State: Kerala

Agriculture Contingency Plan for District: ERNAKULAM

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Western ghats and coastal plain, hot humid region (19.2)			
	Agro-Climatic Region (Planning Commission)	West coast plains and ghat region (XII)			
	Agro Climatic Zone (NARP)	Central Zone (KE-3)			
	List all the districts or part thereof falling under the NARP Zone	Thrissur, Palakkad, Malappuram, Wayanad, Ernakulam			
	Geographic coordinates of district	Latitude		Longitude	Altitude
		10° 0′0″ N		76° 19′ 48″ E	300m above MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Rice Research Station, Vyttila, P.O., Ernakulam			
	Mention the KVK located in the district	KVK, Njarakkal, P.O., Ernakulam			
1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	2035.4		1st week of June	2nd week of September
	NE Monsoon(Oct-Dec):	378.6		1st week of October	2nd week of November
	Winter (Jan- March)	19.6		-	-
	Summer (Apr-May)	405.2		-	-
	Annual	2838.8			

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)	305.826	70.617	38.664	0.004	8.843	0.143	1.306	10.835	6.472

1. 4	**Major Soils (common names like shallow red soils etc.,)**	**Area ('000 ha)**	**Percent (%) of total**
	Alluvial Soil	52.1	17.5
	Hilly Soil	36.0	12.1
	Pokkali Soil	8.0	2.7
	Sandy loam	26.2	8.8
	Laterite soil with well defined B horizon	105.3	35.4
	Forest Soil	69.0	23.2
1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity % (GCA/NSA)
	Net sown area	159.2	113%
	Area sown more than once	19.9	
	Gross cropped area	179.1	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	30.2		
	Gross irrigated area	39.6		
	Rainfed area	110.1		
	Sources of Irrigation	Number	Area (ha)	Percentage of total irrigated area
	Canals		12984	35.73
	Tanks		1559	4.29

	Wells/Bore wells		10419	28.67
	Lift irrigation		5168	14.22
	Micro-irrigation		3493	9.61
	Other sources		2714	7.47
	Total Irrigated Area		36337	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	
	Over exploited	NIL		
	Critical	NIL		
	Semi- critical	NIL		
	Safe	One	28	
	Wastewater availability and use	nil		
	Ground water quality	Good		
*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)

	Major Field Crops cultivated	**Area (ha)**			
1.7		**Viruppu**	**Mundakan**	**Punjab**	**Total**
	Rice	5097	5907	1962	12966
	Pulses	-	-	262	262

	Horticulture crops - Fruits	**Total area(ha)**
	Banana	6385
	Jack	3831
	Mango	3892
	Plantain	4268

	Cashew	948
	Pineapple	7489
	Pappaya	1177
	Other fruits	611
	Horticultural crops - Vegetables	**Total area(ha)**
	Drumstick	634
	Pumpkin	55
	Bitter gourd	158
	Ash gourd	59
	Other vegetables	1287
	Elephant foot yam	463
	Tapioca	6117
	Medicinal and Aromatic crops	**Total area(ha)**
	Ginger	396
	Turmeric	629
	Lemon Grass	326

	Plantation crops	**Total area(ha)**
	Pepper	6637
	Arecanut	4908
	Coconut	54710
	Tea	2
	Rubber	57565
	Fodder crops	**Total area**
	Fodder Grass	205
	Total fodder crop area	5426
	Grazing land	
	Sericulture etc	
	Others (Specify)	

1.8	**Livestock**			**Total (number)**		
	Non descriptive Cattle (local low yielding)			171796		
	Crossbred cattle					
	Non descriptive Buffaloes			7770		
	Graded Buffaloes					
	Goat			114225		
	Sheep			81		
	Pig			5951		
	Commercial dairy farms (Number)					
1.9	**Poultry**			**No. of farms**	**Total No. of birds ('000)**	
	Ducks				60.6	
	Fowls				1694.9	
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)
		75748	1327	3214	236+950	1842	26
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks
		3450		15		732
	B. Culture					

		Water Spread Area (ha)	Yield (t/ha)	Production (‘000 tons)
	i) Brackish water (Data Source: MPEDA/ Fisheries Department)	2091.23	0.475	0.993
	ii) Fresh water (Data Source: Fisheries Department)	733.94	0.984	0.722
	Others	327.73	NA	NA

1.11 Production and Productivity of major crops 2008-2009

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 (tonnes/ha)	Productivity (Kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
Rice		10.172	1996	12.3	2088	0.3	1733	25.9	1939	
Major Horticultural crops (Crops to be identified based on total acreage)										
Pepper								928	175	
Coconut								249 (million nut)	5385 (nos./ha)	
Arecanut								5564	1163	
Rubber								94270	1617	
Ginger								736		
Banana								60775	9518	
Plantain								25199	6661	
Jackfruit								18 (million	5003 (nos/ha)	

							nos.)		
Tapioca							209906	36955	
Cashew nuts							241	404	
Cocoa							718	555	
Sesamum							20	769	

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Rice	Coconut	Banana	Vegetables
	Kharif- Rainfed	Apr/ May to Aug/ Sep	May/June to Aug /Sep	April/May to Dec/Jan	May-June to September-October
	Kharif-Irrigated				
	Rabi- Rainfed	June/July to Dec/Jan			
	Rabi-Irrigated			August/Sept to July/August	
	Summer	Jan/Feb to May/June	Jan/Feb to May/June		Jan/Feb to May/June

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 (specify)			
	Wildlife			✓

1.14. Mean monthly rainfall (RRS, Vyttila)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	0	26	229.4	105.2	198.6	374.7	591.8	355.7	569.2	216.5	21.6	22	2710.7
2007	0	0	0	93.9	139	910	943.9	547	836	312.4	68	14.4	3864.6
2006	16	0	26	25	431.3	706.7	524.5	435.7	491.6	489.7	269.4	0	3415.9
2005	46.8	0	0	220.2	127.2	607.5	968.9	337.2	504.2	154.6	102.4	59.9	3128.9
2004	1	4	20	154.2	757.1	558.2	362.4	369.6	220.5	327.9	245.4	0	3020.3
2003	0	35	49.4	70	94	537.4	583.8	445.7	131	374.6	60.4	18.4	2399.7
2002	6	0	48	98	479.8	350.2	216	592.4	59.6	418.6	58.6	0	2327.2
2001	28	41	1.6	99.7	243	653.5	535.5	266.1	219.5	431.5	80	3	2602.4
2000	10	255.5	3	46.3	120.4	506.7	247.1	498.8	161.2	66.1	39	22.2	1976.3
1999	0	55	21.6	92.2	538.6	630.6	511.5	188.9	78.9	634.5	38.4	0	2790.2
1998	0	0	0	70.6	253.6	735.5	554.8	446.6	770.7	520.2	78.8	42	3472.8

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 3rd week of June	Low land	Rice – Vegetables/pulses	No change in cropping system but delay in sowing date	Selection of appropriate varieties with enough plasticity to adjust to changed sowing dates Exogenous application of organic manure for improving moisture retention capacity	Seed producing agencies have to be equipped to meet the seed requirement.
	Pokkali lands	Rice – prawn integrated farming	No change	Delaying the sowing to ensure salt removal	Traditional seed soaking to retain quiescent condition
	Mid land / Uplands	Rice-Rice-/pulses/vegetables	No change in cropping system but delay in sowing date	Sowing changed to transplanting during first crop (Kharif) Plant protection measures to be adopted against rice thrips and brown spot disease incidence which are likely to occur Medium/short duration photo insensitive varieties instead of photo sensitive long duration varieties during second crop (Rabi) Irrigation due to lack of residual moisture for summer crops like pulses and vegetables	Labour requirement under NREGS and CLDP Seed producing agencies have to be equipped to meet the seed requirement. Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP and RKVY

		Coconut based cropping system in garden lands with Banana, tuber crops and vegetables as inter crops	No change	Life saving irrigation is suggested for banana and vegetables. Short duration varieties of tuber crops and pulses as inter crops	Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP, NFSM and RKVY
		Open uplands of homesteads	No change	Provide irrigation in initial stages of crop growth Mechanical weed control measures	-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 1st week	Mid land / Up lands	Rice-Rice- /Pulses/Vegetables	Rice –Rice –Fallow Fallow-Rice- Veg/pulses	Sowing changed to transplanting during first crop (Kharif) Medium/short duration photo insensitive varieties during second crop (Rabi) Irrigation due to lack of residual moisture for summer crops like pulses and vegetables	Labour requirement under NREGS and CLDP Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP and RKVY
	Pokkali lands	Rice – prawn integrated farming	No change	Delaying the sowing to ensure salt removal/ repeat sowing	Traditional seed soaking to retain quiescent condition
		Coconut based cropping system in garden lands with Banana, tuber crops and vegetables as inter crops	No change	Life saving irrigation is suggested. Short duration varieties of tuber crops and pulses as inter crops	Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP and RKVY
		Open uplands of homesteads	No change	-	-

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	Midland / Uplands	Not Applicable			
	Pokkali lands				

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	Mid land / Up lands	Not Applicable			
	Pokkali lands				

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.	Mid land / Up lands	Rice-rice- /pulses/vegetables	Re-sowing necessary if germination affected Provide irrigation facilities Weed control measures are to be taken	Sufficient organic matter application Insitu rain water conservation	Alternate source of seed to be ensured Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP and RKVY
	Pokkali lands	Rice – prawn integrated farming	Stress tolerant varieties to be grown	Liming , impounding inflow tidal water	

		Coconut based cropping system in garden lands with Banana, tuber crops and vegetables as inter crops	No change	Life saving irrigation is suggested.	Irrigation facilities can be provided in link with IWMP NFSM and RKVY

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) **At vegetative stage**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
	Mid land / Up lands	Rice-rice- /pulses/vegetables	Provide irrigation facilities Weed control measures are to be taken	Sufficient organic matter application	Alternate source of seed to be ensured Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP and RKVY
	Pokkali lands	Rice – prawn integrated farming	Stress tolerant varieties to be grown	Liming , impounding inflow tidal water	
		Coconut based cropping system in garden lands with Banana, tuber crops and vegetables as inter crops	No change	Life saving irrigation is suggested.	
		Open uplands of homesteads	Timely weed management and fertilizer application	Life saving irrigation is suggested	Irrigation facilities in link with IWMP NFSM and RKVY

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	Mid land / Up lands	Rice-rice- /pulses/vegetables	Provide irrigation facilities	Basal application of Sufficient organic matter	Irrigation facilities can be provided in link with Micro irrigation schemes, IWMP and RKVY
	Pokkali lands	Rice – prawn integrated farming	Stress tolerant varieties to be grown	Liming , impounding inflow tidal water	

		Coconut based cropping system in garden lands with Banana, tuber crops and vegetables as inter crops	No change	Life saving irrigation for banana and vegetables is suggested.	Irrigation facilities can be provided in link with IWMP NFSM and RKVY
		Open uplands of homesteads	Provide irrigation facilities	Life saving irrigation is suggested	

Condition			**Suggested Contingency measures**		
Terminal drought	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Mid land / Up lands	Rice-rice- /pulses/vegetables	No change Harvesting at physiological maturity stage	No change	
	Pokkali lands	Rice – prawn integrated farming	Crop fails to be saved	Only single crop during low saline phase	
		Coconut based cropping system in garden lands with Banana, tuber crops and vegetables as inter crops	Provide irrigation for inter crops like banana and vegetables	No change	Irrigation facilities in link with IWMP NFSM and RKVY
		Open uplands of homesteads	No change	No change	

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 Irrigation is from the canals. Delay in monsoon results in lowering of water level in the	Loamy sand soils	Rice-Rice- /pulses/vegetables	Rice-Rice (SD)-Pulses, SD)	Mulching for vegetables Selection of suitable cropping systems	NREGS, RKVY
	Low lands	Rice- Rice - Fallow	No change. Delay in sowing of first crop	Selection of short duration varieties	Source of seed to be ensured

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
rivers					
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	Loamy sand soils	Rice-rice- /pulses/vegetables	Rice-Rice (SD)-Pulses,	Mulching for vegetables Selection of suitable cropping systems	NREGS, RKVY

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	Loamy sand soils	Rice-rice- /pulses/vegetables	Fallow- Rice –Pulses/	Rain water harvesting ,Direct sowing	NREGS, RKVY
		No change. Delay in sowing of first crop	Selection of short duration varieties	Source of seed to be ensured	

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	Loamy sand soils	Rice-rice- /pulses/vegetables	Fallow- Rice –Pulses	Rain water harvesting,Direct sowing	NREGS, RKVY
		No change. Delay in sowing of first crop	Selection of short duration varieties	Source of seed to be ensured	
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	Loamy sand soils	Rice-rice-sesame/pulses/vegetables	Fallow- Rice –Pulses/ Sesame	Rain water harvesting	NREGS, RKVY

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
low rainfall					

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	Provide drainage		Provide drainage Cultivation of varieties having seed dormancy, harvest crop at physiological maturity	Improve storage facilities/ godown
Pulses	Provide drainage		Provide drainage ,Cultivation of varieties having seed dormancy, harvest crop at physiological maturity	
Vegetables	Provide drainage		Provide drainage	
Horticulture				
Banana		Provide drainage		
Coconut (seedlings)	Provide drainage			
Tuber crops			Provide drainage	
Heavy rainfall with high speed winds in a short span[2]				
Rice	Select sturdy varieties with culm strength			
Horticulture				
Banana	Provide drainage	Propping		
Outbreak of pests and				

diseases due to unseasonal rains				
Rice	Provide drainage, adopt suitable control measures to avoid spread of Bacterial leaf blight Cultivate resistant varieties, Apply biocontrol agents, seed treatment, cultural practices for pest control		Harvest crop at physiological maturity	Improve storage facilities/godown
Tuber crops	Use healthy planting material, prophylactic spraying of bio control agents, use resistant varieties			
Horticulture				
Banana	Provide drainage and adopt suitable control measures to avoid the incidence of rhizome rot disease Use healthy planting material, Use TC plants which are virus free, Prophylactic spray of bio control agents			
Vegetables	Provide drainage,Use resistant varieties, Biocontrol agents, disease free seeds, seed treatment, balanced application of fertilizers based on soil test data, phytosanitation			
Coconut	Provide drainage, Use healthy planting material, Phytosanitation, prophylactic spraying of chemicals			
Pepper	Phytosanitation, grow foot rot tolerant varieties, prophylactic spraying of chemicals, use of bio control agents, , balanced application of fertilizers			Improve storage facilities

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	Elevation of outer bunds around all *Padashekarams* above the flood mark. Pumping out excess water using axial flow pump. Providing adequate drainage for draining excessive stagnating water around the root system, Improve drainage facility, scientific and proper land utilization, cultivation flood tolerant varieties, Crop insurance, Increase the storage capacity of reservoir. Spraying 3% KNO3 or 3% solution of Urea and MOP in 3:2 proportion at boot leaf stage if root damage already			Combine harvesters can be used for rapid harvesting of the crop. The grain may be excessively wet and if drying is difficult for few days, the harvested grain may be mixed with common salt and the produce may be sun

	occurred.			dried at the earliest opportunity Immediately after the standing water column recedes
Horticulture				
Vegetable	Providing adequate drainage for draining excessive stagnating water around the root system, Foliar spray of 2% DAP + 1% KCl (MOP)			
Banana				
Tuber				
Continuous submergence for more than 2 days				
Rice	Elevation of outer bunds around all *Padashekarams* above the flood mark. Pumping out excess water using axial flow pump, Cultivation flood tolerant varieties, Crop insurance, Improve drainage facility, Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels, Construction and protection of all the flood protection embankments, ring bunds and other bunds. Crop insurance, Increase the storage capacity of reservoir.			
Horticulture				
Vegetable	Providing adequate drainage for draining excessive stagnating water around the root system, Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels, Construction and protection of all the flood protection embankments, ring bunds and other bunds. Crop insurance, Increase the storage capacity of reservoir.			
Banana				
Tuber				
Sea water intrusion				
Rice	Cultivate saline tolerant pokkali varieties			

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	Straw enrichment and preservation, silage preparation,	Unconventional feeding with locally available feedstuffs and feeding during cooler part of the day, ie.during night time.	New planting of fodder with irrigation facilities

Drinking water	Construction of storage facility, cleaning of existing water bodies, steps to prevent water pollution	Minimise the use of clean water	water harvesting measures with the help of local bodies
Health and disease management	Provide nutritionally balanced feed, ensure the timely availabilities of medicines and vaccines and personnel. Promote vaccination, proper disease surveillance ,	Ensure timely treatment and control measures	Provide curing measures with proper management.
Floods			
Feed and fodder availability	Ensure proper drainage facilities, Silage preparation, straw enrichment and preservation, proper storage of feedstuffs to prevent fungal infestation.	Unconventional feeding with locally available feedstuffs	Planting new fodder slips in suitable lands. Give due consideration to land management to mitigate flooding
Drinking water	Prevent contamination of potable water sources, desilting of water channels, strengthening of water storing facilities,	Provide clean water in required quantity; make use of water purifying techniques if contamination is suspected.	Clean polluted water bodies, desilting of water channels
Health and disease management	Provide nutritionally balanced feed, promote vaccination, proper disease surveillance, ensure the timely availability of medicines and vaccines and personnel.	Ensure timely treatment and control measures	Provide curing measures with proper management.
Cyclone			
Feed and fodder availability	Ensure preservation and storage of fodder, straw , feed concentrate	Adequate feeding , ensure the quality of feed	Replanting of high yielding fodder slips.
Drinking water	Strengthening of water storage facility	Provide clean water in required quantity; make use of water purifying techniques if contamination is suspected.	Desilting and cleaning of water bodies for enough water storage
Health and disease management	Create awareness among farmers about adverse effect of unfavourable weather. Give timely cyclone forewarning to farmers,	Protect from direct exposure to un acclimatized weather , give proper care and management	Cleanliness of surrounding, disinfestaion of water bodies, proper disposal of deceased animals.

	strengthening of livestock shelter and feed store.		
Heat wave and cold wave			
Shelter/environment management	Timely maintenance of shelter, proper ventilation during hot days , proper insulation during very cold days	Avoid direct exposure to severe weather. In hot days- feeding during cool time with succulent feed stuffs, provide plenty of drinking water, washing during hot times, In cold days- keep in shelter, give bedding for insulation.	Construct modern weather proof shelter with ample space like Micro water sprayer and , false ceiling Plant trees to provide shade to shelter.
Health and disease management	Create awareness among farmers about adverse effect of unfavorable weather	Avoid thermal stress to animals, keep in shelter with proper feeding and watering, give treatment if any health problem observed. Give more attention to infants and physiologically stressful animals.	Provide curing measures with proper management

Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	Collection and preservation of feed ingredients in required quantity	Feeding with nutritionally balanced feed	Ensure adequate supply of ingredients for future use	
Drinking water	Construction of storage tank with adequate capacity Storage of clean drinking water	Provide cold clean drinking water Medication to reduce stress	Maintenance of existing water storing facilities and setting up of additional water sources like bore wells	Programmes can be linked with ATMA,RKVY and NREGS

Health and disease management	Vaccination, provide stress free environment	Proper feeding and watering, maintain correct stock density, observe for health problem and give treatment if required	Observe the production and growth. Avoid weaklings. Maintain proper stock density, Provide clean coops for shelter	
Floods				
Shortage of feed ingredients	Correct storage of feed stuffs to avoid fungal infestation, maintenance of store room , testing of feedstuff for quality	Feeding with nutritionally balanced feed	Disinfestations of surrounding premises and water bodies, proper disposal of dead birds	Programmes can be linked with ATMA,RKVY and NREGS
Drinking water	Infrastructure reinforcement to avoid contamination of drinking water	Provide clean drinking water round the clock, medication to reduce stress	Disinfection of water bodies, provide adequate drainage	
Health and disease management	Avoid possibilities of disease outbreak, maintenance of shed to give adequate protection from flood , provide stress free environment	Timely detection of diseases and treatment, avoid chances of disease spreading, medication to reduce stress, isolation of affected birds	Proper disposal of dead birds, sanitation of surroundings, isolation of affected birds	
Cyclone				
Shortage of feed ingredients	Proper storage of feed stuffs to avoid fungal infestation, maintenance of store room , testing of feedstuff for quality	Avoid feeding fungal infected feed, treatment if required and provide balanced feed	Disposal of damaged feed, testing of feed for quality Cultivation of suitable fodder crops	
Drinking water	Infrastructure reinforcement to avoid contamination of drinking water	Provide clean drinking water round the clock, medication to reduce stress	Disinfection of water bodies, provide adequate drainage	
Health and disease management	Avoid possibilities of disease outbreak, maintenance of shed to give adequate protection from cyclone	Timely detection of diseases and treatment , avoid chances of disease spreading , medication to reduce stress, isolation of	Proper disposal of dead birds, sanitation of surroundings, isolation of affected birds	

		affected birds		
Heat wave and cold wave				
Shelter/environment management	Timely maintenance of shelter, proper ventilation during hot days, proper insulation during very cold days. Planting trees around the shed and fitting of exhaust fan on the hoof can also be recommended	**Hot days**-Avoid direct exposure to severe weather. Provisions for air circulation by providing watered gunny bags in the direction of wind **Cold days**- keep in shelter, give bedding for insulation. Provide brooding facilities	Construct modern weather proof shelter with ample space, Plant trees to provide shade to shelter.	Programmes can be linked with ATMA,RKVY and NREGS
Health and disease management	Create awareness among farmers about adverse effect of weather Give vaccination to birds Provide water and feed	Avoid thermal stress to birds, keep in shelter with proper feeding and watering, give treatment if any health problem observed. Give more attention to chicks and parent stocks, reduce stock density.	Provide curing measures with proper management Provide clean coops and balanced feed	

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	Insuring the fishers Shall be provided with life saving equipments and provide weather forecast	Facility of patrol boats/ sea rescue. Support of coast guard shall be solicited. Opening of control room	Rehabilitation pacxkage Damaged boats / gears to be repaired/ replaced
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Fixing of display boards indicatng navigation routes Bottom dredging of navigation routes	Arrange rescue facilities Opening of control room	Rehabilitation measures Livelihood support to the affected

(ii) Changes in water quality	Continued water quality monitoring	Amelioration measures by expert team	Rehabilitation measures and continued vigilance against pollution
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Develop varieties tolerant to low water table and warm shallow water condtions	Oxygen supply will be affected.so water filling arrangements and aeration facilites	Development of deeper ponds, by annual desilting and prevention of water loss.
(ii) Impact of salt load build up in ponds / change in water quality	Seepage proofing and Storage of sufficient water to safeguard form salinity ingression.	Emergency harvest	Flushing with freshwater. Fixing of bore well
(iii) Any other			
2) Floods			
A. Capture			
Marine	NA	NA	NA
Inland	Fore warning of calamities	Livelihood support .Opening of relief camps	Rehabilitation stocking in open waters affected by fish loss .Ranching of commercially important seeds to recoup fisheries
(i) Average compensation paid due to loss of human life		Rs. 2 .00 Lakhs	
(ii) No. of boats / nets/damaged			
(iii) No.of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality		Water pH decline, Increase in organic matter content and sediment load ,	Algal blooms and fish kill possible due to blooming of algae. To counter this vigilant monitoring of water quality needed.
(vi) Health and diseases		EUS disease outbreak possible with lowering of temperature	EUS disease outbreak possible with lowering of temperature and consequent fish kill and unemployment and fisher

			folks.
B. Aquaculture			
(i) Inundation with flood water	Raising of pond dykes above flood mark. Provision of protective fencing to protect fish loss. Insurance cover	Rapid action to protect the stock against breach of dykes and protective maintenance of the outer bund.	Assessment of loss and compensation measures against loss. Supply of seed for fresh crop.
(ii) Water continuation and changes in water quality		pH decline. Productivity decline-primary productivity of water body. Fish growth affe4cted	Algal blooming and fish kill.
(iii) Health and diseases		EUS disease outbreak possible with lowering of temperature. Fungal, bacterial and protozoan disese outbreak	Fish kill to be compensation and pond treatment against agents of diseases
(iv) Loss of stock and inputs (feed, chemicals etc)	Insurance cover to be ensured	Loss of valuable germplasm / Brood stock possible. Stored Feed can loose its quality, afflatoxin problem. Loss of feed/ chemicals in storage system possible	Compensation for loss. Livelihood Support to the affected. Support by providing critical input seed/ feed for fresh crop
(v) Infrastructure damage (pumps, aerators, huts etc)	Insurance cover.	Craft, gears, pumps. Aerators etc can become damaged	Compensation. Repair and replacement of machinery and craft and gears
3. Cyclone / Tsunami			
A. Capture			
Marine	Protecting shoreline by afforestation by forming a mangrove belt Strict enforcement of CRZ regulation Construction of tsunami resistant housing and dwelling places. Forewarning system	Speedy rescue Operation to save the affected. Provision for shelter to the affected. . Rapid health care Drinking water can become saline	Assessment of loss and compensation. Rehabilitation housing, Livelihood support , Action to prevent epidemic outbreak
(i) Average compensation paid due to loss of fishermen lives		Rs 5 lakh / person	
(ii) Avg. no. of boats / nets/damaged			

(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds		Salination of pond systems affecting freshwater fish stock and fish kill	Assessment of loss and compensation. Loss of fish stock to be compensated by sedd msupply ands support of or building stock
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			
4. Heat wave and cold wave			
A. Capture		Fish availability will be affected fish shoal can move to deeper waters. Tropical fish close to their upper tolerance limit so fish availability will be affected	Rehabilitation of the coastal fishers. Alternate livelihood enterprises.
Marine			
Inland		Rivers can go dry affecting fish gernplasm and stock will affect livejood of inland fishers	Rehabilitation of the fishers affected
B. Aquaculture		Perennial pond can become seasonal. Cropping intensity will be reduced. The product ivy will be affected	Facilities for water storage. Deepening of ponds to store more water .Annual desilitign should become necessary
(i) Changes in pond environment (water quality)	Develop and popularize temperature tolerant eurythermal species for	Low DO. Warming of waters. Fish kill in summer. Breeding of fishes	Supply of fish seeds from other places might become necessary.

	culture systems. Develop water storage systems and water reservoirs to tide over adversity. Insurance cover against drought	will be affected. Seed availability will be affected. Severe shortage for fish seeds possible	Can upset the inland fish production programe as fish spawning and seed production is affected. Compensationg clamity.
(ii) Health and Disease management		Disease outbreak especially parasitic diseases possible. DO decline and recurrent fish mortality.	Rehabilitation package. Fresh stocking support. Replacement with Healthy seeds