

State: TAMILNADU

Agriculture Contingency Plan for District: KANYAKUMARI

1.0 District Agriculture profile

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1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Region / Sub Region (ICAR)	Eastern Ghats And Tamil Nadu Uplands And Dry Region (8.1)		
	Agro-Climatic Region (Planning Commission)	West Coast Plains And Ghat Region (XII)		
	Agro Climatic Zone (NARP)	High Rainfall Zone (TN-6)		
	List all the districts or part thereof falling under the NARP Zone	Kanyakumari district only		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		8°14'23.10" N	77°20'04.02"E	58.3m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station, Thirupathisaram, Kanyakumari District - 629161 Floriculture Research Station, Thoivalai, Kanyakumari District - 629161 Horticultural Research Station, Pechiparai, Kanyakumari District - 629161		
Mention the KVK located in the district	ICAR-KVK, Pechiparai, Kanyakumari District-629161			
1.2	Rainfall	Average (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	554.5	1 st Week of June	1 st week of October
	NE Monsoon(Oct-Dec):	347.7	2 nd week of October	4 th week of December
	Winter (Jan- Feb)	161.5		
	Summer (Mar-May)	68.0		
	Annual	1361.2		

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 ('000 ha)	167.2	54.2	28.3	0.1	-	0.7	4.0	-	-

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Red soil	30	18.0
	Black soil	61	36.5
	Others	76.2	45.6
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	80.2	115.4
	Area sown more than once	12.3	
	Gross cropped area	92.6	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	27.1		
	Gross irrigated area	38.1		
	Rainfed area	53.1		
	Sources of Irrigation	Number	Area ('000 ha)	% area
	Canals		10.1	38.0
	Tanks	2623	15.9	59.5

Tube wells & filter points	1303	0.2	0.6
Lift irrigation	-	-	
Other sources	-	0.1	0.6
Total	3979	26.7	98.6
Pumpsets	-	-	-
Micro-irrigation	-	0.142	-
Groundwater availability and use	No. of blocks	% area	Quality of water
Over exploited	-		Salinity level: 99 % good
Critical	-		Residual Sodium Carbonate: 98% good
Semi-critical	-		Sodium Adsorption Ratio:98 % good
Safe	9	100%	
Wastewater availability and use	Data not available		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			

1.7	S.No.	Major Field Crops cultivated	Area ('000 ha)					
			<i>Kharif</i>		<i>Rabi</i>		Summer	Total
			<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>		
		Paddy	-	-	-	-	-	20.3
		Black gram	0.004	0.06	0.07	0.8	-	0.9
		Horticulture crops - Fruits	Total area					
		Banana	6.5					
		Mango	1.8					
		Horticultural crops - Vegetables	Total area					
		Tapioca	8.5					
		Brinjal	0.06					
		Bhendi	0.05					
		Horticultural crops - Plantation	Total area					

	crops	
	Coconut	24.8
	Rubber	21.4
	Cashew nut	2.1
	Horticultural crops - Flower crops	Total area
	Tuberose	0.07
	Rose	0.03
	Nerium	0.02
	Jasmine	0.02
	Marigold	0.02
	Horticultural crops - Medicinal and Aromatic crops	Total area
	Ocimum	-
	Fodder crops	Total area
	Total fodder crop area	-
	Grazing land	-
	Sericulture etc	-
	Others	
	Non-edible oil crop: Punnai (<i>Calophyllum inophyllum</i>)	0.2

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	1.7	4.6	6.4
	Crossbred cattle	9.1	74.0	83.2
	Non descriptive Buffaloes (local low yielding)	0.686	1.8	2.5
	Graded Buffaloes			
	Goat			118.3
	Sheep			1.2

	Others (Camel, Pig, Yak etc.)					1.2	
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial	124	186.4				
	Backyard	-	353.8				
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)	
		176430	2439	13684	16594	958	13
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		4		4		2642	
	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)	7.54 lakh	-		3.7		
	Others	-	-		-		

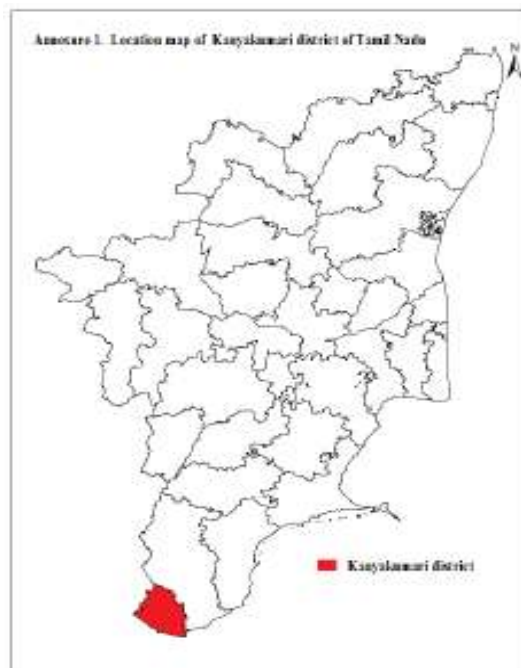
1.11	Production and Productivity of major crops (Average of last 3 years: 2006, 07, 08)	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Paddy	-	-	-	-	-	-	94.2	4433
	Black Gram	-	-	-	-	-	-	0.2	245
	Major Horticultural crops								
	Banana	-	-	-	-	-	-	298.0	45750
	Mango	-	-	-	-	-	-	4.5	2470
	Coconut	-	-	-	-	-	-	272.5 (‘000 nuts)	10.9 (‘000 nuts)
	Rubber	-	-	-	-	-	-	117.8	550
	Cashew nut	-	-	-	-	-	-	0.9	440
	Tapioca	-	-	-	-	-	-	296.6	34750
	Brinjal	-	-	-	-	-	-	0.7	11080
	Bhendi	-	-	-	-	-	-	0.4	7480
	Jasmine	-	-	-	-	-	-	0.6	7750
	Nerium	-	-	-	-	-	-	0.008	7750

1.12	Sowing window for 5 major crops (start and end of sowing period)	Paddy	Blackgram	Banana	Tapioca	Flower crops	Ocimum
	Kharif- Rainfed	-	February 1 st week	Throughout the year	June 1 st week – July 4 th week	April 2 nd week – November 2 nd week	June 1 st week – July 4 th week
	Kharif-Irrigated	May 2 nd week – July 1 st week	- March 4 th week				
	Rabi- Rainfed	-					
	Rabi-Irrigated	September 3 rd week - October 4 th week					

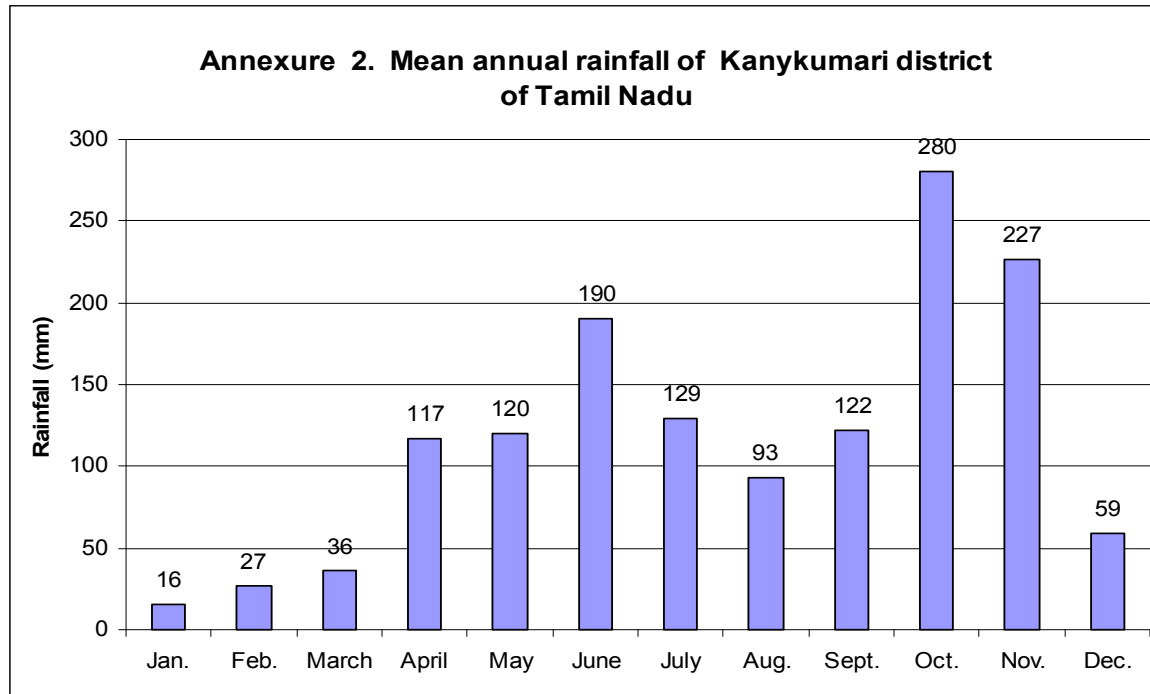
1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought	✓		
	Flood	✓		
	Cyclone			✓
	Hail storm			✓
	Heat wave			✓
	Cold wave			✓
	Frost			✓
	Sea water intrusion			✓
	Pests and diseases			✓
	Wind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

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

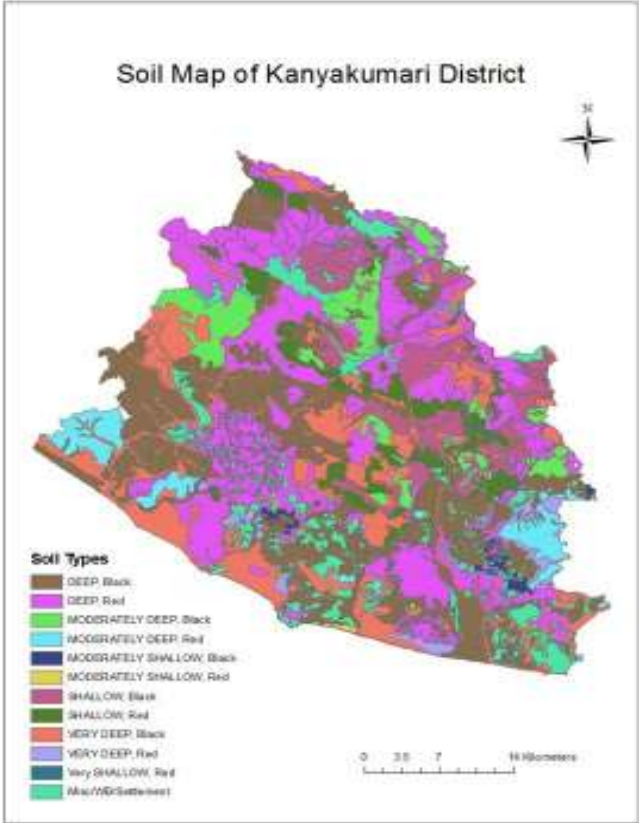
Annexure 1. Location map of Kanyakumari district and the blocks



Annexure 2. Mean annual rainfall of Kanyakumari district of Tamil Nadu



Annexure 3. Soil map of Kanyakumari district of Tamil Nadu



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 2 weeks June 3 rd week	Black soils	Banana	No change	<ol style="list-style-type: none"> 1. Postponement of the planting season 2. Strengthening the field bund for in-situ moisture conservation. 3. Use of biofertilizers viz., Azospirillum or Phosphobacteria @ 10 packets / ha along with 25 kg of soil or FYM 	
	Red soils	Tapioca + pulses (April-Dec.)		<ol style="list-style-type: none"> 1. Postponement of the planting season 2. Pretreatment of the setts with Potassium chloride @ 5 g/lit of water 	

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 4 weeks July 1 st week	Black soil	Banana	Banana Rasakathali, Poovan, Nendhran, Matti, Red Banana	1. Postponement of the planting season 2. Strengthening the field bund for in-situ moisture conservation. 3. Use of biofertilizers viz., Azospirillum or Phosphobacteria @ 10 packets / ha along with 25 kg of soil or FYM	
	Red soil	Tapioca + pulses (April-Dec.)	Tapioca CO 3 and CO TP 4	1. Postponement of the planting season 2. Pretreatment of the setts with Potassium chloride @ 5 g/lit of water	

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks July 3 rd week	Black soil	Banana	Banana Rasthakali, Poovan, Nendhran, Matti, Red Banana	1. Postponement of the planting season 2. Strengthening the field bund for in-situ moisture conservation. 3. Use of biofertilizers viz., Azospirillum or Phosphobacteria @ 10 packets / ha along with 25 kg of soil or FYM	

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Red soil	Tapioca + pulses (April-Dec.)	Tapioca (Sep - Mar) CO 3 and CO TP 4	1. Postponement of the planting season 2. Pretreatment of the setts with Potassium chloride @ 5 g/lit of water	

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Delay by 8 weeks August 1 st week	Black soil	Banana		1. Postponement of the planting season 2. Strengthening the field bund for in-situ moisture conservation. 3. Use of biofertilizers viz., Azospirillum or Phosphobacteria @ 10 packets / ha along with 25 kg of soil or FYM	
	Red soil	Tapioca + pulses (April-Dec.)		1. Postponement of the planting season 2. Pretreatment of the setts with Potassium chloride @ 5 g/lit of water	

2.1.2 Irrigated situation: NA

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

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Paddy	<ol style="list-style-type: none"> 1. Foliar spraying of <i>Pseudomonas fluorescens</i> 2. Foliar spraying of DAP 3. Strengthening of field bunds 	<ol style="list-style-type: none"> 1. Providing adequate drainage for draining excessive stagnating water around the root system. 2. Strengthening of field bunds 3. Increase the dose of potash during 2nd top dressing 4. Foliar spraying of DAP and urea 5. Foliar spraying of <i>Pseudomonas fluorescens</i> 6. Foliar spraying of systemic insecticide 	<ol style="list-style-type: none"> 1. During rainy season drain excess water 2. Strengthening of field bunds 	<ol style="list-style-type: none"> 1. Drain the water from the field 2. Immediately after the standing water column recedes, combine harvesters can be used for rapid harvesting of the crop. 3. The harvested grain may be mixed with common salt and the produce may be sun dried at the earliest opportunity.
Horticulture				
Banana	<ol style="list-style-type: none"> 1. During rainy season drain excess water 	<ol style="list-style-type: none"> 1. Trench system of cultivation: Form trenches in between alternate rows and cross trenches at every 5th row 2. Foliar spray of 0.3 % Boric acid + 0.5 % ZnSO₄ + 0.5 % FeSO₄ + 1.0 % urea during critical stages of the stress. 	<ol style="list-style-type: none"> 1. During rainy season drain excess water 2. Periodical deepening of trenches 	<ol style="list-style-type: none"> 1. During rainy season drain excess water 2. Periodical deepening of trenches

Tapioca	-	Foliar spray of 2% DAP + 1% KCl (MOP)	Providing adequate drainage for draining excessive stagnating water around the root system	Drain the water from the field
Flower crops	Delay the transplanting	<ol style="list-style-type: none"> 1. Retransplanting of seedlings/planting materials in damaged fields 2. Foliar spray of growth retardant of 500 ppm cycocel for arresting apical dominance and thereby promoting growth of laterals 3. Drenching with systemic fungicides 4. Foliar spraying of contact fungicides 	Nipping terminal buds for arresting apical dominance and to promote the laterals	-
Ocimum	Delay the transplanting	<ol style="list-style-type: none"> 1. Retransplanting of seedlings in damaged fields 2. Foliar spraying of DAP and urea 	-	-
Continuous submergence for more than 2 days				
Paddy	<ol style="list-style-type: none"> 1. Foliar spraying of <i>Pseudomonas fluorescens</i> 2. Foliar spraying of DAP 	<ol style="list-style-type: none"> 1. Drain the excess water 2. Foliar spraying of DAP and urea 3. Foliar spraying of <i>Pseudomonas fluorescens</i> 4. Foliar spraying of systemic insecticide 	<ol style="list-style-type: none"> 1. During rainy season drain excess water 2. Strengthening of field bunds 	<ol style="list-style-type: none"> 1. During rainy season drain excess water 2. Immediately after the standing water column recedes, combine harvesters can be used for rapid harvesting of the crop.

				3. The harvested grain may be mixed with common salt and the produce may be sun dried at the earliest opportunity.
Horticulture				
Banana	Providing adequate drainage for draining excessive stagnating water around the root system.	Foliar spray of 0.3 % Boric acid + 0.5 % ZnSO ₄ + 0.5 % FeSO ₄ + 1.0 % urea during critical stages of the stress.	Draining the excess water from the field	Draining the water from the trenches and from the field
Tapioca	-	Foliar spray of 2% DAP + 1% KCl (MOP)	Providing adequate drainage for draining excessive stagnating water around the root system	Drain the water from the field
Flower crops	Delay the transplanting	<ol style="list-style-type: none"> 1. Retransplanting of seedlings/planting materials in damaged fields 2. Drenching with systemic fungicides 3. Foliar spraying of contact fungicides 	<ol style="list-style-type: none"> 1. Foliar spray of 0.3 % Boric acid + 0.5 % ZnSO₄ + 0.5 % FeSO₄ + 1.0 % urea 2. Drenching with systemic fungicides 3. Foliar spraying of contact fungicides 	Remove the excess water from the flowers by pat drying after harvest
Ocimum	Delay the transplanting	<ol style="list-style-type: none"> 1. Retransplanting of seedlings in damaged fields 2. Foliar spraying of DAP and urea 	-	Remove the excess water from the leaves by pat drying after harvest

2.4 Extreme events:

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heavy wind				
Paddy	Postponement of the planting season	-	-	-
Horticulture				
Banana	-	-	Staking the plants	Staking the plants
Tapioca	-	-	-	-
Flower crops	-	-	-	-
Ocimum	-	-	-	-

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	MILD		
Feed and fodder availability	<ol style="list-style-type: none"> 1. Training and motivation of SHG for cultivation of fodder. 2. Undertaking fodder development through SHG. 3. Establishment of fodder banks in Government and private institutions. 4. Storage of ingredients for the preparation of concentrate feed. 	<ol style="list-style-type: none"> 1. Awareness to be created among the farmers where the Fodder and feed are available during the calamity. 2. Transportation and supply of feed and fodder to the needy areas. 3. Wastage of feed and fodder to be avoided. Dry cows should not be fed with excess feed. 	Immediate steps to be taken to cultivate fodder utilizing the maximum advantage of monsoon.
Drinking water	1. Construction of water tanks and storage of	1. Farmers should be informed about	Digging of bore wells and

	potable water. 2. Collection of particulars regarding availability of potable water in adverse conditions.	the availability of potable water. 2. Chlorination of water for disinfection. 3. Transportation of potable water to the needy areas.	creation of water reservoirs.
Health and disease management	1. Construction and provision of animal shelters. 2.It will be necessary to procure and stock vaccines for diseases like FMD,PPR,HS,BQ,Anthrax and ET so as to manage emergencies due to disease outbreak.Keep a stock of 20% of vaccine requirement in the District.	1. Transportation of animals to shelters. 2. Conducting Vaccination campaigns. 3. Rapid communication, mobilization of vaccines and personnels. 4.Conducting animal health camps 5.Mobile Veterinary services to the door steps	1. Conducting Animal health camps. 2. Recording disease outbreak particulars for future reference.
Floods	MILD		
Feed and fodder availability	1. Training and motivation of SHG for cultivation of fodder. 2. Undertaking fodder development through SHG. 3. Establishment of fodder banks in Government and private institutions. 4. Storage of ingredients for the preparation of concentrate feed.	1. Awareness to be created among the farmers where the Fodder and feed are available during the calamity. 2. Transportation and supply of feed and fodder to the needy areas. 3. Wastage of feed and fodder to be avoided. Dry cows should not be fed with excess feed.	Immediate steps to be taken to cultivate fodder utilizing the maximum advantage of monsoon.
Drinking water	1. Construction of water tanks and deepening of ponds.	1. Chlorination of water for disinfection.	Utilization of excess water for other purposes.
Health and disease management	1. Construction and provision of animal shelters. 2.It will be necessary to procure and stock vaccines for diseases like FMD,PPR,HS,BQ,Anthrax and ET so as to manage emergencies due to disease outbreak. Keep a stock of 20% of vaccine requirement in the District.	1. Transportation of animals to shelters. 2. Conducting Vaccination campaigns. 3. Rapid communication, mobilization of vaccines and personnels. 4.Conducting animal health camps 5.Mobile Veterinary services to the door steps	1. Conducting Animal health camps. 2. Recording disease outbreak particulars for future reference.
Cyclone			
Feed and fodder availability			
Drinking water			
Health and disease			

management			
Heat wave and cold wave			
Shelter/environment management			
Health and disease management			

2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event	During the event	After the event	
Drought	MILD			
Shortage of feed ingredients	Procurement and storage of feed ingredients	Nutritional supplementation of poultry	Nutritional supplementation of poultry	
Drinking water	Arrangements for ample potable drinking water to meet to the ensuing draught situation	1. Supply of cool potable water to poultry 2. Water sanitation	Creation if water reservoirs.	
Health and disease management	1. Vaccination against Ranikhet disease 2. Deworming of poultry 3. Provision of foggers and sprinklers to reduce heat load 4. Supplementation of vitamins and minerals	1. Prevention and control of Coccidiosis in poultry 2. Summer management of poultry- use of foggers and sprinklers 3. Continuous supply of cool potable water 4. Supplementation of vitamins and minerals 5. Feeding during cooler parts of the day 6. Mixing water in the concentrate mash and	Nutritional supplementation of poultry	

		feeding		
Floods				
Shortage of feed ingredients	Procurement and storage of feed ingredients	Nutritional supplementation of poultry	Nutritional supplementation of poultry	
Drinking water	Construction of water tanks and deepening of ponds	Water sanitation	Creation of water reservoirs.	
Health and disease management	<ol style="list-style-type: none"> 1. Vaccination against Ranikhet disease 2. Deworming of poultry 3. Supplementation of vitamins and minerals 	<ol style="list-style-type: none"> 1. Prevention and control of Coccidiosis in poultry 2. Covering the sides of the sheds with polythene sheets to prevent rain water entering into the shed. 	Nutritional supplementation of poultry	
Cyclone				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Heat wave and cold wave				
Shelter/environment management				
Health and disease management				

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Providing suitable for fishermen (shore seine)	Alternate employment for fishermen like preparation of value added fishery products and coastal aquaculture practices.	Train the fishermen in hygienic handling of fishes, fish preservation and marketing.
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Nursery rearing of fish seeds.	Improving fish capture methods.	Stocking of fish seeds in tanks and ponds.
(ii) Changes in water quality	Assessment of water quality parameters and plankton productivity.	Analysis of environmental parameters for the presence of algal blooms.	Assessment of water quality parameters.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Desilting the tanks and ponds	Growing and harvesting of fishes.	Stocking of fishes in ponds and tanks after fertilization.
(ii) Impact of salt load build up in ponds / change in water quality	Assessment of water hardness.	Assessing the water hardness due to salt incursion.	Assessment of water hardness.
(iii) Any other			
2) Floods			
A. Capture			
Marine	Encouraging and enhancing offshore fishing practices.	Encouraging offshore fish capture methods.	Enhancing shore seine operation and coastal fishing.
Inland			
(i) Average compensation paid due to loss of human	Not applicable	Not applicable	Not applicable

life			
(ii) No. of boats / nets/damaged	Providing subsidy for repairing boats and nets.	Providing subsidy for rectifying the damages.	Providing subsidy for rectifying the damages.
(iii) No.of houses damaged	Repairing the damaged houses.	Moving the fish farmers to safer places.	Repairing the damaged houses.
(iv) Loss of stock	Assessment of fish stock before the event.	Providing assistance to prevent loss of stocks.	Restocking of aquaculture ponds and tanks.
(v) Changes in water quality	Open the tanks and ponds for irrigation. Drying the tanks and ponds.	Observing water quality parameters.	Analysing the water quality parameters.
(vi) Health and diseases	Microbial analysis of water.	Microbial analysis of water.	Microbial analysis of water.
B. Aquaculture			
(i) Inundation with flood water	Close the outlets with nets to prevent the escape of fishes.	Measures to prevent escape of fishes.	Sampling of fishes in the pond.
(ii) Water continuation and changes in water quality	Monitoring the water quality.	Monitoring the water storage.	Stocking of seeds in water bodies.
(iii) Health and diseases	Analyse the microbes present in the sediments.	Microbial analysis of water.	Analysing the presence of hazardous microbes present in the water.
(iv) Loss of stock and inputs (feed, chemicals etc)	Sampling of fish ponds and lakes.	Sampling of fish ponds and lakes.	Sampling of fish ponds and lakes.
(v) Infrastructure damage (pumps, aerators, huts etc)	Repairing the pumps, aerators <i>etc.</i> used for aquaculture.	Safety measures of the infrastructures.	Repairing the pumps, aerators <i>etc.</i> used for aquaculture.
(vi) Any other			
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	Maintaining the cyclone shelters and community halls.	Analyse the extent of loss of life.	Provide compensation to the kith and kin of lost people.

(ii) Avg. no. of boats / nets/damaged	Survey of the boats and nets.	Survey the boats and nets damaged.	Provide compensation for the loss.
(iii) Avg. no. of houses damaged	Survey of the houses.	Survey on the damage.	Provide compensation for the loss.
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds	Monitor the outlets to prevent escape of fishes.	Strengthen the bunds to prevent overflow of water from lakes and ponds.	Strengthen the bunds to prevent overflow of water from lakes and ponds.
(ii) Changes in water quality (fresh water / brackish water ratio)	Monitoring the water quality of the tanks and ponds.	Analysing the water quality of the ponds and lakes.	Analysing the water quality of the ponds and lakes.
(iii) Health and diseases	Microbial analysis of water in the ponds and lakes.	Analysis of water for the presence of hazardous chemicals in the ponds and lakes.	Microbial analysis of water in the ponds and lakes.
(iv) Loss of stock and inputs (feed, chemicals etc)	Measures for the prevention of loss of stock in the ponds and lakes.	Strengthen the bunds to prevent damage in the ponds and lakes.	Stocking of ponds and lakes for aquaculture.
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Strengthen the infrastructure facilities to prevent damage to the pumps, aerators, shelters/huts <i>etc.</i>	Monitor the flood situation to prevent damage for the aquaculture infrastructure facilities.	Repairing the damages for the infrastructure facilities.
4. Heat wave and cold wave			
A. Capture			
Marine			
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			