

State: KERALA

Agriculture Contingency Plan for District-KOTTAYAM

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 Ghats region Zone (XII)			
	Agro Climatic Zone (NARP)	Southern Zone(KE 2)			
	List all the districts or part thereof falling under the NARP Zone	Kollam, Kottayam, Alapuzha, Pathanamthitta, Trivandrum			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		9° 35 42 N,	76° 31 51.6 E	3m MSL	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RARS, Kumarakom North P.O, Kottayam, Kerala- 686566			
	Mention the KVK located in the district	KVK Kottayam, Kumarakom North P.O, Kottayam, Kerala- 686566			
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	1706	77	June 1 st week	September 2 nd week
	NE Monsoon(Oct-Dec):	474	24	October 1 st week	November 2nd week
	Winter (Jan- March)	84	5	-	-
	Summer (Apr-May)	348	18	-	-
	Annual	2612	124	-	-

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 (Lakh ha)	220.4	8.1	23.2	0	5.3	0.1	1.6	3.0	2.8

Source: Farm Guide 2011

1.4	Major Soils (common names like shallow red soils etc.,)	Area ('000 ha)	Percent (%) of total
	1. Clay Loam soils	33.7	15.3
	2. Alluvial soils	44.0	20.0
	3. Laterite soils	69.9	31.7
	4. Gravelly Clay soils	56.0	25.4
	5. Gravelly Loam soils	10.1	4.6
	Others (specify): Forest Soil	4.8	2.2
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	168.8	130.13
	Area sown more than once	50.8	
	Gross cropped area	219.6	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	14.62		
	Gross irrigated area	18.83		
	Rainfed area	200.83		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		0.003	0.02
	Tanks		0.13	0.90
	Open wells		1.21	8.28
	Bore wells		0.009	0.061
	Lift irrigation		-	
	Micro-irrigation		14.09 (minor irrigation)	9.6
	Other sources		11.85	81.08
	Total Irrigated Area		14.6	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	
	Over exploited	NA		
	Critical	NA		
	Semi- critical	NA		
	Safe	NA	100	
	Wastewater availability and use			
	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)

1.7	Major Field Crops cultivated	Area (000ha)					
		<i>Kharif ha</i>		<i>Rabi ha</i>		Summer ha	Total ha
		<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>		
	Paddy	3.327	0.004	2.279	0	5.341	10.951
	Tuber crops						1.848
	Tapioca		0.686		3.037	2.549	6.272
	Pulses					0.056	0.056
	Horticulture crops – Fruits	Total area ha		Irrigated ha			
	Banana	6.650		0.96			
	Jack fruit	4.196		Nil			
	Mango	2.849		Nil			
	Pineapple	1.689					
	Horticultural crops – Vegetables	Total area ha		Irrigated ha			
	Drumstick	0.529		1.681			
	Amaranthus	0.094					
	Cucurbits	0.912					
	Ladies finger	0.0051					
	Brinjal	0.112					
	Chillies	0.092					
	Other Vegetables	0.606					
	Medicinal and Aromatic crops	Total area ha		Irrigated ha			
	Spices						
	Pepper	9.573		Nil			
	Ginger	0.193		Nil			
	Cardamom	0.2					
	Nutmeg	1.236		0.035			
	Turmeric	169					

Plantation crops	Total area ha	Irrigated ha
Rubber	112.59	Nil
Coconut	34.881	0.335
Cocoa	1.339	Nil
Tea	1.963	Nil
Fodder crops	Total area ha	Irrigated ha
Fodder	0.213	Nil
Total fodder crop area		
Grazing land		
Sericulture etc		
Others (Specify)		

Source: Farm Guide 2011, Kerala State

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	0.299	5.5	5.8
	Crossbred cattle	7.839	124.6	132.2
	Non descriptive Buffaloes (local low yielding)			
	Graded Buffaloes			2.2
	Goat			129.0
	Sheep			0.07
	Others (Camel, Pig, Yak etc.)			7.95
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial	303	541.0	
	Backyard		617.3	

1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department) NIL	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)	
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
1641		6		226			
B. Culture							
		Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)			
i) Brackish water (Data Source: MPEDA/ Fisheries Department)	2525 (total area under aquaculture)						
ii) Fresh water (Data Source: Fisheries Department)							

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

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)							
Major Field crops (Crops to be identified based on total acreage)										
	Rice	9138 t	2321	15823 t	2590	6300 t	2509	31261	2473	
	Tuber					88 t	863 kg			
	Tapioca					182262	32t ha ⁻¹			
Major Horticultural crops (Crops to be identified based on total acreage)										
	Rubber							163942 t	1.46 t	
	Coconut							217million nuts	3 nuts/palm	
	Banana							62703 t	8.6t/ha	
	Pepper							1695 t	179kg/ha	

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Tapioca	Rubber	Coconut	Banana
	Kharif- Rainfed	May 15 th -June30th	15th April-May25	June1st - July30th	May1- September31	April15 –May 30
	Kharif-Irrigated		February-April		April 1-April30	
	Rabi- Rainfed	November10th -December20th	September15th - November 15 th			
	Rabi-Irrigated					November- December

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) Coconut root wilt, Leaf rot, Virus diseases in cucurbits Foot rot in pepper, Red palm weevil in coconut Stem borer, leaf folder, thrips, sheath blight, blast Mites in cucurbits, Sigatoka Pseudo stem borer		BPH,	
	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

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation		Normal Crop/cropping system	Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation		Normal Crop/cropping system	Change in crop/cropping system	Agonomic measures	Remarks on Implementation
Delay by 2 weeks (June 3 rd week)	Low land (Acid Sulfate Soil)	Kari	Rice-Rice	Use short duration varieties and saline tolerant varieties	Mat nursery and mechanized transplanting Spray of B and K increases drought tolerance.	Sufficient machinery and HY short duration varieties are required.
		Kayal	Puncha Crop(October-March)	No Change		
		Garden land	Coconut	No Change	Mulching Drip irrigation Organic manuring	Scheme for micro irrigation
	Vegetable		No Change	Planting can be delayed Drip irrigation Protected cultivation		
	Banana		No Change	Delay planting up to the onset of monsoon Drip irrigation Organic manuring		
	Midland Laterite Soils	Rice:				
		Virippu (April-Sept)		Phasic stress irrigation with available water if onset of Monsoon is delayed in June	Use Short duration varieties Direct sowing	
		Mundakan (Sept-January)		If Mundakan Crop is delayed due to delay in harvesting of Virippu Crop use only non photo sensitive varieties which can be harvested by Dec-January	Do not use photo sensitive varieties recommended for Mundakan if harvesting will be delayed	
		Puncha (Dec-April)		If Puncha crop is delayed	Phasic stress irrigation with	

			due to delay in harvesting of Mundakan use short duration varieties	available water for economizing water use in summer	
		Coconut	No change	1.Sprinkler irrigation 2.Burial of Coconut husk in circular trenches taken around the palm 3.Give shade to young Coconut seedlings up to onset of Monsoon 4.Application of organic manure will help to conserve soil moisture for thriving the summer drought	Scheme for micro irrigation and composting
		Nutmeg	No change	Mulching basins Application of organic manure	Scheme for micro irrigation and composting
		Rubber	No change	White washing the stem of young plants Cover crops Rain harvesting pits	
		Tapioca	No change	Short duration var, cover crops	
		Ginger	No change	Delayed planting	Breeding for short duration varieties
		Pepper	No change	Mulching Covering young plants with dried leaves Micro irrigation Organic manuring	Scheme for micro irrigation and composting
		Banana	No Change	Delay planting up to the onset of monsoon Drip irrigation Organic manuring	-do-
	Uplands	Pepper	No change	Mulching Covering young plants with dried leaves Micro irrigation Organic manuring	-do-
		Rubber	No change	White washing the stem of young plants Cover crops	

				Rain harvesting pits	
		Coconut	No change	1.Sprinkler irrigation 2.Burrial of Coconut husk in circular trenches taken around the palm 3.Give shade to young Coconut seedlings up to onset of Monsoon 4.Application of organic manure will help to conserve soil moisture for thriving the summer drought	Scheme for micro irrigation and composting

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 4 weeks (Specify month)	Low land (Acid Sulfate Soil)	Rice-Rice	Use extra short duration varieties	Desilting and renovation of irrigation canals	Extra HY short duration varieties are required. RKVY Scheme NREGS
		Puncha Crop(October-March)	No Change		
		Coconut	No Change	Mulching Drip irrigation Organic manuring Husk burial	Scheme for micro irrigation Schemes for composting
		Vegetable	No Change	Planting can be delayed Drip irrigation Protected cultivation	
		Banana	No Change	Delay planting up to the onset of monsoon Drip irrigation Organic manuring	Scheme for micro irrigation and composting
	Midland	Rice:	Phasic stress irrigation with available water if	Use Short duration varieties Direct sowing	
		Virippu(April-Sept)			

			onset of Monsoon is delayed in June		
		Mundakan(Sept-January)	If Mundakan Crop is delayed due to delay in harvesting of Virippu Crop use only non photo sensitive varieties which can be harvested by Dec-January	Do not use photo sensitive varieties recommended for Mundakan if harvesting will be delayed	
		Puncha(Dec-April)	If Puncha crop is delayed due to delay in harvesting of Mundakan use short duration varieties	Phasic stress irrigation with available water for economizing water use in summer	
		Coconut	No change	1.Sprinkler irrigation 2.Burrial of Coconut husk in circular trenches taken around the palm 3.Give shade to young Coconut seedlings up to onset of Monsoon 4.Application of organic manure will help to conserve soil moisture for thriving the summer drought	Scheme for micro irrigation and composting
		Nutmeg	No change	Mulching basins Application of organic manure	Scheme for micro irrigation and composting
		Rubber	No change	White washing the stem of young plants Cover crops Rain harvesting pits	
		Tapioca	No change	Short duration var, cover crops Life saving irrigation	
		Ginger	No change	Delayed planting Life saving irrigation	Breeding for short duration varieties
		Pepper	No change	Mulching Covering young plants with dried leaves Micro irrigation Organic manuring	Scheme for micro irrigation and composting

		Banana	No Change	Delay planting up to the onset of monsoon Drip irrigation Organic manuring	Scheme for micro irrigation and composting SHM Scheme
		Pepper	No change	Mulching Covering young plants with dried leaves Micro irrigation Organic manuring	
		Rubber	No change	White washing the stem of young plants Cover crops Rain harvesting pits	
		Coconut	No change	1.Sprinkler irrigation 2.Burrial of Coconut husk in circular trenches taken around the palm 3.Give shade to young Coconut seedlings up to onset of Monsoon 4.Application of organic manure will help to conserve soil moisture for thriving the summer drought	Scheme for micro irrigation and composting NREGS

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks (Specify month)	Low land/Midland/Upland		Not Applicable		

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 (Specify month)	Low land/Midland/Upland	Not Applicable			

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 on set followed by 15-20 days dry spell after sowing leading to poor germination/ crop stand etc.	Midland	Rice	Irrigate at 1-4 days after disappearance of ponded water	Application of P and K as basal, Reduce N dose Application of organic manure	
		Vegetables	Give life saving irrigation		

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	Midland	Rice	Suppress weed growth	Irrigate at 1-4 days after disappearance of ponded water, Foliar spray of 2% DAP + 1% KCl (MOP) during critical stages of flowering and grain formation. 3% Kaolin (Antitranspirant) spray at critical stages of moisture stress	
		Vegetables	Sprinkler irrigation Organic matter application		Scheme on micro irrigation

			Mulching Rain water harvesting		NWDPRA
		Banana	Irrigation		
		Coconut	Organic matter application mulching		
		Nutmeg	Rain water harvesting		

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	Midland	Rice	Suppress weed growth, Spraying 3% KNO ₃ or 3% solution of Urea and MOP in 3:2 proportions at boot leaf stage if root damage already occurred.	Irrigate at 1-4 days after disappearance of ponded water	
		Vegetables	Sprinkler irrigation Mulching Rain water harvesting	Organic matter application, Terracing Establish rainwater harvesting structures like rain pits.	
		Banana	Irrigation		
		Coconut	Organic matter application mulching		
		Nutmeg	Rain water harvesting		
Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
	Midland	Rice	Use extra short duration and drought tolerant variety Terminate the irrigation 14-15 days before harvest, Harvest at physiological maturity		Breed drought tolerant varieties
		Vegetables	Sprinkler irrigation Mulching Rain water harvesting	Establish rainwater harvesting structures like rain pits,	NWDPRA

		Banana	Irrigation Organic matter application Mulching Cover crops Rain water harvesting	checkdams etc	
		Coconut			
		Nutmeg			

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Rice	Improve drainage facilities Deepening of canals		Cultivate varieties having seed dormancy	Improve storage facilities/ godowns
Horticulture				
Vegetable	Improve drainage facilities, cover crops, strip cropping with fodder grass, water harvesting structures			Improve storage facilities/ godowns
Banana				
Coconut				
Pepper				
Nutmeg				
Heavy rainfall with high speed winds in a short span				
Rice	Improve drainage			Improve storage facilities/ godowns
Horticulture				
Banana	Improve drainage, provide propping, shelter belts			Improve storage facilities/ godowns
Pepper	Improve drainage, shelter belts			
Vegetable	Protected cultivation			
Outbreak of pests and diseases due				

to unseasonal rains			
Rice	Cultivate resistant varieties, Application of bio-control agents, Seed treatment, cultural practices for pest control	Harvest crop at physiological maturity	Improve storage facility
Horticulture			
Vegetable	Use resistant varieties, Bio control agents, Disease free seeds, seed treatment, Balanced application on fertilizers, Based on soil test, Phytosanitation		Improve storage facility
Banana	Phytosanitation Use healthy planting material Use TC plants which are virus free Provide drainage, Prophylactic spraying of bio control agents		
Tuber crops	Use healthy planting material Prophylactic spraying of bio control agents Use resistant varieties,		
Pepper	Phytosanitation Grow quick wilt tolerant varieties, Prophylactic spraying of chemicals Use of bio control agents, Balanced application on fertilizers		
Coconut	Phytosanitation Use healthy planting material Provide drainage Prophylactic spraying of chemicals Use of bio control agents		

2.3 Floods

Condition	Suggested contingency measure ^o			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation ¹				
Rice	Elevation of outer bunds around all <i>Padashekarams</i> above the flood mark. Pumping out excess water using axial flow pump. Providing adequate drainage for draining excessive stagnating water around the root system, River embankments, Improve drainage facility, scientific and proper land utilization, cultivation flood tolerant varieties, Crop insurance, Increase the storage			The grain at this situation may be excessively wet. If drying is difficult for few days, the harvested grain may be mixed with common salt and the produce may be sun dried at the earliest opportunity Immediately

	capacity of reservoir. Spraying 3% KNO ₃ or 3% solution of Urea and MOP in 3:2 proportion at boot leaf stage if root damage already occurred.	after the standing water column recedes, combine harvesters can be used for rapid harvesting of the crop. Special harvesters are available to work in a mire situation.
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 <i>Padashekarams</i> 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	Modifying the operation of <i>Thannner Mukkam</i> Barrage in accordance with crop calendar by consultation with Agricultural Scientists. Cultivate saline tolerant varieties, application of gypsum, filling and sealing of individual fields with fresh water before the operation of barrage. Avoid drying up of fields.	
Banana	Filling and sealing of channels with fresh water before the operation of barrage	
Vegetables		
Tree spices		
Fisheries		Fresh water harvesting, strengthening and sealing of bunds to prevent saline water intrusion.

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event ^s	During the event	After the event
Drought			
Feed and fodder availability	Silage preparation, straw enrichment and preservation	Unconventional feeding with locally available feedstuffs and feeding during cooler part of the day, esp. 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	Provide <i>ad libitum</i> clean water, provide salt licks,	Promote all possible water harvesting measures with the help of local bodies
Health and disease management	Provide nutritionally balanced feed, promote vaccination, proper disease surveillance , ensure the timely availabilities of medicines and vaccines and personnel	Ensure timely treatment and control measures	Provide recuperative 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, strength 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 availabilities of medicines and	Ensure timely treatment and control measures	Provide recuperative measures with proper management.

	vaccines and personnel		
Cyclone			
Feed and fodder availability	Ensure preservation and storage of fodder, straw , concentrate feed	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 bad weather Give timely cyclone forewarning to farmers, strengthening of livestock shelter and feed store.	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.
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, provide wallowing facilities Cold days- keep in shelter, give bedding for insulation.	Construct modern weather proof shelter with ample space(eg. Micro water sprayer, fan, false ceiling) Plant trees to provide shade to shelter.
Health and disease management	Create awareness among farmers about adverse effect of bad 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 recuperative 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	Can be linked with ATMA, NREGS, RKVY, People's plan
Drinking water	Construction of storage tank with adequate capacity	Provide clean drinking water round the clock, medication to reduce stress	Maintenance of existing water storing facilities and setting up of additional water sources	
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	
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	Can be linked with ATMA, NREGS, RKVY, People's plan,
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	Correct 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	Disposal of damaged feed, testing of feed for quality	Can be linked with ATMA, 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	RKVY ,People's plan
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 affected birds	Proper disposal of dead birds, sanitation of surroundings, isolation of 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	Hot days-Avoid direct exposure to severe weather. Provisions for air circulation 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.	Can be linked with ATMA, NREGS, RKVY ,People's plan
Health and disease management	Create awareness among farmers about adverse effect of bad weather	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 recuperative measures with proper management	

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 package Damaged boats / gears to be repaired/ replaced
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Fixing of display boards indicating 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
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Develop varieties tolerant to low water table and warm shallow water conditions	Oxygen supply will be affected. so water filling arrangements and aeration facilities	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 ingressions.	Emergency harvest	Flushing with freshwater. Fixing of bore well
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 affected	Algal blooming and fish kill.
(iii) Health and diseases		EUS disease outbreak possible with lowering of temperature. Fungal, bacterial and protozoan disease outbreak	Fish kill to be compensation and pond treatment against agents of disease
(iv) Loss of stock and inputs (feed, chemicals etc)	Insurance cover to be ensured	Loss of valuable germplasm / Brood stock possible. Stored Feed can lose its quality, aflatoxin problem. Loss of feed/ chemicals in storage system possible	Compensation for loss. Livelihood Support to the affected. Support by providing critical inputs 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 seed supply and support for 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	Rehabilitation of the coastal fishers. Alternate livelihood enterprises.

		upper tolerance limit so fish availability will be affected	
Marine			
Inland		Rivers can go dry affecting fish germplasm and stock will affect livefood 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 desilition should become necessary
(i) Changes in pond environment (water quality)	Develop and popularize temperature tolerant eurythermal species for culture systems. Develop water storage systems and water reservoirs to tide over adversity. Insurance cover against drought	Low DO. Warming of waters. Fish kill in summer. Breeding of fishes will be affected. Seed availability will be affected. Severe shortage for fish seeds possible	Supply of fish seeds from other places might become necessary. 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