State: KARNATAKA

Agriculture Contingency Plan for District: KOPPAL

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	North Sahyadris and Western Karnataka Plateau , hot dry sub humid (3.0)			
	Agro-Climatic Region (Planning Commission)	Southern Plateau and Hills Region (X)			
	Agro Climatic Zone (NARP)	Northern Dry zone (KA-3)			
	List all the districts or part thereof falling under the NARP Zone	Entire District: Bijapur, Bagalkot, Gadag, Bellary, Koppal Part of District: Belgaum, Dharwad, Raichur, Davanagere			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		15º-21'N to 15º -45'N	76º-10' E to 76º-32' E	582.0 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Associate Director of Research Regional Agricultural Research Station, P. B.No. 18 BIJAPUR - 586 101			
	Mention the KVK located in the district	Krishi Vigyan Kendra, P.O.Gangavathi , Koppal (Dist)			
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):	372		2 nd week of June	4 th week of September
	NE Monsoon(Oct-Dec):	127		2 nd week of October	4 th week of November
	Winter (Jan- March)	--		-	-
	Summer (Apr-May)	73		-	-
	Annual	572	36	-	-

1.3	**Land use pattern of the district** (latest statistics)	Geographical 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 (‘000ha)	552.5	29.5	38.9	14.7	2.6	0.2	16.6	68.4	0.0

1. 4	**Major Soils (common names like shallow red soils etc.,)**	**Area (‘000 ha)**	**Percent (%) of total**
	Red soils	253.0	66
	.Medium deep black soils	131.5	34
	Others (specify):		
1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	349.2	124.20
	Area sown more than once	84.5	
	Gross cropped area	433.7	

1.6	**Irrigation**	Area (‘000 ha)	Percent (%)	
	Net irrigated area	77.0	26.7	
	Gross irrigated area	141.7		
	Rainfed area	272.2	73.3	
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		30.0	29.8
	Tanks	-	0.5	0.5
	Open wells	-	--	0
	Bore wells	-	65.0	64.6
	Lift irrigation	-	1.3	1.1
	Micro-irrigation		1.3	1.0
	Other sources			
	Total Irrigated Area		122.9	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	
	Over exploited	-		
	Critical	-		
	Semi- critical	-		
	Safe	-		
	Wastewater availability and use	-		
	Ground water quality	-		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

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

1.7		Major Field Crops cultivated	Area ('000 ha)					
			Kharif		Rabi		Summer	Total
			Irrigated	Rainfed	Irrigated	Rainfed		
	1	Sunflower	13.8	25.0	2.0	47.1	7.9	75.8
	2	Paddy	35.8	0.2	-	-	35.0	71.0
	3	Sorghum	4.0	11.0	-	50.0	1.5	66.5
	4	Bajra	1.0	58.0	-	-	-	59.0
	5	Groundnut	5.0	24	-	-	21.0	50.0
	6	Maize	10.0	12	4	1.6	2.0	29.6
	7	Bengalgram	-	-	-	20.0	0.8	20.8
	8	Cotton	1.45	0.35	-	16.8	-	18.6
	9	Sugarcane	0.9	-	-	-	0.4	1.3
		Horticulture crops - Fruits	**Total area**					
	1	Pomegranate	6.0					
	2	Mango	2.6					
	3	Banana	1.4					
	4	Sapota	0.8					
	5	Papaya	0.6					
	6	Total	11.3					
		Horticultural crops - Vegetables	**Total area**					
	1	Green Chillies	0.8					
	2	Brinjal	0.7					
	3	Okra	0.5					
		Medicinal and Aromatic crops	**Total area**					
	1	Periwinkle	0.02					
	2	Dry chilli	0.20					
	3	Coriander	0.02					

		Plantation crops	Total area
	1	Coconut	1.3
	2	Oil Palm	0.5
	3	Tamarind	0.2

1.8	Livestock	Male (number)	Female (number)	Total (number)
1	Non descriptive Cattle (local low yielding)	108.3	120.1	228.5
2	Crossbred cattle	2.5	14.1	16.6
3	Non descriptive Buffaloes (local low yielding)	11.0	97.7	108.8
4	Graded Buffaloes			
5	Goat			199.4
6	Sheep			474.9
7	Others (Pig+Dog+Rabbit)			6.67
8	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
1	Commercial		2097.69	
2	Backyard			

1.10	**Fisheries** (Data source: Chief Planning Officer)				
	A. Capture				
	i) Marine (Data Source:	**No. of fishermen**	**Boats**	**Nets**	**Storage**

	Fisheries Department)		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	**facilities (Ice plants etc.)**
		Nil	Nil	Nil	Nil	Nil	Nil
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		700		5		33	
	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)	1000		2.40		2400	
	Others						

1.11 Production and Productivity of major crops (Average of last 3 years: 2007, 08, 09)

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)										
1	Paddy	212.1	3012	--	---	136.4	3883	348.5	3447	-
2	Maize	66.3	2643	13.33	3658	4.70	3067	84.4	3123	-
3	Sorghum	14.3	1310	37.25	767	2.62	1983	54.2	1353	-
4	Bajra	44.8	1280	---	---	----	---	44.8	1280	-
5	Groundnut	13.3	975	----	---	32.29	1500	90.3	1238	-
6	Sunflower	33.4	1044	22.93	780	7.32	1217	63.7	1014	-
Major Horticultural crops (Crops to be identified based on total acreage)										
1	Pomegranate	-	-	-	-	-	-	47.9	15326	-
2	Mango	-	-	-	-	-	-	28.0	12380	-
3	Banana	-	-	-	-	-	-	39.2	31366	-
4	Coconut	-	-	-	-	-	-	14780	146	-
5	Sapota	-	-	-	-	-	-	8.7	14112	-

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	**Sunflower**	**Paddy**	**Sorghum**	**Bajra**	**Groundnut**	**Bengalgram**
	Kharif- Rainfed	1 st week of June to 4 th week of August	----	1 st week of May to 4 th week of June	1 st week of June to 4 th week of July	1 st week of June to 4 th week of July	-
	Kharif-Irrigated		1 st week of June to 4 th week of July	---	-	1 st week of June to 4 th week of July	-
	Rabi- Rainfed	-	----	3 rd week of September- 3 rd week of October	-	-	3 rd week of September- 3 rd week of October
	Rabi-Irrigated	1 st week to 4 th week of October -	----	-----	-	-	-

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	-	-	√
	Pests and diseases (specify)	-	√	-
	Sea water intrusion	-	-	√
	Others	-	-	√

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

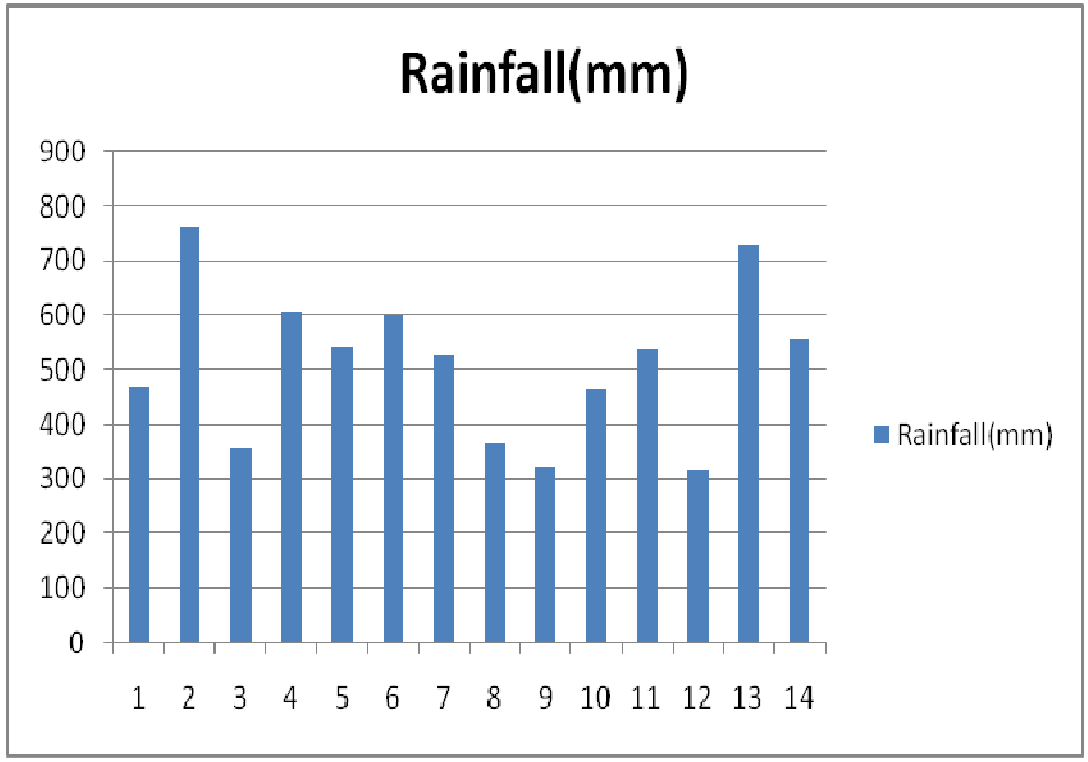
Annexure-1

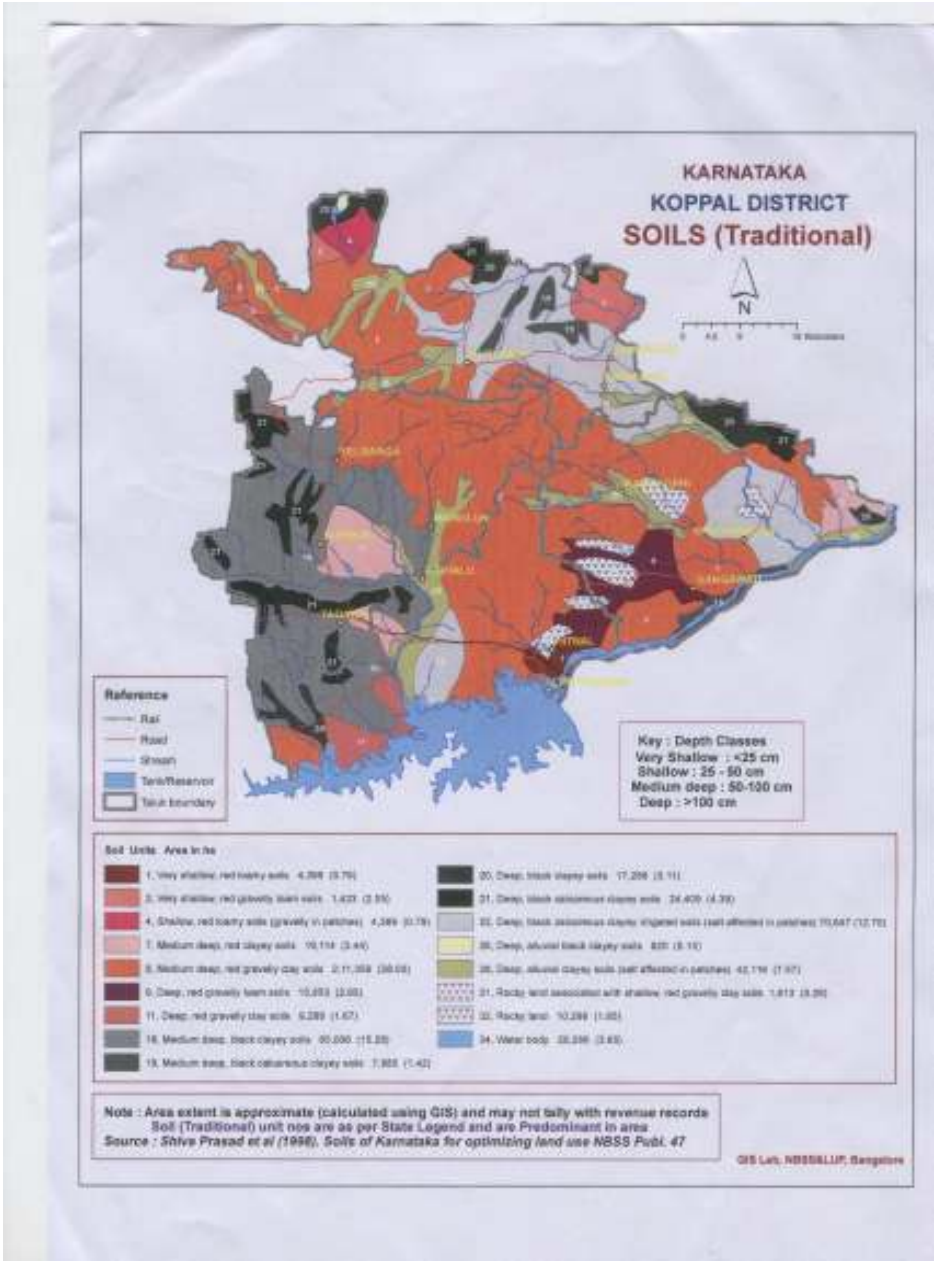
Location map of Koppal in Karnataka


CHITRADURGA
ಚಿಕ್ಕಮಗಳೂರು
CHIKAMAGALUR
ಉಡುಪಿ
UDUPI
ತುಮಕೂರು
TUMKUR
ಚಿಕ್ಕಬಳ್ಳಾಪುರ
CHIKKABALLAPURA
ಕೋಲಾರ
KOLAR
ಹಾಸನ
HASSAN
ದಕ್ಷಿಣ ಕನ್ನಡ
SOUTH KANARA
ಮಂಡ್ಯ
MANDYA
ರಾಮನಗರ
RAMANAGARA
ಕೊಡಗು
KODAGU
ಮೈಸೂರು
MYSORE
ಚಾಮರಾಜನಗರ
CHAMARAJANAGAR

Annexure-2

Average rainfall Map of Koppal district




KARNATAKA
KOPPAL DISTRICT
SOILS (Traditional)
N
Reference
Rail
Road
Stream
Tank/Reservoir
Taluk boundary
Key : Depth Classes
Very Shallow : <25 cm
Shallow : 25 - 50 cm
Medium deep : 50-100 cm
Deep : >100 cm
Soil Units Area in ha
Note : Area extent is approximate (calculated using GIS) and may not tally with revenue records
Soil (Traditional) unit nos are as per State Legend and are Predominant in area
Source : Shiva Prasad et al (1998). Soils of Karnataka for optimizing land use NBSS Publ. 47
GIS Lab, NBSS&LUP, Bangalore

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition				Suggested Contingency measures			
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**		**Change in crop/cropping system**		**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 3rd week)	Rainfed Kharif Shallow black/Red sandy soils	Bajra		No change		No change	
		Sorghum					
		Groundnut					
		Sunflower					
		Maize					
		Red gram					
		Sesamum					
		Bajra+ Red gram (2:1) : Recommended varieties					
		Groundnut + Red gram (3:1or 4:2): Recommended var Sorghum+ Groundnut					
	Rainfed post-monsoon. Deep black soils	Rabi sorghum				Keep the land fallow in kharif by treating with compartment bunds & furrows for insitu moisture conservation	
		Safflower					
		Cotton					
		Sunflower					
		Rabi- sorghum + Bengal gram: (2:1)					
		Bengal gram + Safflower: (4:2)					
	Rainfed cropping kharif and Rabi.	***Kharif***	***Rabi***	***Kharif***	***Rabi***		
		Red gram	----	No change	No change		

	Medium deep to deep black/sandy clay soils	Green gram	Rabi-sorghum			
		Castor			Bengal gram+ Safflower	
		Groundnut	Sunflower		No change	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
Early season drought (delayed onset)			**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks (Specify month) July 1 week	Rainfed Kharif Shallow black/Red sandy soils	Bajra	No change	Seed hardening, wider row spacing	-
		Sorghum		Seed hardening	
		Groundnut			
		Sunflower			
		Maize			
		Red gram	Use 20% higher seed rate	Take up transplanting	
		Sesamum	No change		
		Bajra+ Red gram (2:1)	No change	Seed hardening, wider row spacing &20% higher seed rate in Red gram	
		Groundnut + Red gram (3:1or 4:2): Sorghum+ Groundnut	Setaria		
			Sesamum		
			Castor		
	Rainfed post-monsoon. Deep black soils	Rabi sorghum	No change	Keep the land fallow in kharif by treating with compartment bunds & furrows for insitu moisture conservation	
		Safflower			
		Cotton			
		Sunflower			
		Rabi- sorghum+ Bengal gram (2:1)			

		Bengal gram+ Safflower: (4:2)					
	Rainfed cropping Kharif and Rabi Medium deep black/sandy clay soils	**Kharif**	**Rabi**	**Kharif**	**Rabi**	No change	
		Red gram	----	No change	---		
		Green gram	Rabi-sorghum	Fallow	Rabi Sorghum		
		Castor		No change			
		Groundnut	Sunflower	Fallow	Sunflower		
		Sunflower	Fallow	No change	Fallow		

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 July 3rd week	Rainfed Kharif Shallow black/Red sandy soils	Hybrid Bajra with recommended varieties	No change	Seed hardening and wider row spacing	-
		Sorghum	Red gram		
		Groundnut	Spreading varieties like S-230, DSG-1		
		Sunflower	No change		
		Maize	Setaria		
			Horsegram		
			Sesamum		
		Red gram	Grow short duration varieties like Pragathi	Use 20% higher seed rate, wider row spacing	
		Bajra+ Red gram (2:1)	No change	Wider row spacing	
		Groundnut + Red gram (3:1or 4:2)		-	
	Rainfed area cropping in post monsoon season	Rabi sorghum	Follow *in situ* moisture conservation practices like opening of compartment bunds, tied ridges and furrows to conserve rainwater for regular sowing of rabi crops		
		Safflower	---do---		
		Cotton			

		Sunflower				
		Rabi- sorghum + Bengal gram : (2:1)				
		Bengal gram + Safflower (4:2)				
	Rainfed cropping Kharif and Rabi Medium deep black/sandy clay soils	***Kharif***	***Rabi***	***Kharif***	***Rabi***	
		Red gram	----	No change	---	
		Green gram	Rabi-sorghum	Fallow	Rabi-sorghum	
		Fallow	Safflower	No change	No change	
		Groundnut	Sunflower	Fallow	sunflower	
			Safflower		No change	
			Rabi-sorghum+ Bengal gram (2:1)			
			Bengal gram+ Safflower			

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 August 1st week	Rainfed Kharif Shallow black/Red sandy soils	Bajra	Horsegram/setaria/sunflower		-
		Sorghum			
		Groundnut			
		Sunflower	No change	Wider row spacing	
		Maize	Horsegram/setaria/sunflower		
		Red gram	Grow long duration varieties (Asha)		
		Bajra+ Red gram (2:1)	Sunflower		
		Groundnut + Red gram (3:1or 4:2):			
				Keep the land fallow in kharif by treating with compartment	
	Rainfed area cropping in post monsoon	Rabi sorghum	No change		
		Safflower			
		Cotton			

	season	Horsegram				bunds & furrows for insitu moisture conservation	
		Sunflower					
		Rabi- sorghum+ Bengal gram : (2:1)					
		Bengal gram+ Safflower: (4:2)					
	Rainfed cropping Kharif and Rabi Medium deep black/sandy clay soils	***Kharif***	***Rabi***	***Kharif***	***Rabi***		
		Red gram	--	Fallow	Sorghum+ Bengal gram		
		Green gram	Rabi-sorghum		Sorghum		
		Green gram	Safflower		Safflower		
		Groundnut	Sunflower		Sunflower		

Condition				**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**		**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Rainfed Kharif Shallow black/Red sandy soils	Hybrid Bajra		Thinning and inter cultivation Gap filling Resowing the crop within 15 days when population is 30%.	Opening conservation furrows at 15-20m apart	
		Sorghum		---do---	---do---	
		Groundnut				
		Sunflower				
		Maize				
		Red gram				
	Rainfed area cropping in post monsoon season	Rabi sorghum			Compartment bunding	
		Safflower				
		Cotton				
		Horsegram				
		Sunflower				
		Rabi- sorghum+ Bengal gram (2:1)				
		Bengal gram + Safflower: (4:2)				
	Rainfed cropping Kharif and Rabi Medium deep black/sandy clay soils	***Kharif***	***Rabi***			
		Red gram	----			
		Green gram	Rabi-sorghum			
		Black gram	Safflower		Opening furrows to conserve water	
		Groundnut	Sunflower			

Condition	Major Farming situation	Normal Crop/cropping system		Suggested Contingency measures		
				Crop management	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) **At vegetative stage**	Rainfed Kharif Shallow black/Red sandy soils	Bajra		Repeated inter cultivation and weeding, removal of weaklings between 30-45 DAS	Opening of conservation furrows at 15-20m apart	
		Sorghum			---do---	
		Groundnut		Repeated inter cultivation up to 45 days or peg formation ,weeding, and mulching in spreading groundnut		
		Sunflower		Repeated inter cultivation and weeding		
		Maize				
		Red gram				
	Rainfed area cropping in post monsoon season	Rabi sorghum		Repeated inter cultivation and weeding, Removal of weaklings between 30-45 DAS	Compartment bunding	
		Safflower		Repeated inter cultivation and weeding		
		Cotton				
		Horsegram				
		Sunflower				
		Rabi- sorghum+ Bengal gram (2:1)				
		Bengal gram + Safflower (4:2)				
	Rainfed cropping Kharif and Rabi Medium deep black/sandy clay soils	***Kharif***	***Rabi***			
		Red gram	----	Repeated inter cultivation and weeding	Opening furrows to conserve water	
		Green gram	Rabi-sorghum			
		Black gram	Safflower			
		Groundnut	Sunflower			

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 measues**	**Remarks on Implementation**
At Flowering/ fruiting stage	Rainfed kharif Shallow black/Red sandy soils	Hybrid Bajra	Repeated inter cultivation and weeding .Harvest the crop for fodder purpose and allow for ratooning in sole & intercropping	Opening conservation furrows at 15-20 m apart. Spray anti transpirants like 5% Kaoline . Provide supplemental irrigation.	
		Sorghum	Stripping of old & nonfunctional leaves. Repeated inter cultivation and weeding	---do---	
		Groundnut	Harvesting for fodder purpose	Foliar spraying of 2% urea soon after receipt of rains	
		Sunflower	Repeated inter cultivation and weeding	Opening conservation furrows at 15-20 m apart	
		Maize	Repeated inter cultivation and weeding. Harvesting for fodder purpose.	do	
		Red gram	Repeated inter cultivation and weeding	do	
	Rainfed area cropping in post monsoon season	Rabi sorghum	-	Compartment bunding	
		Safflower			

		Cotton				
		Horsegram				
		Sunflower				
		Rabi- sorghum+ Bengal gram (2:1)				
		Bengal gram + Safflower: (4:2)				
	Rainfed cropping *kharif* and Rabi Medium deep black/sandy clay soils	***Kharif***	***Rabi***			
		Red gram	----	Opening conservation furrows at 15-20 m apart	-	
		Green gram	Rabi-sorghum	Incorporate greengram in soil		
		Black gram	Safflower			
		Groundnut	Sunflower	Foliar spraying of 2% urea		
			Bengal gram + safflower	Harvest the crop		

Condition				Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Normal Crop/cropping system**		**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
	Rainfed *kharif* Shallow black/Red sandy soils	Hybrid Bajra		Harvest the crop at physiological maturity & go for early rabi crop. Harvest for fodder purpose in case of severe drought	Spraying of anti transpirants like 5% Kaoline & provide supplemental irrigation	
		Sorghum		--do---	---do---	
		Groundnut				
		Sunflower			supplemental irrigation	
		Maize				
		Red gram				
	Rainfed area cropping in post monsoon season	Rabi sorghum		-	Compartment bunding	
		Safflower				
		Cotton				
		Horsegram				
		Sunflower				
		Rabi- sorghum + Bengal gram (2:1)				
		Bengal gram + Safflower: (4:2)				
	3 Rainfed cropping Kharif and Rabi Medium deep black/sandy	***Kharif***	***Rabi***			
		Red gram	----	Harvest the crop at physiological maturity & go for early rabi crop. Harvest for fodder purpose in case of severe drought		

	clay soils	Green gram	Rabi-sorghum	---do----		
		Black gram	Safflower			
		Groundnut	Sunflower			

2.1.2 Irrigated situation

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 canals due to low rainfall	Canal irrigated black soil	**TBP area**			
		Hybrid Jowar-wheat-Hybrid bajra	No change		
		Hybrid bajra-cotton-groundnut			
		Groundnut-no-Hybrid Jowar			
		Paddy-no-Hybrid Jowar/Groundnut			
		TBP left bank canal			
		Paddy-paddy	Paddy-paddy with short duration varieties	For 35-40 days old seedlings use 4-5 seedlings/hill in the case of paddy Provide additional 20% nitrogen to compensate for reduced tillering	

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	Canal irrigated black soil	**TBP area**			
		Hybrid Jowar-Hybrid bajra			
		Hybrid bajra-cotton-groundnut			
		Groundnut-no-Hybridjowar			
		Paddy-no-HybridJowar/Groundnut,cotton		Irrigate the paddy maintaining saturation level moisture or adopt SRI method f cultivation	
		TBP left bank canal			
		Paddy-paddy	Grow light irrigated crops like sunflower		

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	-	-	-	-	-

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Kharif-irrigated Medium deep to deep black/sandy clay soils	Maize	Follow rain fed cropping system		
		Sorghum	-do-		
		Cotton			
		Groundnut+ Red gram (4:2)			
	Rabi-irrigated Medium deep to deep black/sandy clay soils	Green gram (rainfed)			
		Blackgram (rainfed)			
		Sunhemp green manuring			

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall		Not applicable			
Any other condition (specify)					

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations) and **Heavy rainfall with high speed winds in a short span**

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Maize	Drain out excess water Top dress the crop with N & K Inter cultivation & weeding Take up foliar spray with water soluble NPK Fertilisers Gap filling/ Resowing	Drain out excess water Earthing up	Drain out excess water. Harvest at physiological maturity & dry the cobs	Proper drying and storage
Sorghum	Drain out excess water Top dress the crop with N & K Inter cultivation & weeding Take up foliar spray with water soluble NPK Fertilisers Gap filling/ Resowing	Drain out excess water	Drain out excess water. Tying up of lodged plants	Proper drying and storage
Groundnut	Drain out excess water Take up foliar spray with water soluble NPK Fertilisers Gap filling/ Resowing	Drain out excess water	Drain out excess water and harvest	Proper drying and storage
Paddy	Apply additional 25% RFD NPK	Maintain optimum water level	Drain out excess water and harvest	Proper drying and storage
Sunflower	Drain out excess water Top dress the crop with N & K Inter cultivation & weeding Take up foliar spray with water soluble NPK Fertilisers Gap filling/ Resowing	Drain out excess water Earthing up	Drain out excess water. Harvesting and drying of earhead	Proper drying and storage

Horticulture				
Pomegranate	Provide Drainage	Provide Drainage	Harvest the crop at physiological maturity immediately	Shifting of produce to safer place
Mango	Provide Drainage	Do		
Banana	Provide Drainage Application of Urea for induction of vegetative growth			
Coconut	Provide Drainage			Shifting of produce to safer place
Sapota	Provide Drainage		Take up Harvest at physiological maturity stage	Produce sent for market
Outbreak of pests and diseases due to unseasonal rains	Appropriate plant protection measures are to be taken up as given in package of practices for the following pests snd diseases			
Maize	Leaf blight	---	Cob borer	
Sorghum	---	Rust	Grain mold	
Groundnut	Leaf minor			
Paddy	------	BPH and blast	Neck blast	
Sunflower	Hairy caterpillar and necrosis	Earhead borer	Earhead borer	
Horticulture				
Pomegranate	Control of pest and disease in an holistic approaches with proper PP chemicals	Go for need based plant protection measures Use of neem based chemicals	Quicker harvest	Use of clean and safer packing materials
Mango				
Banana				
Coconut	Need based plant protection measures	Need based plant protection measures	---------	
Sapota				

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Maize	Drain out excess water Take up gap filling/ Resowing Take up foliar spray with water soluble NPK Fertilisers	Drain out excess water Weeding and Topdressing With urea	Drain out excess water And earthing up	Drain out excess water and harvesting and drying
Sorghum	Drain out excess water Take up gap filling/ Resowing Take up foliar spray with water soluble NPK Fertilisers	Drain out excess water Weeding and Topdressing With urea	Drain out excess water	Drain out excess water Tying of lodged plants and harvesting and drying
Groundnut	Drain out excess water/ Resowing Take up foliar spray with water soluble NPK Fertilisers	Drain out excess water	Drain out excess water	Drain out excess water Harvesting and drying of pods
Paddy	Drain out excess water/ Resowing Take up foliar spray with water soluble NPK Fertilisers	Drain out excess water Apply additional 25% RFD NPK	Drain out excess water Apply additional 25% RFD NPK	Drain out excess water Harvesting and drying
Hy. Cotton	Drain out excess water/ Resowing Take up foliar spray with water soluble NPK Fertilisers Resowing Take up foliar spray with water soluble NPK Fertilisers	Drain out excess water	Drain out excess water	Drain out excess water Harvesting and drying
Sunflower	Drain out excess water Take up gap filling. Drenching with fungicides	Drain out excess water Weeding and Topdressing With urea	Drain out excess water And earthing up	Drain out excess water and harvesting and drying
Horticulture				

Pomegranate Mango Banana Coconut	Provide Drainage	1) Provide immediate drainage by opening deep furrows along the slope at suitable intervals to drain the excess moisture and provide aeration to the roots. 2) Spray the crop with 1% Urea or 19:19:19 all or apply Urea @ 45 kg/Acre and each up. 3) Spray the crop with water soluble NPK. Fertilizers 4 to 5gm/Ltre		Harvest the produce immediately and take up marketing activities.
Sapota	Provide Drainage			
Continuous submergence for more than 2 days				
Maize	Draining the excess water Re-sowing with seed treatment if mortality is more otherwise take up gap filling	Drain out excess water Top dressing with urea weeding	Drain out excess water Earthing up.Tying of lodged plants	Drain out excess water Harvesting and drying
Sorghum	Draining the excess water Re-sowing with seed treatment if mortality is more otherwise take up gap filling	Drain out excess water Top dressing with urea weeding	Drain out excess water Earthing up.Tying of lodged plants	Drain out excess water Tying of lodged plants Harvesting and drying
Bajra	Draining the excess water Re-sowing / gap filling	Drain out excess water Top dressing with urea weeding	Drain out excess water Earthing up.Tying of lodged plants	Drain out excess water Tying of lodged plants Harvesting and drying
Paddy	Drain out excess water	Drain out excess water	Drain out excess water	Drain out excess water Harvesting and drying

Sunflower	Draining the excess water Re-sowing with seed treatment if mortality is more otherwise take up gap filling	Drain out excess water Top dressing with urea weeding	Drain out excess water Earthing up.	Drain out excess water Harvesting and drying
Horticulture				
Pomegranate	Provide Drainage	Provide drainage & immediately pump out the water using diesel motors		
Mango				
Banana				
Coconut				
Sapota	Provide Drainage			
Sea water intrusion	NA			

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

Extreme event type	Suggested contingency measure[r]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave	-NA-			
Cold wave				
Frost				
Hailstorm				
Cyclone	Measures to be adopted as suggested under heavy rains with high speed winds			

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 frequently prone for frequent drought, it should have reserves (feeding 5000 ACU (maintenance ration) for about 1-3 weeks period) of the following at any point of the year for mobilization to the needy areas Silage:20-50 t Urea molasses mineral bricks (UMMB):50-100 t Hay:100-250 t Concentrates: 20-50 t Minerals and vitamin supplements mixture:1-5 t Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production	Harvest and use all the failed crop (Rice, Bajra, Groundnut, jowar, maize) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipol etc) and unconventional feeds resources available and use as fodder for livestock (LS). Stall fed the LS so as to reduce the energy requirements of the animals Supply silage / hay to farmers with productive stock on subsidized rates **Mild drought:** hay should be transported to the drought affected villages **Moderate drought:** hay, silage and vitamin & minerals mixture should be transported to the drought affected villages **Severe drought:** UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the drought	Short duration fodder crops of Sorghum / Bajra / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, Gaint Bajra, L-74, K-6677, Ananand / African tall, Kissan composite, Moti, Manjari, BI-7) should be sown in unsown and crop failed areas Capacity building to stake holders on drought/flood mitigation in livestock sector Flushing the stock to recoup Replenish the feed and fodder banks

	Increase area under short duration fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality crop cutters. Avoid burning of maize stover Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon Proper drying, bailing and densification of harvested grass Creation of permanent fodder, feed and fodder seed banks in all drought prone villages Capacity building and preparedness of the stakeholders and official staff for the unexpected events	affected villages. All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS Herd should be split and supplementation should be given only to the highly productive and breeding animals Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive & breeding stock) Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals Arrangements should be made for mobilization of small ruminants across the districts where no drought exits Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals) Subsidized loans (5-10 crores) should be provided to the livestock keepers	
Cyclone	Harvest all the possible wetted grain (Rice/maize/bajra/jowar/groundnut etc) and use as animal feed. As the district is chronically prone for cyclone, arrange for storing minimum required quantity of hay (25-50 kg) and concentrates (10-25 kg) per animal in farmer's / LS keepers house/ shed for feeding during cyclone. Stock of anti-diarrheal drugs and electrolytes should be made available for emergency transport Don't allow the animals for grazing in case of early forewarning (EFW) of cyclone Incase of EFW of severe cyclone, shift the animals to safer places.	Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Diarrhea out break may happen. Health camps should be organized In severe cases un-tether **or** let loose the animals Arrange transportation of highly productive animals to safer place Spraying of fly repellants in animal sheds	Repair of animal shed Deworm the animals through mass camps Vaccinate against possible disease out breaks like HS, BQ, FMD and PPR Proper dispose 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 Bleach / chlorinate (0.1%) drinking water or water resources Collect drowned crop material, dry it and store for future use Sowing of short duration fodder

			crops in unsown and water logged areas when crops are damaged and no chance to replant Application of urea (20-25kg/ha) in the inundated areas and CPR's to enhance the bio mass production.
Floods	In case of early forewarning (EFW), harvest all the crops (Rice, Bajra, Groundnut, jowar, maize etc.,) that can be useful as fodder/feed in future (store properly) Don't allow the animals for grazing if severe floods are forewarned As regularly flood prone district, arrange for storing minimum required quantity of hay (25-50kg) and concentrates (25kgs) per animals in farmer / LS keepers house / shed for feeding animals during floods 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 Stall feeding of animals with stored hay and concentrates Proper hygiene and sanitation of the animal shed In severe floods, un-tether or let loose the animals 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 Deworming with broad spectrum dewormers Vaccination against possible disease out breaks like HS, BQ, FMD and PPR 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.
Heat & Cold wave	NA		
Health and Disease management	Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases Procure and stock emergency medicines vaccines for important endemic diseases of the area Surveillance and disease monitoring network to be established at Joint Director	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 epidemic Rescue of sick and injured animals and their treatment	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-

	(Animal Husbandry) office in the district	Organize with community daily lifting of dung from relief camps	September so that the peak milk production does not coincide with mid summer
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
Drinking water	Identification of water resources 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	Restrict wallowing of animals in water bodies/resources	Bleach (0.1%) drinking water / water sources Provide clean drinking water

Vaccination schedule in small ruminants (Sheep & Goat)

Disease	**Season**
Foot and mouth disease (FMD)	Preferably in winter / autumn
PPR	All seasons, preferably in June-July
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May
Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	December / march

Vaccination programme for cattle and buffalo:

Disease	**Age and season at vaccination**
Anthrax	In endemic areas only, Feb to May
HS	May to June
BQ	May to June
FMD	November to December

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds	Supplementation to all
Drinking water	Rain water harvesting	Sanitation of drinking water	Give sufficient water as per the bird's requirement
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with line powder in pit
Floods			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging	Routine practices are followed
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed

Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Heat wave and cold wave	NA		

2.5.3 Fisheries/ Aquaculture:

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. Capture	NA		
Marine	NA		
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Stocking of advanced fingerlings in half or even less than the normal stocking density or stocking of common carp seed	Immediate harvesting or decreasing the density commensurate with the water quantity.	De weeding and deepening of tank to ensure retention of water for a longer period and provision of employment under MGNREGP
(ii) Changes in water quality	Regular monitoring of water quality parameters and application of	Immediate harvesting or changing the water quality by application of	Removal of top layer, deep ploughing of tank and application of lime

	geolites, soil probiotics, etc to maintain water qaulity	sanitisers.	
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Crop holiday or going for stocking of yearlings by reducing the density according to availability of water	Harvesting of fish and leaving the pond fallow till next season	Removal of top layer, deep ploughing of tank and application of lime
(ii) Impact of salt load build up in ponds / change in water quality	Stocking of salinity tolerant fish / shrimp, application of geolites and other buffers	Frenquent change of water with fresh water	Frequent draining of the pond with fresh water, removal of top layers
(iii) Any other			
2) Floods			
A. Capture	NA		
Marine	NA		
Inland			
(i) Average compensation paid due to loss of human life	Shifting the people from low lying areas to relief camps	Deployment of specially trained persons for rescue operations by providing life bouys, jackets, ropes, boats, etc	Payment sufficient ex-gratia to the families
(ii) No. of boats / nets/damaged	Shifting and relocating boats and nets to safer places when warnings are issued, to avoid fishing, etc	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of livelihoods
(iii) No.of houses damaged	Avoidance of construction of houses in flood prone ares, construction of pucca houses at elevated places,	Shifting of people by relief boats to the relief camps	Assessment of damages to houses and provision of compensation in case of partial damage and sanction house under existing schemes
(iv) Loss of stock	Avoidance of surface species like catla, silver carp since they are vulnerable in tanks prone to floods, erection of nets across the spill way or just beyond it	Erection of nets at spill ways	Taking up compensatory stocking
(v) Changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of	

		water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(vi) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Heamorrhagic septicimea. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to constrol the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light
B. Aquaculture			
(i) Inundation with flood water	Raising and rivetting the bunds, construction of spill way to release excess water, erection of nets to avoid escape of fish	Continuous pumping of excess water, erection of nets low lying areas	Strengthening of bunds, excavating channels along the sides of the ponds for free escape of water
(ii) Water continuation and changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(iii) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Heamorrhagic septicimea. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to constrol the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light
(iv) Loss of stock and inputs (feed, chemicals etc)	Advance erection of nets, strengthening of bunds where they are prone to breaches, harvesting or reducing the density	Suspension of feeding, application of organic manures	Compensatory stocking, assessment of values and payment of subsidy on inputs
(v) Infrastructure damage (pumps, aerators, huts etc)	Insuring pond, accessories, etc., Shifting of aerators, pumps soon after warnigs are issued	Relocating pumps, aerators to elevated places	Assessment of damages and provision of them on subsidy
(vi) Any other			
3. Cyclone / Tsunami			

A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	Avoidance of fishing, preventing fishermen from venturing into sea, carrying of safety equipment and VHF sets, shifting fishermen from vulnerable areas to relief camps, etc	To ensure the return of fishing boats on long voyages, provision of information on such boats to coast Guard	Payment sufficient ex-gratia to the families
(ii) Avg. no. of boats / nets/damaged	Avoidance of fishing when warnings are issued, shifting of boats and nets to safe places	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of livelihoods
(iii) Avg. no. of houses damaged	Avoidance of houses in Coastal Regulation Zone, designing of houses to withstand impact of turbulent wind and water	Shifting of people by relief boats to the relief camps	Assessment of damages to houses and provision of compensation in case of partial damage and sanction house under existing schemes
Inland	Erection of protective nets acroos the surplus weir to prevent fish loss due to overflows	Continuous monitoring to prevent or minimise escape of fish along with surplus water	Compensatory stocking of seed
B. Aquaculture			
(i) Overflow / flooding of ponds	The design of the pond must be in such a manner as to bail out surplus water and to prevent loss of stanidng crop	Continuous monitoring to prevent or minimise escape of fish along with surplus water	Compensatory stocking of seed
(ii) Changes in water quality (fresh water / brackish water ratio)	Recircualtion water to repleish and ensure sufficient dissolved oxygen levels in the pond. Maintenance of salinity levels by pumping in water from creecks.	Continuation of the same process.	Restoration of physical and chemical parameters
(iii) Health and diseases	Removal of stress causing factors to maintain the health of the animal	Removal of stress causing factors to maintain the health of the animal	
(iv) Loss of stock and inputs (feed, chemicals etc)	Preventive nets must be erected to minimise loss of stock	Continuation of the same process.	Compensatory stocking of seed
(v) Infrastructure damage (pumps,	Pumps, aerators, etc must be protected	To avoid use of aerators, pumps	Overhauling of the eqipment to

aerators, shelters/huts etc)	by moving them to safe locations	and other appliances	prevent from being damaged
(vi) Any other			
4. Heat wave and cold wave	NA		
A. Capture			
Marine			
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			
(iii) Any other			