	Garlic	1.1
	4	Guar	2.0
	5	Cucurbits	1.0
		Others	0.9
	Sr. No.	**Medicinal and Aromatic crops**	**Total**
	1	Cumin	9.0
	2	Fenugreek	0.2
	3	Chilly	0.2
	4	Ajawan	0.1
	5	Coriander	0.1
	Others		
	Sr. No.	**Plantation crops**	**Total**
	1	Coconut	0.1
	Others (Specify)	eg., industrial pulpwood crops etc.	
	Sr. No.	Total fodder & Grazing land	**Total**
	1	Total fodder crop area	15.2
	2	Grazing land	49.7
	3	Sericulture etc	-
	4	Others (specify)	-

Source: Bagayaat Bhavan, Amreli

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	81.2	154.7	235.9
	Crossbred cattle	-	-	-
	Non descriptive Buffaloes (local low yielding)	13.4	134.9	148.3
	Graded Buffaloes	-	-	-
	Goat	125.7		125.7
	Sheep	131.3		131.3
	Others (Camel, Pig, Yak, horse etc.)	8.9		8.9
	Commercial dairy farms (Number)			3.0
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	1	1.867	
	Backyard	-	10.77	

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)	
27723	930	220	4134	-	24 cold storage & Ice units

ii) Inland (Data Source: Fisheries Department)

No. Farmer owned ponds	**No. of Reservoirs**	**No. of village tanks**
424	8	13

B. Culture

	Water Spread Area (ha)	**Yield (t/ha)**	**Production**
i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	-	-	200.7
ii) **Fresh water** (Data Source: Fisheries Department)	5732	-	0.3

1.11 Production and Productivity of major crops (Average of last 5 years:2004- 2009)

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)										
Crop 1	Groundnut	115.4	465			7.80	1829	123.2	488	201.9
Crop 2	Cotton (Lint)	760.8	570					760.8	570	1521.6
Crop 3	Wheat			112.00	2849			112.0	2849	235.2
Crop 4	Sesame	7.9	422					7.9	422	11.8
Crop 5	Bajra	23.2	1727			3.40	2440	26.6	1797	66.5
Major Horticultural crops (Crops to be identified based on total acreage)										
Crop 1	Mango							37.3	6000	-
Crop 2	Sapota (Chiku)							4.3	7000	-
Crop 3	Citrus							3.6	8000	-

Source: District Panchayat, Amreli

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Groundnut	Cotton	Wheat	Sesame	Bajra (Pearl Millet)
	Kharif- Rainfed	June 2nd wk to July 1st wk	2nd wk of June to 2nd wk of July	-	June 2nd wk to July 2nd wk	2nd wk of June to 2nd wk of July
	Kharif-Irrigated	-	4th wk of May to 1st wk of June	-	-	-
	Rabi-Irrigated	-	-	November 2nd wk to November 4th wk	-	-

1.13	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought	-	√	-
	Flood	-	√	-
	Cyclone	-	√	-
	Hail storm	-	-	√
	Heat wave	-	√	-
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water intrusion (Rajula & Jafrabad)	√	-	-
	Pests and disease outbreak (specify) Pests-Aphid, Jasid, Thrips, White fly&Fruit fly Diseases-Powdery Mildew,Rust,Leaf spot,Tikka & Downy Mildew	√	-	-
	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: Yes

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 4th wk)	Medium & shallow Black to Mixed Red & Black soils	Groundnut (Spreading & Semi spreading)	No change	Follow normal package of practices	-
		Bajra,	-do-	-do-	
		Sesame	-do-	-do-	
	Coastal Alluvial & saline soils	Groundnut	-do-	-do-	-
		Bajra	-do-	-do-	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks (July 2nd wk)	Medium & shallow Black to Mixed Red & Black soils	Groundnut (Spreading & Semi spreading)	Bunch variety (GG-2/GG-5/ GG-7)/ Semi spreading variety G-20 of groundnut	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively. Other practices will be as such.	Agencies for quality seed supply are National Seed Corporation(NSC), Gujarat State Seed Corporation(GSSC), University, Gujcomasol

		Bajra	Castor (GAU-CH-1, GCH-6)/ Pigeon pea (GT-100, BDN-2)/ Sorghum (GFS-4&5, Gundhari, S-1049)	(As per crop change, follow the package of practices.	
		Sesame	No change	Follow normal package of practices	
	Coastal Alluvial & saline soils	Groundnut (Spreading & Semi spreading)	Bunch variety (GG-2/GG-5/ GG-7)/ Semi spreading variety (G-20)of Groundnut	Keep 45 cm and 60 cm row spacing for bunch and semi spreading Groundnut, respectively. Other practices will be as such.	
		Bajra	Castor (GAU-CH-1, GCH-6)/ Pigeonpea(GT-100, BDN-2)/ Sorghum (GFS-4&5, Gundhari, S-1049)	As per crop change, follow the package of practices.	

Condition					
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 (July 4th wk)	Medium & shallow Black to Mixed Red & Black soils	Groundnut	Greengram (Guj. Mung-4, K-85)/ Sesame (Purva-1)/ Sorghum (GFS-4&5, Gundhari, S-1049)/ Castor (GAU-CH-1, GCH-)6 / Pigeon pea, (BDN-2)/ Cotton (G cot 13,15,21)	(As per crop change, follow the package of practices.)	Agencies for quality seed supply are National Seed Corporation(NSC), Gujarat State Seed Corporation(GSSC), University,Gujcomasol. Supply of quality seed

		Bajra,	-do-	(As per crop change, follow the package of practices.)	from NSC, GSSC, SAU, and zero till seed drill, seed dressing equipments, Spayers & dusters from government schemes(Implements like seed drill,seed dressing are available in Rajkot).
		Sesame	Sorghum (GFS-4&5, Gundhari, S-1049)/ Castor (GAU-CH-1, GCH-5)	(As per crop change, follow the package of practices.)	
	Coastal Alluvial & saline soils	Groundnut(Spreading & Semi spreading)	Greengram (Guj. Mung-4, K-85)/ Sesame (Purva-1)/ Sorghum (GFS-4&5,Gundhari, S-1049)/ Castor (GAU-CH-1, GCH-)6 / Pigeon pea (BDN-2)/ Cotton (G cot 13,15,21)	(As per crop change, follow the package of practices.)	

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 (Aug 2nd wk)	Medium & shallow Black to Mixed Red & Black soils	Groundnut	Sesame (Purva-1)/ Sorghum (GFS-4&5, Gundhari, S-1049)/ Castor (GAU-CH-1, GCH-5)	(As per crop change, follow the package of practices.)	Agencies for quality seed supply are National Seed Corporation(NSC), Gujarat State Seed Corporation(GSSC), University,Gujcomasol. Supply of quality seed from NSC, GSSC, SAU, and zero till seed drill, seed dressing equipments, Spayers & dusters from government schemes(Implements like seed drill,seed dressing are available in Rajkot).
		Bajra,	-do-	(As per crop change, follow the package of practices.)	
		Sesame	Sorghum (GFS-4&5, Gundhari, S-1049)/ Castor (GAU-CH-1, GCH-5)	(As per crop change, follow the package of practices.)	
	Coastal Alluvial & saline soils	Groundnut	Sesame (Purva-1)/ Sorghum (GFS-4&5, Gundhari, S-1049)/ Castor(GAU-CH-1, GCH-5)	(As per crop change, follow the package of practices.)	
		Bajra,	Sorghum (GFS-4&5, Gundhari,	(As per crop change,	

			S-1049)/ Castor (GAU-CH-1, GCH-5)	follow the package of practices.)	

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 & shallow Black to Mixed Red & Black soils	Groundnut	Gap filling	Inter tilling to fill soil cracks, mulching with wheat straw or shredded cotton stalk Mulching(Plastic film 25 micron, ~200 kg/ha.)	Supply of plastic film through govt. schemes. Cotton stock shredding machine which available in Jasdan Village of Rajkot district to be supplied by Govt.
		Bajra	Thinning to maintain 10 cm plant to plant spacing	Inter culturing to fill soil cracks, mulching with wheat straw or shredded cotton stalk	Supply of plastic film through govt. schemes. Cotton stock shredding machine which available in Jasdan Village of Rajkot district to be supplied by Govt.
		Sesame	Thinning to maintain plant to plant distance(5 cm)	Interculturing to fill soil cracks,mulching with wheat straw or shredded cotton stalk	-do-
	Coastal Alluvial & saline soils	Groundnut	Gap filling	Inter culturing to fill soil cracks, mulching with wheat straw or shredded cotton stalk	-do-
		Bajra	Thinning to maintain 10 cm plant to plant spacing	Inter tilling to fill soil cracks	-do-.

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 & shallow Black to Mixed Red & Black soils	Groundnut	Weeding Protection against sucking pests (To control Jassid spraying methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water) , life saving irrigation if possible	Mulching with wheat straw or crushed cotton stalk Mulching (Plastic film 25 micron, ~200 kg/ha.) Inter tilling	Supply of plastic film and pesticides through govt. schemes. Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	Weeding/ thinning to maintain 10 cm plant to plant spacing. Life saving irrigation if possible.	Inter tilling Spray 1 % N through urea after relief of drought.	Supply of urea through govt. schemes Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Sesame	Weeding/ thinning to maintain 5 cm plant to plant spacing. Life saving irrigation if possible.	Inter tilling Spray 1 % N through urea after relief of drought.	-do-
	Coastal Alluvial & saline soils	Groundnut	Weeding Protection against sucking pests (To control Jassid spray methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water) life saving irrigation if possible	Mulching with wheat straw or crushed cotton stalk Mulching (Plastic film 25 micron, ~200 kg/ha.) Inter tilling ,	Supply of plastic film and pesticides through govt. schemes. Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	Weeding/ thinning to maintain 10 cm plant to plant spacing. Life saving irrigation if possible.	Inter tilling. Spray 1 % N through urea after relief of drought.	Supply of urea through govt. schemes Ensure electric supply for life saving irrigation by Electricity Supply Board of State

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 & shallow Black to Mixed Red & Black soils	Groundnut	Supplemental irrigation if possible followed by weeding.	-	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	1. Supplemental irrigation if possible. 2. Harvest non flowering plants for fodder purpose if water is not available	Inter tilling, Top dressing N through urea after relief of drought	Ensure electric supply for life saving irrigation by Electricity Supply Board of State. Supply of urea through govt. schemes
		Sesame	Supplemental irrigation if possible.	-	-do-
	Coastal Alluvial & saline soils	Groundnut	Supplemental irrigation if possible followed by weeding.	-	-do-
		Bajra	Supplemental irrigation if possible. Harvest non flowering plants for fodder purpose if water is not available	Inter tilling, Top dressing N through urea after relief of drought	-do-

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Medium & shallow Black to Mixed Red & Black soils	Groundnut	Life saving irrigation if possible.	-	Ensure electric supply for life saving irrigation by Electricity Supply

					Board of State
		Bajra	Supplemental irrigation if possible. Harvest non flowering plants for fodder purpose if water is not available.	-	-do-
		Sesame	Supplemental irrigation if possible.	-	-do-
	Coastal Alluvial & saline soils	Groundnut	Life saving irrigation if possible.	-	-do-
		Bajra	1. Supplemental irrigation if possible. 2. Harvest non flowering plants for fodder purpose if water is not available.	-	-do-

2.1.2 Drought - Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed/ limited release of water in canals due to low rainfall	NA				

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

Condition			Suggested Contingency measures		
	Major Farming situation	**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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Medium & shallow Black to Mixed Red & Black soils	Wheat	Wheat	Supply irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
			Gram ICCC 4, Guj 1 &2 / Cumin Guj 1,2,3 & 4/ Coriander Guj 1 & 2/ Fenugreek Guj 1, Leafy vegetables / carrot.	Adoption of Sprinkler irrigation system. Reduce area of irrigation.	Construction of Well recharge structures, Timely supply of MIS and seeds through govt. schemes.
		Cotton	Cotton	Supply irrigation	Ensure electric supply

				during night time to reduce transpiration.	for life saving irrigation by Electricity Supply Board of State.
			Gram ICCC 4, Guj 1 &2 / Cumin Guj 1,2,3 & 4/ Coriander Guj 1 & 2/ Fenugreek Guj 1, Leafy vegetables / carrot	Adoption of drip irrigation system. Mulching of 50 μ, ~370 kg/ha. Reduce area of irrigation.	Supply of MIS and plastic film through govt. schemes.
	Coastal Alluvial & saline soils	Wheat	Wheat	Supply irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by Electricity Supply Board of State.
			Gram (ICCC 4, Guj 1 &2) / Cumin (Guj 1,2,3 & 4)/ Coriander (Guj 1 & 2)/ Fenugreek (Guj 1)/ Leafy vegetables, / Carrot	Adoption of Sprinkler irrigation system, deficit irrigation, Reduce area of irrigation.	Construction of well recharge structures, Timely supply of MIS and seeds through govt. schemes.
Any other condition (specify)	-	-	-	-	-

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**
Wheat	-	-	Surface drainage to avoid lodging of crop. Spray Mancozeb 0.2% to control black point in grain	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc, Preparation of quick drying techniques to separate good lot and bad lot.
Cotton	Surface drainage to avoid water logging Apply Amonium Sulphate	Surface drainage to avoid water logging Apply Amonium Sulphate	Surface drainage (management of water logging) harvesting of mature bolls	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc,
Groundnut	-	-	Quick surface drainage , Ditch channel around field	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc, Preparation of quick drying techniques to separate good lot and bad lot.
Bajra	-	-	Harvest mature ear heads	-do-
Green gram	-	-	Quick drainage , Harvest mature pods	-do-
Horticulture				
Mango	-	Spray 0.2% wet. sulphur or 0.005% Hexaconazole for control of PM	-	Unripe fruit may be used for pickles.

Heavy rainfall with high speed winds in a short span				
Wheat	Surface drainage (to control water logging condition)	Surface drainage (to control water logging condition)	Surface drainage (for management of water logging, lodging crop and black point in grain, Spray Mancozeb 0.2%	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc, Preparation of quick drying techniques to separate good lot and bad lot.
Cotton	Surface drainage (for management of water logging, Apply Amonium Sulphate	Surface drainage (for management of water logging, Apply Amonium Sulphate	Surface drainage (for management of water logging) harvesting mature bolls	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc
Groundnut	-	-	Quick surface drainage , Ditch channel around field	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc, Preparation of quick drying techniques to separate good lot and bad lot.
Bajra	-	-	Harvest mature ear heads, Quick surface drainage	-do-
Green gram	-	-	Quick surface drainage , Harvest mature plants.	-do-
Horticulture				
Mango	-	Spray 0.2% wettable sulphur or 0.005% Hexaconazole for protection against PM	Collect fallen fruits	Unripe fruit may be used for pickles.
Outbreak of pests and diseases due to unseasonal rains				
Wheat	Spray Mancozeb 0.2% (To control leaf Blight & rust)	Spray Mancozeb 0.2% (To control leaf Blight & rust)	For black point in grain, Spray Mancozeb 0.2%	-
Cotton	-	Control cotton angular	Control cotton angular leaf	-

		leaf spot by spray of Copper Oxy chloride 0.2 % & streptocycline 100 ppm	spot by spray of Copper Oxy chloride 0.2 % & streptocycline 100 ppm	
Groundnut	Spray 0.005% Hexaconazole for rust & tikka	Spray 0.005% Hexaconazole for rust & tikka	Spray 0.005% Hexaconazole for rust & tikka	-
Greengram	-	-	-	-
Horticulture				
Mango	-	-	Hang methyle euginol trap, one /acre	-

2.3 Floods

Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Groundnut	-	As a preventive step open drainage channel.	As a preventive step open drainage channel.	-
Cotton	-	-do-	-do-	-
Bajra	-	-do-	-do-	-
Greengram	-	-do-	-do-	-
Horticulture	-	-	-	-
Mango	Proper surface drainage	Surface drainage	Surface drainage	-
Continuous submergence for more than 2 days				

Groundnut	As a preventive step open drainage channel followed by spray 0.05 % carbendazim for control of leaf spot.	As a preventive step open drainage channel followed by spray 1 % $FeSO_4$ + 0.1 % citric acid for control yellowing, 0.0025% hexaconazole for rust & leaf spot management.	As a preventive steps open drainage channel followed by spray 1 % $FeSO_4$ + 0.1 % citric acid for control yellowing.	-
Cotton	As a preventive step open drainage channel and apply amonium sulphate.	As a preventive step open drainage channel and apply amonium sulphate.	As a preventive step open drainage channel. Harvesting mature bolls.	-
Bajra	As a preventive step open drainage channel and spray mancozeb 0.2% (To control downy mildew)	As a preventive step open drainage channel and spray mancozeb 0.2% (To control downy mildew.)	As a preventive step open drainage channel and spray mancozeb 0.2% (To control rusts).	Harvest Mature ear heads.
Green gram	As a preventive step open drainage channel and spray 0.05 % carbendazim for powdery mildew.	As a preventive step open drainage channel and spray 0.005% hexaconazole or 0.025 % carbendazim for leaf spot & powdery mildew.	As a preventive step open drainage channel and spray 0.005% hexaconazole or 0.025 % carbendazim for powdery mildew.	Picking of Mature pods.
Horticulture				
Mango	Shift to safe place & proper Surface drainage	Surface drainage	Surface drainage	Surface drainage
Sea water intrusion	NA			

Notes: Sea water intrusion is a phenomenon of entry of sea water in coastal aquifers due to over exploitation of groundwater through pumps. Wells are major source for irrigation in Saurashtra region, flood may not increase the problem on the contrary flood creates the groundwater recharge which reduces the sea water intrusion. Therefore, it is mentioned that it is not applicable (NA). Therefore, it is included in the draught situation**.**

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	Light & frequent irrigation to all crops	Light & frequent irrigation to all crops	Light & frequent irrigation to all crops	-
Cold wave	NA			
Frost	NA			
Hailstorm	NA			
Cyclone	NA			
Wheat	Quick drainage	Quick drainage	Quick drainage	Shift produce at safer place
Cotton	Earthing up , Quick drainage	Earthing up, Quick drainage	Earthing up, Quick drainage	
Groundnut	Quick drainage	Quick drainage	Quick drainage	
Horticulture				
Mango	Shift to safe place if possible & Build Cyclone proof nursery houses, Grow wind bearer trees around nursery	Reduce canopy & tying plants diagonally if possible, Grow wind bearer trees around field	Reduce canopy & tying plants diagonally if possible	Early harvesting of crop

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	Store fodder (silage and hay). Conventional feeds are used for feeding (Roughages & concentrates) of maize, sorghum, groundnut fodder & wheat straw).	Stored feed & fodder in silage & Hay. Treated wheat straw with 4 % urea solution. Use chaff cutter for fodder. Use press for making compact bundles of fodder for easy transportation.	Feed little green fodder along with unconventional feed, 5 kg green feed/mature animal.

		Establish feed block preparation facilities for animals. Arrange bulk transportation of fodder.	
Drinking water	Rain water harvesting and create water bodies/watering points. When water is scarce use only for drinking water for animals.	Avoid wallowing. Judicious use of drinking water. Establish and arrange the community based drinking water facilities. In coastal area community based R.O. Plant to be established for drinking water. Add bleaching powder to drinking water (1%).	Give sufficient water as per the animal requirement..
Health and disease management	Foot & Mouth disease vaccination in June, Vaccination for Bacterial diseases e.g. , HS,BQ Dehorning of the animals (cattle & buffaloes). Add mineral mixtures 25 g/animal/day along with feed. Animals to be covered cover under insurance schemes. Vaccination for bacterial diseases e.g. , HS,BQ	Add mineral mixtures 25 g/Animal/day along with feed, dehorning of the animals. Arrange mobile dispensary for animal heath in the region. Establish link with Agricultural/Veterinary University for animal health. Involve vet. Science students for health management of animal. Carry out decease diagnosis camps.	Add vitamin mineral mixtures 25 g/Animal/day along with feed, quarantine diseased animals and dehorning of the animals.
Floods			
Feed and fodder availability	Harvest available fodder and store it at safe place if floods forecast. Shift animals to safe place. Identify rescue places for safety of animals.	Give stored fodder with mineral mixture. Fodder should be stored at safe place. In severe rain and flood unteather animals.	Feed silage & hay material along with concentrate feed. Use chaff cutter for fodder. Use press for making compact bundles of fodder for easy transportation. Establish community based shelter houses for animals. Establish feed block preparation facilities for animals. Arrange bulk transportation of fodder.
Drinking water	Add bleaching powder (1%) to drinking	Add bleaching powder to drinking	Add bleaching powder to drinking water

	water when heavy rains occur and flood expected.	water (1%).	(1%).
Health and disease management	Provide insurance cover to the animals.	Vaccination of animals against HS, BQ Add mineral mixtures 25 g/Animal/day along with feed, dehorning of the animals. Arrange mobile dispensary for animal heath in the region. Establish link with Agricultural/Veterinary University for animal health. Involve vet. science students for health management of animal. Carry out decease diagnosis camps.	Disposal of dead animals by burning the carcass and sanitation measures to control spread of diseases. Health checking to diseases out break.
Cyclone			
Feed and fodder availability	Early harvesting & storage of fodder.	Shift animals to safe place; give stored fodder with mineral mixture along with concentrated feed. In severe rain and flood unteather animals.	Feed silage & hay material along with concentrated feed. Use chaff cutter for fodder. Use press for making compact bundles of fodder for easy transportation. Establish community based shelter houses for animals. Establish feed block preparation facilities for animals. Arrange bulk transportation of fodder.
Drinking water	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).
Health and disease management	Provide insurance cover to the animals.	Vaccination of animals to HS & BQ. Keep animal free. Add mineral mixtures 25 g/Animal/day along with feed, dehorning of the animals. Arrange mobile dispensary for animal heath in the region.	Disposal of dead animals by burning the carcass and sanitation measures to control spread of diseases. Health checking to diseases out break.

		Establish link with Agricultural/Veterinary University for animal health. Involve vet. science students for health management of animal. Carry out decease diagnosis camps.	
Heat wave and cold wave	NA	NA	NA
Heat wave	NA	NA	NA

[s] *based on forewarning wherever available*

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event[a]	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	Stored feed, conventional feed, Antibiotics and probiotics	Stored feed, conventional feed, Antibiotics and probiotics	Use conventional feed, vaccination for viral diseases –Marek's and Ranikhet diseases (MD & RD).	Linkage Govt. schemes with public/NGOs at grass root levels.
Drinking water	Rain water harvesting	Give water for drinking only	Give sufficient water as per the bird's requirement	Linkage Govt. schemes with public/NGOs at grass root levels
Health and disease management	Vaccination for viral diseases –against MD & RD, cover birds under insurance.	Provide ventilation. Add more calcium with feed. Assure supply of electric power.	Routine practices are to be followed.. Culling affected birds disposal by burning.	Vaccination for viral diseases –against MD & RD
Floods				

Shortage of feed ingredients	Use conventional feed, ingredients.	Use stored feed, Antibiotics Pro biotics, and Assure supply of electric power.	Routine practices are to be followed.	Linkage Govt. schemes with public/NGOs at grass root levels.
Drinking water	-	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).	Linkage Govt. schemes with public/NGOs at grass root levels
Health and disease management	Cover birds under insurance.	For suspected cases give antibiotic in the feed, prevent water logging surrounding sheds , Assure supply of electric power.	Dispose dead birds by burning.	Vaccination for viral diseases –against MD & RD
Cyclone				
Shortage of feed ingredients	Use stored feed ingredients.	Use stored feed & Use conventional feed, Antibiotics Pro biotic.	Routine practices are to be followed.	Use stored feed ingredients
Drinking water	-	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).	-
Health and disease management	Cover birds under insurance.	For suspected cases give antibiotics.	Dispose dead birds by burning.	-
Heat wave and cold wave				
Heat wave				
Shelter/environment management	Arrangement of good	Operate fans ,	Routine practices are to be	

	ventilation by fitting fan and foggers	foggers, keep open ventilators in night and cool period.	followed.	
Health and disease management	Cover birds under insurance.	Viral vaccination add calcium in the poultry feed.	Routine practices are to be followed.	-
cold wave				
Shelter/environment management	N.A.	N.A.	N.A.	-
Health and disease management	N.A.	N.A.	N.A.	-

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

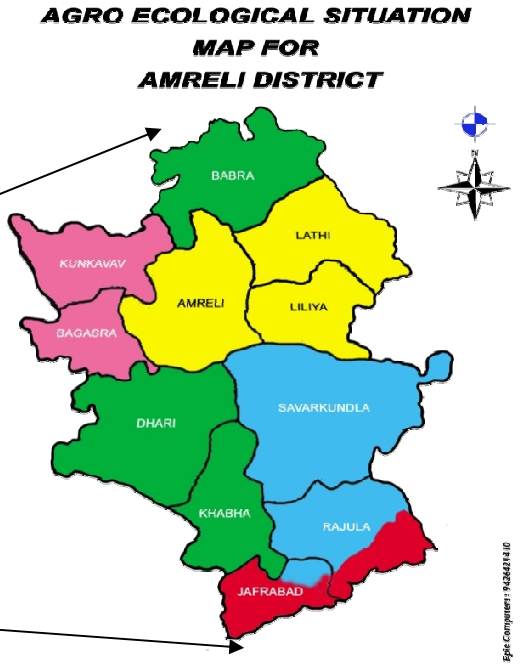
	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	NA
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Desilting/deepening of pond so that more water can be stored	Provision of additional bore wells use Euryhaline species	Maintaining pond water level at least 1 m depth.

(ii) Impact of salt load build up in ponds / change in water quality	Replenishment of water in pond with fresh water	30 % exchange of water	10 % exchange of water
(iii) Any other	-	-	-
2) Floods			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	NA
B. Aquaculture			
(i) Inundation with flood water	Deepening of ponds, Repair, strengthening of dykes	Enhancement of dykes height by sand bags	-
(ii) Water contamination and changes in water quality	Use of calcium hydroxide @ 150 kg/ha	Infected fishes to be treated with $KMno_4$ 1 % as prophylactics	Lime treatment for oxidation
(iii) Health and diseases	Antibiotics fortified feeding as prophylactics	Disinfectants formalin treatments as prophylactics	-do-
(iv) Loss of stock and inputs (feed, chemicals etc)	Stock cover under insurance	-	
(v) Infrastructure damage (pumps, aerators, huts etc)	-	-	Repaire & maintenance of aqua structures to be given
(vi) Any other	-	-	-
3. Cyclone / Tsunami	-	-	-
A. Capture	-	-	-
Marine			
(i) Average compensation paid due to loss of fishermen lives	For warning systems to be installed. Insurance & communication instruments supplied to fisher man , Warning systems to be installed	Warning systems to be installed	Compensations to be paid for repair & maintenance of boats & gears on actual survey basis

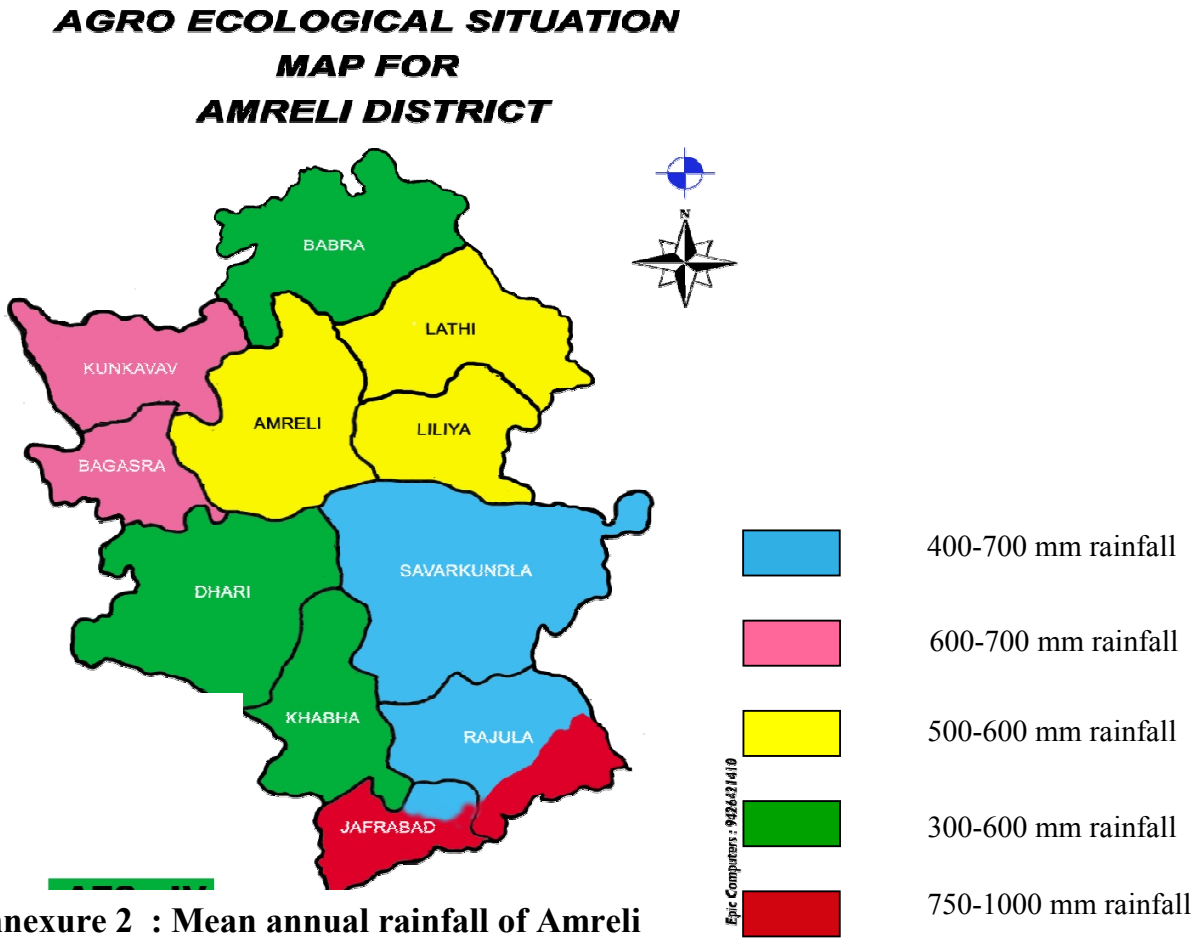
(ii) Avg. no. of boats / nets/damaged			Compensation on assessment of actual losses & damage of boats & nets to be given
(iii) Avg. no. of houses damaged	-	-	Compensation on assessment of actual losses & damage of houses to be given
Inland	NA	NA	NA
B. Aquaculture			
(i) Overflow / flooding of ponds	Strengthing of dykes	Enhancement of dykes height by sand bags	-
(ii) Changes in water quality (fresh water / brackish water ratio)	Maintain salinity by addition of fresh water up to 20-25 ppt.	Use euryhaline species	use Euryhaline species for culture
(iii) Health and diseases	Liming and formalin treatment	Disinfectants treatments	-
(iv) Loss of stock and inputs (feed, chemicals etc)	Stock cover under insurance	-	-
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	-	-	Compensation on assessment of actual losses & damage of pumps, aerators, shelters/huts to be given
(vi) Any other	-	-	-

4. Heat wave and cold wave			
Heat wave			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	NA
B. Aquaculture			

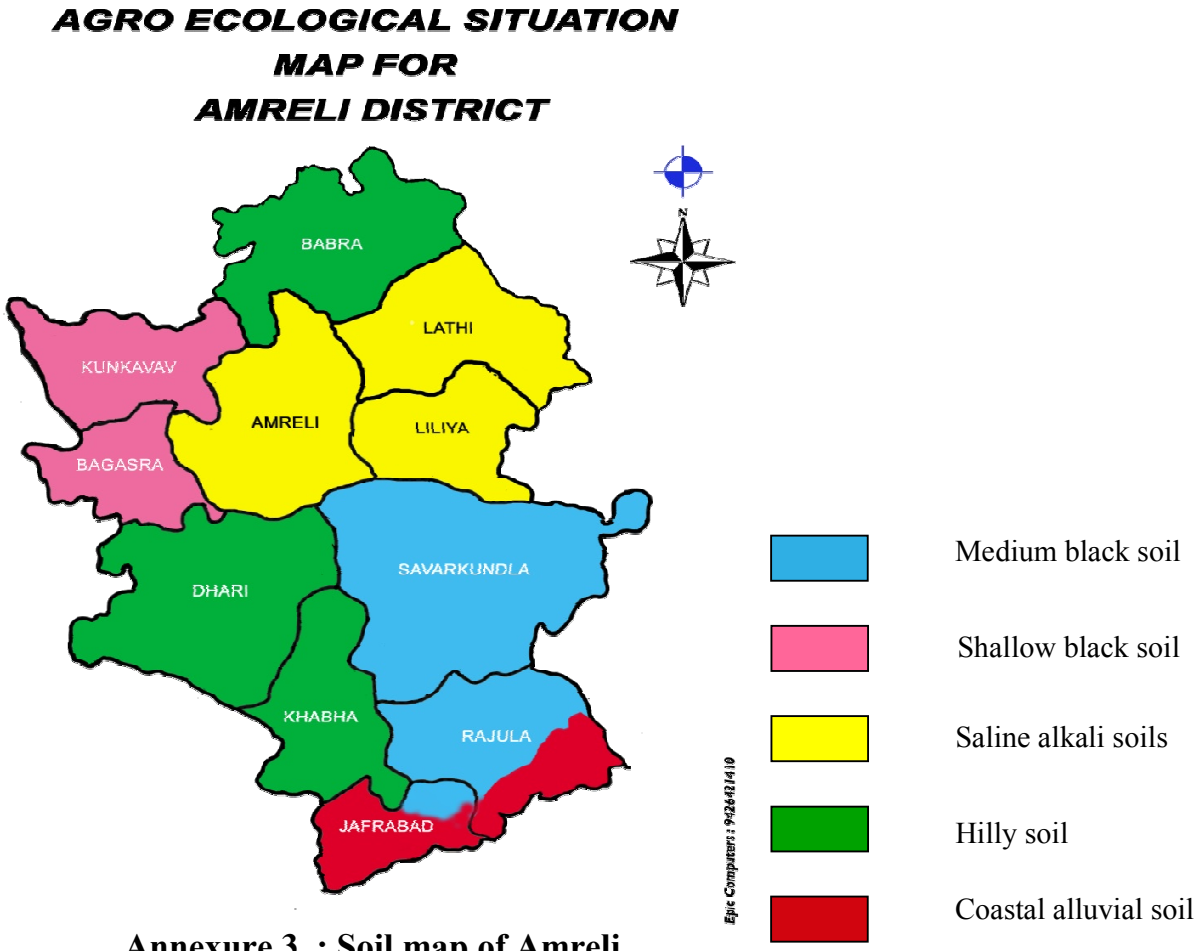
(i) Changes in pond environment (water quality)	Plantation of leafy trees on dyke , increase depth	To maintain Water level in pond , Use of fountain and peddle wheel aerator	Prophylactic measures
(ii) Health and Disease management	-	Bleaching powder 1 to 2 % , formalin treatment to prevent disease	$KMnO_4$ 2 % to maintain oxygen level
(iii) Any other	-	-	-
cold wave			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	NA
B. Aquaculture			
(i) Changes in pond environment (water quality)	-	To maintain Water level in pond ,	Prophylactic measures
(ii) Health and Disease management	-	Bleaching powder 1 to 2 % , formalin treatment to prevent disease	$KMnO_4$ 2 % to maintain oxygen level
(iii) Any other	-	-	-



Annexure-1. The map of the Amreli district with Gujarat state



Annexure 2 : Mean annual rainfall of Amreli



Annexure 3 : Soil map of Amreli