

State: TAMILNADU

Agriculture Contingency Plan for District: THIRUVALLUR

1.0 District Agriculture profile

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1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Region / Sub Region (ICAR)	Eastern Ghats And TamilNadu Uplands And D (8.3)		
	Agro-Climatic Region (Planning Commission)	East Coast Plains And Hills Region (XI)		
	Agro Climatic Zone (NARP)	North eastern zone (TN-1)		
	List all the districts or part thereof falling under the NARP Zone	Villupuram, Kancheepuram, Cuddalore, Thiruvannamalai and Vellore		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		12 ⁰ 10 to 13 ⁰ 15 N	79 ⁰ 15 to 80 ⁰ 20 E	39.47m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Rice Research Station, Tirur, Tiruvallur District		
Mention the KVK located in the district	ICAR-KVK, Tirur, Tiruvallur District			
1.2	Rainfall	Average (mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	449.5	1 st Week of June	4 th week of September
	NE Monsoon(Oct-Dec):	604.1	1 st week of October	4 th Week of December
	Winter (Jan- Feb)	33.5	-	-
	Summer (Mar-May)	65.7	-	-
	Annual	1152.8	-	-

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 ('000 ha)	342.2	19.7	107.9	8.1	8.0	7.7	13.6	26.3	39.3

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	1 Red	72.2	21.1
	2 Lateritic soils (Alfisols)	15.5	4.4
	3 Alluvial soils (Inceptisols)	24.5	7.2
	4. Black soil	188.9	55.2
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	113.0	132.1
	Area sown more than once	36.3	
	Gross cropped area	149.4	

1.6	Irrigation	Area ('000 ha)	Percent (%)	
	Net irrigated area	91.8	82.1	
	Gross irrigated area	122.1	84.1	
	Rainfed area	21.3	17.8	
	Sources of Irrigation	Number	Area ('000 ha)	% area
	Canals	17	1.6	1.8
	Tanks	1895	13.8	15.1
	Open wells	12775	22.5	-
	Bore wells	1615	56.3	61.4
	Lift irrigation	-	-	-
	Other sources(tube wells& filter points)	17616	-	63.3
	Total	33918	93.8	130.5
	Pumpsets	-	-	-
	Micro-irrigation	-	-	-
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	06	42.9	Salinity level: 757 % good, 24% moderate and 1% poor Residual Sodium Carbonate: 100% good Sodium Adsorption Ratio:100 % good
	Critical	02	14.3	
	Semi- critical	05	35.7	
	Safe	01	7.1	
Wastewater availability and use	Data not available		-	
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

Area under major field crops & horticulture etc.

*If break-up data (irrigated, rainfed) is not available, give total area

1.7	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>		
1	Paddy	36.8	2.2	28.4	1.2	10066	96.8
2	Groundnut	2.5	7.5	18.0	-		28.0
3	Greengram	-	0.2	1.9	-	-	13.1
4	Sugarcane	54.0		12.9			10.0
5	Gingelly		1.0	1.0			2.0
	Others	-	-	-	-	-	-
	Horticulture crops - Fruits	Total area					
1	Mango	9.6					
2	Banana	1.6					
3.	Guava	0.2					
4.	Water melon	0.4					
5.	Citrus	0.098					
	Horticultural crops - Vegetables	Total area					
1	Brinjal	0.2					
2	Cowpea	0.1					
3	Bhendi	0.1					
4	Greens	-					
5	Bitter gourd	-					
	Flowers						

		Medicinal and Aromatic crops	Total area
1		Medicinal and Aromatic crops	
2		Ocimum	0.058
		Plantation crops	Total area
1		Coconut	11.1
		Fodder crops	Total area
		Total fodder crop area	
		Grazing land	7.9

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	43.9	54.9	98.8
	Crossbred cattle	97.9	127.4	225.3
	Non descriptive Buffaloes (local low yielding)			194.5
	Graded Buffaloes			
	Goat			321.4
	Sheep			92.9
	Others (Camel, Pig, Yak etc.)			6.0
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial	-	654.3	
	Backyard	-	-	
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)	
	22029	338	1194/3360	1106/118644	204 / 0	29 / 6
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
	1855		6		174	
B. Culture						
		Water Spread Area (ha)		Yield (t/ha)		Production ('000 tons)
i) Brackish water (Data Source: MPEDA/ Fisheries Department)	3500			0.001		5.243
ii) Fresh water (Data Source: Fisheries Department)	1681593			0.004		6.794
Others				0.000		80.357

	Reservoir	Intensive Inland Fish Culture in major irrigation & seasonal tanks	FFDA Tanks	Short seasonal tanks & ponds	Derelict water	Aquaculture farm	Estuaries & backwaters
Inland Fish Production for Thiruvallur district (Quantity in tonnes) 2008-2009/	3263	7813	749	8032	215	86	9236

	Mechanised	Motorised	Non mechanised	Shore Seine	Total
Marine Fish Production- Craft wise (Quantity in tones) 2008-2009	-	4166.70	4844.50	0.00	9011.20

	Number of fishing villages	No. of Fish Landing Centres		
		Major	Minor	Total
Marine Fishing villages & Landing Centres (Thiruvallur district)	58	1	27	28

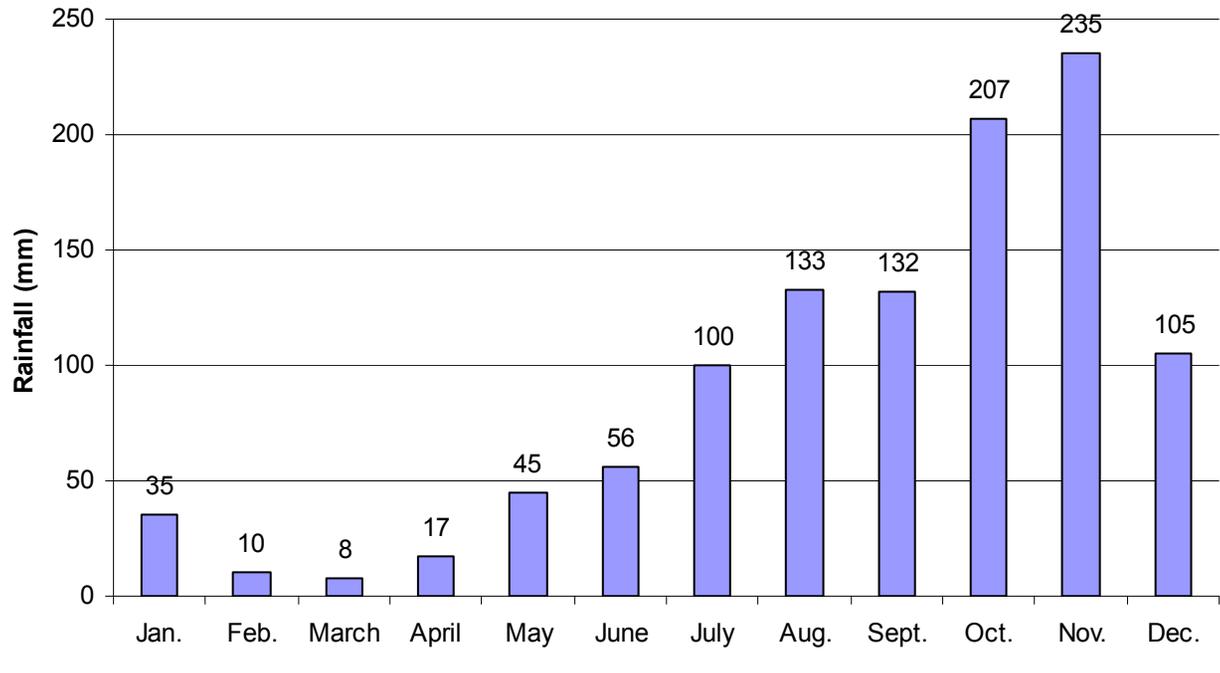
	Number of crafts								
	Mechanised	Wooden Vallams		FRP Vallams		Wooden Catamarans		FRP Catamarans	
		With engine	Without engine	With engine	Without engine	With engine	Without engine	With engine	Without engine
Details of fishing crafts-mechanized fishing boats and country crafts	-	-	-	-	-	-	699	2029	-

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)						
1	Paddy	254.3	4422	-	-			254.3	4422
2	Ground nut	-	-	62.0	3130	-	-	62.1	3130
3	Green gram	-	-	6.0	650	-	-	6.0	650
4	Sugarcane			649.8	120 t/ha			649.8	120 t/ha
5	Gingelly							0.7	0.5
	Major Horticultural crops							32.3	3364
1	Mango							75.0	47741
2	Banana							35.2	13603
3	Guava							0.8	2986
4	Citrus								

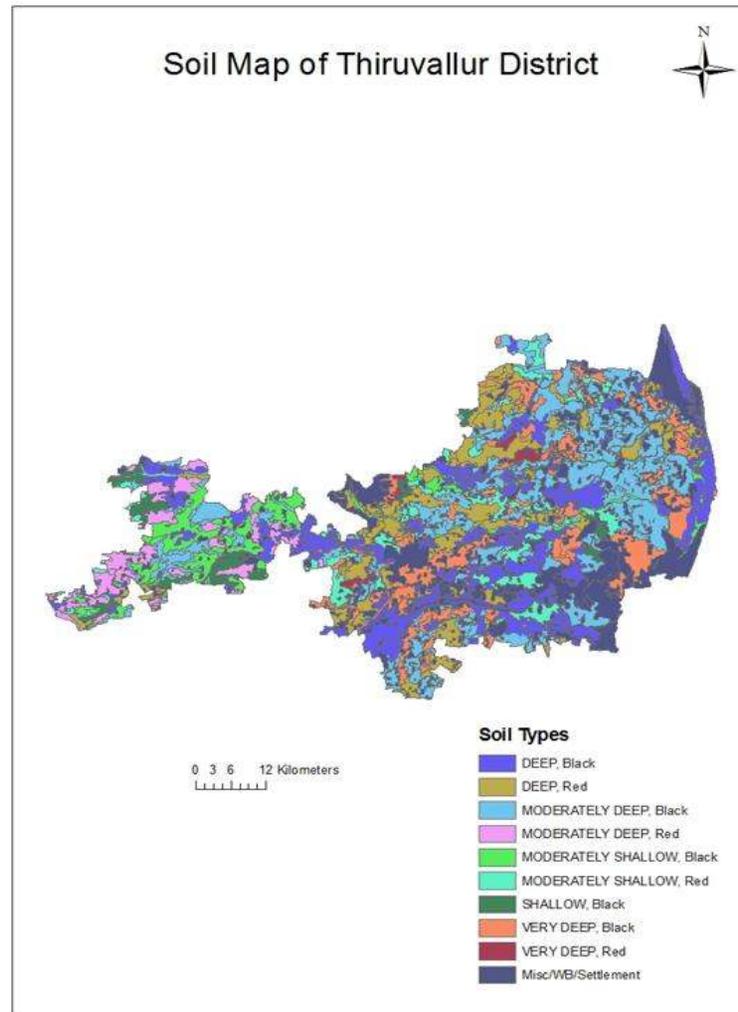
1.12	Sowing window for 5 major crops (start and end of sowing period)	Paddy	Ground nut	Pulse
	Kharif- Rainfed	April-July August-November Dec -January	June-July July 1 st FN to Aug 1 st week	June - July
	Kharif-Irrigated	April 1 st FN - May 1 st FN		-
	Rabi- Rainfed	-	-	-
	Rabi-Irrigated	Dec 1 st week – Dec. 30 th	Dec-January	Jan - Feb

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 inundation	√		
	Pests and diseases (specify)	√		

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



Annexure 3. Soil map of Thiruvallur district



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 2 weeks (June 3 rd week)	Laterite and red soils	Dry rice (June-Aug) Ground nut (June-Sep) Gingelly (Oct –Feb)	No change	No change	-

Condition	Major Farming situation	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 July 1st week	Laterite and red soil	Dry rice (June-Aug) Ground nut (June-Sep) Gingelly (Oct –Feb)	Maize/sunflower/groundnut Tapioca+ Groundnut Groundnut/Gingelly	Making field free of weeds for full utilization of water and nutrient Adopt higher seed rate Adopt Seed hardening	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Laterite and red soils	Dry rice (June-Aug) Ground nut (June-Sep) Gingelly (Oct –Feb)	Pure crop of Pearl millet ICMV – 221/ green gram COGG 912	1. Pearl millet cut for fodder 45 and 65 days and left for grains if rains are continued 2. Thinning of crops 3. Top dressing of Urea	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Laterite and red soils	Dry rice (June-Aug) Ground nut (June-Sep) Gingelly (Oct –Feb)	Fodder Sorghum	Thicker sowing of fodder or green manure for <i>insitu</i> cultivation	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Early season drought (Normal onset, followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.)	Laterite and red soil	Dry rice (June-Aug)	Timely weeding		
		Groundnut (June-Sep)	Re -sowing	Frequent Interculture	
		Gingelly (Oct –Feb)			

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Mid season drought (long dry spell)					

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Laterite and red soils	Paddy	Three splits 25kg N and 12.5 kg K at 22-25, 40-45 and -65 day can be adopted Regular monitoring of the crop for pest and disease Timely weed management to conserve soil moisture	Keep the field bund clean to minimize pest and disease attack	Awareness creation on crop/soil management techniques
Vegetative stage		Groundnut+ Redgram (7:1) intercropping system	Protection from Thrips transmitted BND and PSND	Mulching with groundnut shells (1ton/acre)	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Mid season drought (long dry spell)	Laterite and red soils	Paddy	Foliar spray of 1% urea + 2% DAP + 1% KCL at panicle initiation and 10days later may be taken up for enhancing the rice field, if sufficient soil	.	
At reproductive stage					

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Mid season drought (long dry spell)		Groundnut+ Redgram (7:1)	<p>moisture is ensured</p> <p>Regular monitoring of the crop for pest and disease Spray Urea @ 20g/litre of water at 35,45 and 65days after sowing</p> <p>Repeated inter cultivation</p>		

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought	Laterite and red soils	Paddy	Harvest the crop when 80% of the panicles are ripened	Tied ridges to conserve rainwater during <i>kharif</i> for regular sowing of <i>rabi</i> crops	
		Groundnut+ Red gram intercropping system	Use mobile sprinkler to maintain optimum soil moisture		

2.1.2 Irrigated situation

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

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

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Tank fed red soils and Tank fed black soils	paddy	Blackgram and Greengram are	Irrigation at critical stages Field should be properly leveled for uniform distribution of water	Linkage with NFSM /ISOPOM for seed supply

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
		Paddy	Short duration varieties	-	-
		Groundnut (Jan- April) TMV Pollachi red+ Redgram (LRG 30) intercropping (7 :1)	Normal Season cropping system TMV 2 POL 1 TAG 24	Normal sowing are done Soil Test based fertilizer recommendation	Under ISOPOM project certified seed of groundnut varieties can be sourced from ORS, Tindivanam/state department supply Under ICDP project certified seeds of pearl millet can be sourced from department
		Pearl Millet	Normal season cropping system KM 2, ICMU 221	Normal sowing - broadcast	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Bore well irrigated red soils and black soils	Groundnut and Sunflower	No change	Wherever economically viable, mulching should be practiced in between crop rows using locally available mulch material	-
Any other condition (specify)					

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				
Paddy	Drainoutthe excess water	Drainoutthe excess water	Drainoutthe excess water Harvesting at physiological maturity stage	Shift to safer place, use mechanical drier
Groundnut				Shift to safe place dry in shade and turn frequently
Greengram				
Sugarcane				
Gingelly				
Heavy rainfall with high speed winds in a short span²				
Paddy	Drainoutthe excess water and tying of lodged plants		Drainoutthe excess water	Shift to safe place Shift to safe place dry in shade and turn frequently
Groundnut	Drainoutthe excess water			
Greengram				
Sugarcane	Drainoutthe excess water tying of lodged plants			
Gingelly	Drainoutthe excess water			
Outbreak of pests and diseases due to unseasonal rains				
Paddy	Protect against sheath blight	Set up light trap Spray Hexoconazole for protection against rice blast	Spray carbendazim+ thiram to manage grain discolouration	Dry the grains to 12% moisture level and store
Plant Hoppers, Sheath blight Grain discolouration				
Gingelly				

Groundnut	Need based Integrated Pest management practices			
Greengram				
Sugarcane				

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Paddy	Drainage, Appropriate Plant protection against Thrips	Drainage, appropriate Plant protection management for leaffolder, gall midge & stem borer and BPH	Drainage, appropriate Plant protection management	Drainout excess water
Groundnut	Drainage appropriate Plant protection management	Drainage appropriate Plant protection management	Drainage appropriate Plant protection management	Drainout excess water
Continuous submergence for more than 2 days				
Paddy	Drainout excess water	Drainout excess water, gap filling, top dressing with urea	Drainout the excess water	Drainout the excess water
Groundnut				
Sugarcane				
Greengram				
Blackgram				
Sea water intrusion				
Paddy	-			

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Not applicable			
Cold wave				
Frost				
Hailstorm				
Cyclone				

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	<p>As the district is moderately prone to drought the following measures to be taken to mitigate the drought situation</p> <p>Sowing of cereals (Sorghum) and leguminous crops during North-East monsoon under dry land system for dry fodder production.</p> <p>Harvesting of fodder crops and hay making during the months of January and February for use in summer months/drought season.</p> <p>Ensiling and enrichment of surplus green grasses and sugarcane tops.</p> <p>Motivating the sugarcane farmers to convert</p>	<p>Harvest and use biomass of dried up crops (Paddy/groundnut/Greengram) material as fodder</p> <p>Chaffing of green and dry fodder to avoid wastage</p> <p>Use of unconventional and locally available cheap feed ingredients for feeding of livestock.</p> <p>Enrichment of dry fodder with urea, Salt and molasses.</p> <p>Continuous supplementation of minerals to prevent infertility.</p> <p>Transport of dry fodder bales from the fodder grid at DLF, Hosur to the drought affected villages</p> <p>Advising the farmers to feed balanced ration during summer months.</p>	<p>Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 on their own lands & supporting them with assisting infrastructures like seeds, money manure.</p> <p>Supply of quality seeds of COFS 29, Stylo and fodder slips of Co3, Co4,</p>

	<p>green sugarcane tops in to silage by the end of February</p> <p>Create awareness on establishment of pasture with drought resistant fodder Varieties like Guinea grass, stylo, kolukkattai grass, Acacia trees, etc.</p> <p>Creation of tree fodder models with Subabul, Glyricidia, Agathi, etc for tree fodder production during summer.</p> <p>Encouraging farmers to cultivate short-term fodder crops like sunhemp.</p> <p>Keeping sufficient stock of mineral mixture.</p> <p>Popularization of the use of chaff cutters to avoid fodder wastage.</p> <p>Educate the farmers about the proper method of hay making in order to avoid spoilage.</p> <p>Promote Azola cultivation at backyard</p> <p>Capacity building and preparedness of the stakeholders and official staff for the unexpected events</p>	<p>Feeding of chaffed and salt sprinkled crop residues.</p> <p>Supplementation of tree fodder with the available grass fodder.</p> <p>Feeding livestock with locally available cheaper brewery waste.</p> <p>Using of ensiled grasses and sugarcane tops during the drought period.</p> <p>Promotion of cultivation of Horse gram as contingent crop and harvesting it at vegetative phase as fodder</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</p>	<p>guinea grass well before monsoon</p> <p>Flushing the stock to recoup</p> <p>Replenish the feed and fodder banks</p>
Drinking water	<p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p> <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water bodies/resources</p>	<p>Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>

	Community drinking water trough can be arranged in shandies /community grazing areas		
Health and disease management	<p>List out the endemic diseases (species wise) in that district</p> <p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p> <p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures.</p> <p>Procure and stock multivitamins & area specific mineral mixture</p>	<p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p> <p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Rescue of sick and injured animals and their treatment</p> <p>Organize with community, daily lifting of dung from relief camps</p>	<p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p> <p>Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer</p>

<p>Floods</p>	<p>In case of early forewarning (EFW), harvest all the crops (Paddy/groundnut /greengram) that can be useful as feed/fodder in future (store properly)</p> <p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>Keep stock of bleaching powder and lime</p> <p>Carry out Butax spray for control of external parasites</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations</p>	<p>Transportation of animals to elevated areas</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe storms, un-tether or let loose the animals</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Deworming with broad spectrum dewormers</p> <p>Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p> <p>Drying the harvested crop material and proper storage for use as fodder.</p>
<p>Cyclone</p>	<p>Harvest all the possible wetted grain (Paddy/groundnut /greengram etc) and use as animal feed.</p> <p>Stock of anti-diarrheal drugs and electrolytes should be made available for emergency transport</p> <p>Don't allow the animals for grazing in case of early forewarning (EFW) of cyclone</p> <p>Incase of EFW of severe cyclone, shift the animals to safer places.</p>	<p>Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers.</p> <p>Diarrhea out break may happen. Health camps should be organized</p> <p>In severe cases un-tether or let loose the animals</p> <p>Arrange transportation of highly productive animals to safer place</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Deworm the animals through mass camps</p> <p>Vaccinate against possible disease out breaks like HS, BQ, FMD and PPR</p> <p>Proper dispose of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p> <p>Bleach / chlorinate (0.1%) drinking water or water resources</p>

			<p>Collect drowned crop material, dry it and store for future use</p> <p>Sowing of short duration fodder crops in unsown and water logged areas when crops are damaged and no chance to replant</p> <p>Application of urea (20-25kg/ha) in the inundated areas and CPR's to enhance the bio mass production.</p>
Heat wave and cold wave	NA		

2.5.2 Poultry

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	Culling of sick birds. Deworming and vaccination	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with

	against RD and IBD	one litre water)	lime powder in pit
Floods			
Shortage of feed ingredients	In case of early forewarning of floods, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc,	Use stored feed as supplement Don't allow for scavenging Culling of weak birds	Routine practices are followed Deworming and vaccination against RD
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	In case of EFW, add antibiotic powder (Terramycin/Ampicilline/ Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	Prevent water logging surrounding the sheds through proper drainage facility Assure supply of electricity by generator or solar energy or biogas Sprinkle lime powder to prevent ammonia accumulation due to dampness	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water		Use water sanitizers or offer cool hygienic	

		drinking water	
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder (5-10g per square feet) to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / deep burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against Ranikhet Disease (0.5ml S/c)

2.5.3 Fisheries

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Not applicable	Not applicable	Not applicable
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ul style="list-style-type: none"> i. Rainwater harvesting ii. Deepening/ Desilting of existing water bodies iii. Removal of debris and strengthening of pond embankments through turfing 	<ul style="list-style-type: none"> i. Shallow areas of derelict water bodies can be used for raising table sized fishes using stunted fish seeds and the culture can be done in enclosures (pens). Pens of 0.1 to 0.2ha are ideal for easy operation and economical. ii. Indian major carps and 	<ul style="list-style-type: none"> i. Due to severe water shortage farmers have to harvest fish in large quantities to avoid loss due to mortality. Leading to difficulties in marketing the fish farmers can be trained on the frozen storage techniques and in preparing value added products (ready to eat and processed products) ii. Adoption of short term culture of species wherein culture of species having rapid initial growth can be stocked. Eg. minor carps like silver

		<p>freshwater prawns are ideal species for culture.</p> <p>iii. Temporarily raising the height of the enclosures maybe done to prevent loss of stock in the event of sudden rise in water level due to sudden onset of rain or flooding.</p>	<p>barb (<i>Puntius gonionotus</i>) and fringe lipped carp (<i>Labeo fimbriatus</i>) can be undertaken.</p> <p>iii. Culture of minor carp like <i>Amblypharyngodon mola</i> can be done in shallow ponds and this being an auto breeder it spawns two or three times in a year which also ensure auto stocking.</p>
(ii) Changes in water quality	<p>i. Strictly implement in avoiding the use of plastics and other non-biodegradable material along the river belts (intervention and polluting by human is a common factor)</p> <p>ii. Avoid entry of pollutants like industrial effluents, run off from agricultural land into rivers</p>	<p>i. Reduced water volume in the pond/ local water bodies lowers its buffering capacity hence every precaution has to be taken while adopting use of manures and fertilizers to avoid onset of algal blooms and eutrophication</p>	
(iii) Any other	--	<p>i. Stunting of major carp fingerlings and stocking in grow out ponds as they grow faster (three times more growth than the non stunted fingerlings)</p> <p>ii. Ornamental fish rearing utilizing gold fishes, koi carp or</p>	

		live bearers like mollies and guppies can be done in summer. This ensures money flow to the farmers. ** subsidy to farmers for inputs like feed,seed.	
B. Aquaculture/ Mariculture	Before the event	During the event	After the event
(i) Shallow water in ponds due to insufficient rains/inflow	<ul style="list-style-type: none"> i. Water depth should be at least 1m for initiating fish culture. ii. Adopt low stocking density to reduce culture duration and culture should be done only after ensuring water availability for minimum period of 3 months. iii. In low tidal amplitude areas which receives north-east monsoon it is advised not to go for summer crop because of high temperatures which will lead to stress of culturable species. 	<ul style="list-style-type: none"> i. Farmers can be advised to take up integrated farming (poultry, piggery, duckery and animal husbandry with crops) to cut down cost on expensive inputs like feed and manure. ii. Avoid fertilization and manuring on supplementary basis. iii. Air breathing fish culture to be practised (Cat fish farming) 	<ul style="list-style-type: none"> i. Prepare pond for the next crop after early harvest ii. Always keep a constant check on the onset of algal blooms which will cause mass mortality of fishes iii. Harvest fish broodstock if any and shift to deeper safer areas like cement systems in indoor units to utilize for breeding on onset of monsoon
(ii) Impact of silt load build up in ponds / change in water quality	<ul style="list-style-type: none"> i. Rainwater harvesting ii. Deepening/ Desilting of existing water bodies iii. Removal of debris 	<ul style="list-style-type: none"> i. Feeding should be minimum to avoid organic loading 	<ul style="list-style-type: none"> i. On onset of sudden heavy rains heavy mortality will result so feeding should be controlled to avoid waste accumulation on pond bottom soil.
(iii) Any other	<ul style="list-style-type: none"> i. The physico-chemical quality of water has to be monitored regularly for its suitability for fish 	<ul style="list-style-type: none"> i. Concept of Re-circulatory system can be adopted as 	<ul style="list-style-type: none"> i. Train the farmers to breed fish in captivity and produce required amount of seed either through

	culture.	<p>additional water is not required thereby curtailing need for water exchange.</p> <p>ii. Use of aerators to overcome thermal stratification and build up of ammonia during high temperatures will help break the thermal stratification</p> <p>subsidy can be provided to farmers for the aerators</p> <p>iii. Partial harvesting to reduce biomass thereby competition for space and food is reduced.</p> <p>iv. Reduced stocking densities</p>	<p>hormonal treatment and environment manipulation.</p> <p>ii. Use of cryopreserved milt supplied from research units to aid breeding and ensure healthy stock</p> <p>(in collaboration with TANUVAS)</p>
2) Floods	Before the event	During the event	After the event
A. Capture			
Marine	<p>i. Train fisher folk on hygienic handling of fishes, short and long term preservation techniques and on preparation and packaging of value added fish products – as a small scale village activity</p> <p>ii. Establish cold chain facilities</p> <p>iii. Ensure strengthening of coastal belt by planting and maintaining the mangrove ecosystems</p> <p><i>** mangrove wetlands mitigate the adverse impact of storms, cyclones Tsunami in coastal areas and</i></p>	<p>i. Avoid fishing in deeper waters to avoid loss to gear, craft and human lives.</p>	<p>i. Loss incurred should be reported will be assessed by the State Fisheries Department officials and reimbursed.</p>

	<p><i>coastal erosion</i></p> <p><i>** mangroves are ideal breeding ,nursery and feeding grounds for a number of commercially important prawns, fishes and other shell fishes.</i></p> <p>iv. Ecologically sensitive areas to be earmarked such as mangroves, corals and estuaries to avoid overfishing</p> <p>v. Commercial exploitation of coral reefs and large scale removal of mangrove vegetation to be surveyed as this leads to dwindling fish harvests</p>		
Inland			
(i) Average compensation paid due to loss of human life	--- NA---	--- NA---	As per the norms of the State Government and implemented by the State Fisheries Department
(ii) No. of boats / nets/damaged	---NA---	---NA---	
(iii) No. of houses damaged	---NA---	---NA---	
(iv) Loss of stock	Sell the available fish stock as much as possible	Installation of gill net and using cast net for fishing the stock escapement through flooding	Onset of toxic gases in the system hence immediate stocking of fishes should not be carried out.
(v) Changes in water quality	Strengthening of bunds and embankments either through turfing and terracing to avoid water overflow or entry of waters from outside.	** Water should not be used for domestic purposes	Onset of toxic gases in the system hence immediate stocking of fishes should not be carried out.
(vi) Health and diseases	Water quality management to be followed thoroughly by weekly sampling to monitor water quality parameters		Ulcers and pox diseases in fishes will occur hence the fish stock has to be discarded or buried.

B. Aquaculture/ Mariculture in ponds	Before the event	During the event	After the event
(i) Inundation with flood water	i. Avoid culture of fishes requiring longer duration of culture. ii. Initiating fish culture in advance in areas frequently prone to flooding.	Immediately harvest the stocked fishes	--
(ii) Water exchange and changes in water quality	i. Strengthening of bunds and embankments either through turving and terracing	--	Application of lime to stabilize pH.
(iii) Health and diseases	i. Water quality management to be followed thoroughly by weekly sampling to monitor water quality parameters	--	Discard diseased stock and the following measures to be practiced: i. Drying up of confined water bodies ii. Let pond bottom to sun dry by cracking of soil to let out the release of obnoxious gases and other pests iii. Application of lime to balance soil pH.
(iv) Loss of stock and inputs (feed, chemicals etc)	The stock (feed and medicines) have to be stored separately in rooms designed for the purpose with air circulation facilities and they have to be stored on raised platforms to avoid loss	--	Discard stock if affected by water as they will lead to fungal borne infections in the fish stock.
(v) Infrastructure damage (pumps, aerators, huts etc)	i. Initiating fish culture in advance in areas frequently prone to flooding to prevent damage to the infrastructure	--	** As on date there has been no measure to give subsidy to the inland fish farmers for loss of fish stock or infrastructure hence the farmers are suffering a heavy loss.

			** Therefore suggestions can be made to the Government to assess the impact of damage and the rate of compensation can be decided by the officials
(vi) Any other	** Special emphasis can be made to the Government for compensation to the practicing inland fish farmers as there is no help from the Government as given to the fisher folk suffering damages due to cyclone. The practicing inland/marine fish farmers should register with the State Fisheries Department to avail the formulated compensation		
3. Cyclone / Tsunami	Before the event	During the event	After the event
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	**As per the existing government norms compensation is given to the fisherfolk whenever there is loss due to the impact of cyclones/tsunami		
(ii) Avg. no. of boats / nets/damaged	**As per the existing government norms compensation is given to the fisherfolk whenever there is loss due to the impact of cyclones/tsunami		
(iii) Avg. no. of houses damaged	**As per the existing government norms compensation is given to the fisherfolk whenever there is loss due to the impact of cyclones/tsunami		
Inland	Cyclone / Tsunami		
B. Aquaculture/ Mariculture	Before the event	During the event	After the event
(i) Overflow / flooding of ponds	i. Planting trees like casuarinas along coastal belt to avoid coastal erosion and inundation of sea waters.	--	
(ii) Changes in water quality (fresh water / brackish water)	i. Stocking fishes which can tolerate wide salinity	--	Application of lime to stabilize pH.

ratio)	changes eg. Milkfish, pearl spot etc.		
(iii) Health and diseases	i. Water quality management to be followed thoroughly by weekly sampling to monitor water quality parameters	--	Discard diseased stock and the following measures to be practiced: i. Drying up of confined water bodies ii. Let pond bottom to sun dry by cracking of soil to let out the release of obnoxious gases and other pests iii. Application of lime to balance soil pH.
(iv) Loss of stock and inputs (feed, chemicals etc)	i. The stock (feed and medicines) have to be stored separately in rooms designed for the purpose with air circulation facilities and they have to be stored on raised platforms to avoid loss	--	Discard stock if affected by water as they will lead to fungal borne infections in the fish stock.
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Initiating fish culture in advance in areas frequently prone to flooding to prevent damage to the infrastructure	--	** Special emphasis can be made to the Government for compensation to the practicing inland fish farmers as there is no help from the Government as given to the fisher folk suffering damages due to cyclone. The practicing inland/marine fish farmers should register with the State Fisheries Department to avail the formulated compensation
(vi) Any other	Training programmes for stakeholders including resource users, planners and policy makers on coastal regulations, shoreline protection and environmental awareness.		
4. ****Heat wave and cold wave	Before the event	During the event	After the event
A. Capture			
Marine			i. To conduct studies on the ecological changes to

			assess the density and diversity of phyto and zooplankton and other benthic macro fauna (collaborative work with State Universities-TANUVAS)
Inland			
B. Aquaculture	Before the event ^a	During the event	After the event
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			
(iii) Any other	<p>i. Conservation of our coral reefs (natural treasures) as they are the most diversified and complex marine ecosystems</p> <p>ii. Conserve seagrass beds by imposing strict measures on trawling, removal for commercial purposes.</p>		