State: TAMIL NADU

Agriculture Contingency Plan: TIRUNELVELI

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Region / Sub Region (ICAR)	Eastern Ghats And TamilNadu Uplands (8.1)			
	Agro-Climatic Region (Planning Commission)	West Coast Plains And Ghat Region East Coast Plains And Hills Region (XII, XI)			
	Agro Climatic Zone (NARP)	Southern Zone (TN-6)			
	List all the districts or part thereof falling under the NARP Zone	Ramanathnpuram, Tirunelveli, Part of Anna, Madurai and Pudukottai districts			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		8° 8'to 09° 23' N	77° 09' to 77°35' E	47 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Agricultural Research Station, Aruppukkottai, Virudhunagar District			
	Mention the KVK located in the district	KVK, Oormelazhagiyan, Tirunelveli District			

1.2	**Rainfall**	Average (mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	92.6	1st Week of June	4th week of September
	NE Monsoon(Oct-Dec):	429.8	1st week of October	2nd Week of December
	Winter (Jan- Feb)	72.6	-	-
	Summer (Mar-May)	141.9	-	-
	Annual	736.9	-	-

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)	670.6	120.8	104.1	5.4	41.5	9.8	30.8	26.3	167.8

1. 4	**Major Soils**	Area ('000 ha)	Percent (%) of total
	Very Deep to deep Black soils	235	38
	Very Deep to deep Red soils	149	24
	Moderate deep /shallow Black soils	92	15
	Moderate deep/shallow Red soils	22	4
	Shallow to very shallow black soils	36	6
	Others	77	12
		615	**100**
1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	175.1	119.1
	Area sown more than once	33.4	
	Gross cropped area	208.5	

1.6	**Irrigation**	**Area ('000 ha)**		
	Net irrigated area	118.4		
	Gross irrigated area	145.7		
	Rainfed area	56.7		
	Sources of Irrigation	Number	Area ('000 ha)	% area
	Canals	Thamirabarani Canal fed	20.2	17.2
	Tanks	2172	47.8	40.7
	Open wells	82718	-	

	Bore wells	191	0.9	0.7
	Lift irrigation		-	
	Other sources (Tube well)	502	0.1	0.2
	Total		69.2	60.5
	Pumpsets	24817		
	Micro-irrigation		500	
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	4	36	Salinity level: 66 % good, 27% moderate and 7% poor Residual Sodium Carbonate: 95% good and 5% moderate Sodium Adsorption Ratio:99 % good
	Critical	-	-	
	Semi- critical	5	45	
	Safe	10	91	
	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.

1.7		**Major Field Crops cultivated**	**Area ('000 ha)**					
			Kharif		***Rabi***		**Summer**	**Total**
			Irrigated	***Rainfed***	***Irrigated***	***Rainfed***		
	1	Paddy	22.5	-	64.7	-	**4597**	91.8
	2	Black gram	0.2	3.9	0.6	12.8		17.7
	3	Maize	0.3	0.0	0.2	2.3		8.7
	4	Sugarcane	3.7 (Planted)		1.7 (Ratoon)			5.4
	5	Cotton	2.1	0.1	3.0	1.3		4.3
	6	Sorghum (Sorghum)	1.4	0.3	0.1	0.1	-	2.0
	7	Bajra (Bajra)	0.0		0.1	0.5		0.6
		Horticulture crops - Fruits	**Total area**					
	1	Banana	8.1					
	2	Mango	4.6					
	3	Guava	0.3					
	4	Sapota	0.2					
	5	Lemon	1.9					
	6	Amla	1.4					
	7	Citrus	17.0					
			Total area					
	1	**Vegetable**	3.9					
	2	**Flowers**	1.6					

	Medicinal and Aromatic crops	**Total area**
1	Chillies	2.0
2	Tamarind	0.1
3	Clove	0.1
4	Currey leaf	0.05
5	Senna	0.01
	Plantation crops	**Total area**
1	Cashew	5.0
2	Tea	0.8
3	Arecanut	0.1
4	coffee	0.03
5	Coconut	0.002
	Fodder crops	**Total area**
1	Sorghum	5.031
2	Subha grass	0.087
3	Giniya grass	0.002
4	Korai grass	0.009
5	Feeder grass	0.021
	Total fodder crop area	5.1
	Grazing land	
	Sericulture etc	0.022
	Others (Specify)	

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	41.1	101.7	142.9
	Crossbred cattle	89.7	271.6	361.4
	Non descriptive Buffaloes (local low yielding)			114.7
	Graded Buffaloes			
	Goat			461.3
	Sheep			1222.3
	Others (Camel, Pig, Yak etc.)			12.7
	Commercial dairy farms (Number)			

1.9	Poultry	No. of farms	Total No. of birds ('000)
	Commercial		497.4
	Backyard		721.1

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)	
		20210	1	1191	21062	1388	3
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		Nil		12		2249	
	B. Culture						
		Water Spread Area (ha)		**Yield (t/ha)**		**Production ('000 tons)**	

	i) **Brackish water**	----	---	---
	ii) **Fresh water**	12053	---	1187 tons
	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)
1	Paddy	69	3898	221	4327	13.8	3757	303.5	4193
2	Sorghum (Jowar)		3926		940			5.3	3265
3	Bajra (Bajra)		3191		1414			1.4	1765
4	Ragi		3458		1362			0.8	3438
5	Maize							10.0	2682
6	Black gram							7.3	577
7	Green gram							4.2	696
8	Cotton		418		255			1706	488
9	Sugarcane							395	123000
	Major Horticultural crops								-
1	Banana							374	
2	Mango							16.1	
3	Guava							4.3	
4	Sapota							6.7	
5	Lemon							4.90	
6	Amla							20.6	
7	Onion							25.70	
8	Tomato							9.10	

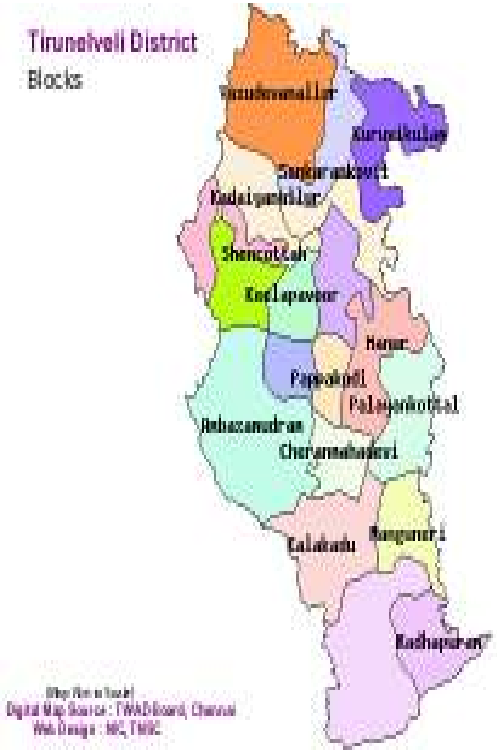
1.12	**Sowing window for 5 major crops (start and end of sowing period)**	**Paddy**	**Cotton**	**Jowar**	**Maize**	**Bajra**
	Kharif- Rainfed	-	-	1st week of June to 4th week of July	-	1st week of June to 4th week of July

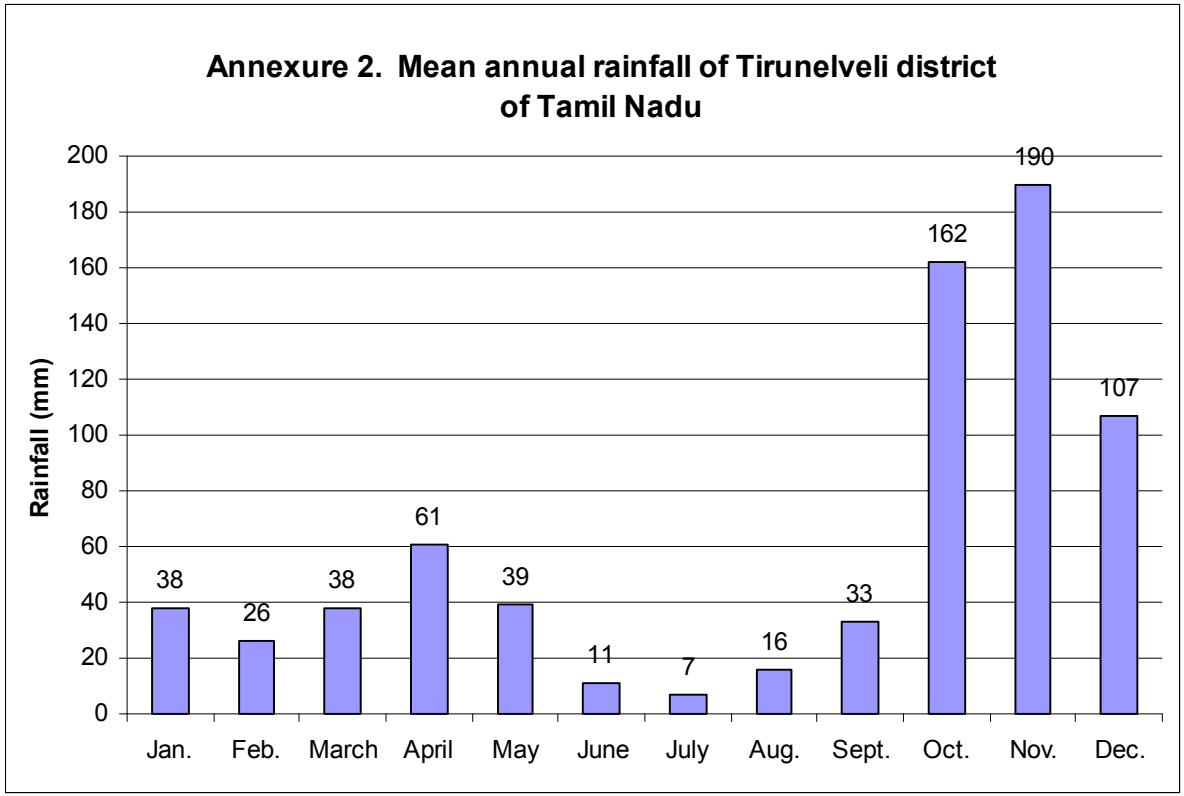
	Kharif-Irrigated	1st week of June to 4th week of July		1st week of May – 4th week of July	1st week of May – 4th week of July	1st week of May – 4th week of July
	Rabi- Rainfed	-	1st week of September to 4th week of October	1st week of September – 4th week of October	1st week of September – 4th week of October	1st week of September – 4th week of October
	Rabi-Irrigated	1st weed of September to 4th week of November	1st week of February to 4th week of March	February - March	1st week of March – 4th week of April	1st week of March – 4th week of April

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			✓
	High intense storms			
	Cyclone		✓	✓
	Hail storm			✓
	Heat wave			✓
	Cold wave			✓
	Frost			✓
	Sea water inundation			✓
	Pests and diseases (specify)	✓		

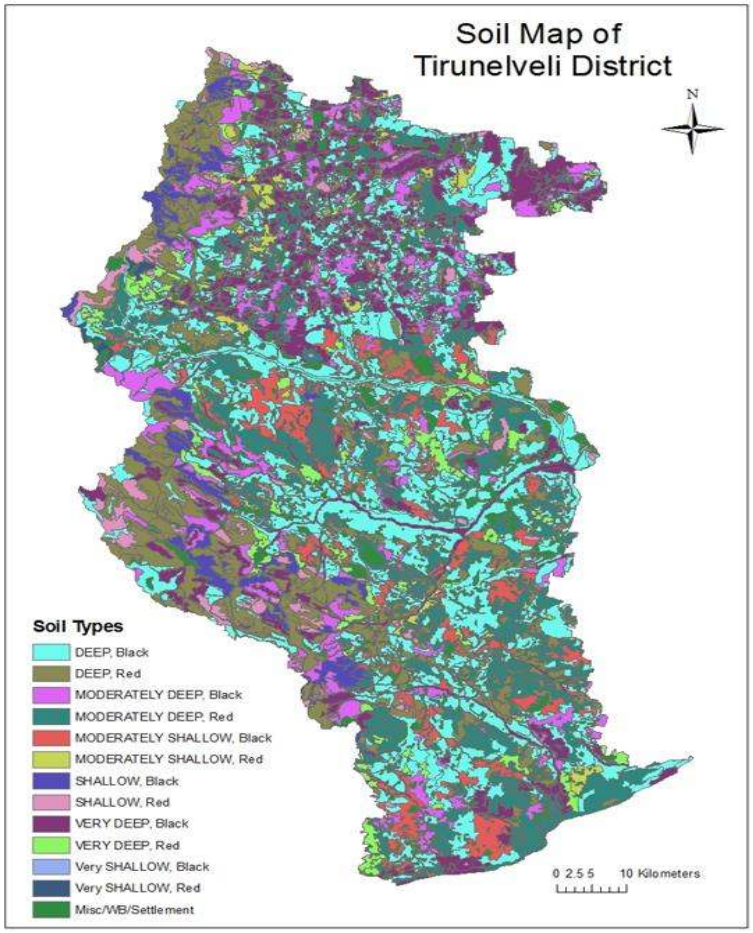
1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

Annexure 1. Location map of Tirunelveli district and the blocks




Annexure 2. Mean annual rainfall of Tirunelveli district of Tamil Nadu
Rainfall (mm)
200
180
160
140
120
100
80
60
40
20
0
38
26
38
61
39
11
7
16
33
162
190
107
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.

Annexure 3. Soil map of Tirunelveli district



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation : Kharif season (Tenkasi and Shenkottai block only)

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop /cropping system**	**Change in crop /cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 3rd week)	Red soils	Sorghum and Bajra	No change	Dry sowing, broad bed furrow with Increased seed rate by 1.5 times. Seed hardening by soaking seeds with 2 % KH_2PO_4 for 6 hours	Linkage with RKVY/other schemes for broad bed furrow implements
Delay by 4 weeks (July 1st week)			Short duration pulses (TMV 1 Black gram) Green manure (Daincha / Sun hemp) (Crops Specify)	Seed pelleting, ($ZnSO_4$ at 100 ppm) Dry sowing, broad bed furrow	
Delay by 6 and 8 weeks (July 3rd week)			Green manures (Daincha / Sunhemp)	-	Green manure seeds obtained from Dept. of Agri.

2.1.2 Rainfed situation : Rabi season

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (October 3rd week)	Red soils	Sorghum / Bajra / Maize	No change	Dry sowing, broad bed furrow with increased seed rate by 1.5 times. Seed hardening by soaking seeds with 2 % KH_2PO_4 for 6 hours	--
		Blackgram/Greengram		Seed pelleting ($ZnSO_4$ and $MnSO_4$ for black gram and green gram respectively)	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
		Minor millets	No change	Dry sowing, broad bed furrow with Increased seed rate by 1.5 times. Seed hardening by soaking seeds with 2 % KH_2PO_4 for 6 hours	Linkage with Government departments for broad bed furrow implements
	Black soils	Cotton		Acid delinting of seeds, Dry sowing, broad bed furrow Foliar spray of 0.5 % $ZnSO_4$ and 1.0 % $MgSO_4$ on 45 and 60 DAS	
		Maize		Seed hardening, Dry sowing, broad bed furrow	
		Blackgram/Greengram		Seed Pelleting, ($ZnSO_4$ and $MnSO_4$ for black gram and green gram respectively) Dry sowing, broad bed furrow	
Delay by 4 weeks November 1st week	Red soils	Sorghum / Bajra / Maize	Sorghum + Cow pea, Black gram, Green gram Bajra + Cluster bean CO4, CO6 (75-80 days duration)	Adopt paired row inter cropping system Maintain optimum population (sorghum – 100 % and cowpea – 50 %)	
		Blackgram/Greengram	Minor millets	Seed Pelleting, ($ZnSO_4$ and $MnSO_4$ for black gram and green gram respectively) Dry sowing, broad bed furrow	--
	Black soils	Cotton	Gengelly / Maize / Bajra /Minor Millets	Acid delinting of seeds, Dry sowing, broad bed furrow Foliar spray of 0.5 % $ZnSO_4$ and 1.0 % $MgSO_4$ on 45 and 60 DAS	Linkage with Government Departments for cotton MN mixture
		Maize	Maize + Green gram, Black gram, lab lab	Seed hardening, Dry sowing, broad bed furrow	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
			COH3 with 100 days duration (Drought resistant variety)		
		Pulses	Sesame / Maize / Bajra		Linkage with NFSM for seed supply

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks (November 3rd week)	Red soils	Sorghum / Bajra / Maize	Minor millets / sesame (TMV3 and Co1)	Dry sowing with Increased seed rate of 15 to 20 % in broad bed furrow Seed hardening by soaking seeds with 2 % KH_2PO_4 for 6 hours	Seeds can be purchased from State Seed farm or seed corporation / Agri. Dept.
		Pulses	Minor millets / Sesame (TMV3 and Co1)	Seed hardening, Dry sowing, broad bed furrow	--
		Minor millets	Minor millets / Sesame		--
	Black soils	Cotton	Coriander + onion or Groundnut	Inter crop with Ragi or minor Millet (Row ratio Specify)	--
		Maize	Minor millets / Groundnut	--	--
		Pulses	Minor millets / Groundnut	--	--
Delay by 8 weeks (December 1st week)	Red soils	Sorghum / Bajra / Maize	Fodder sorghum / Bajra / Minor millets	Seed hardening,with KH_2PO_4 at 2 % Dry sowing, broad bed furrow	Seeds can be purchased from State Seed farm or seed agency / Agri. Dept.
		Pulses	Sesame (TMV3 and Co1)	Seed hardening, Dry sowing, broad bed furrow	--

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
		Minor millets	-	-	--
	Black soils	Cotton	Sesame / Bajra /Minor Millets / Groundnut (TMV 7, VRI1, Co2 and Co3)	1. Delinting of cotton seeds with Conc, H_2SO_4 @ 100 ml/kg 2. Foliar spray of 0.5 % $ZnSO_4$ and 1.0 % $MgSO_4$ on 45 and 60 DAS	--
		Maize	Gengelly / Bajra /Minor Millets / Groundnut	Seed hardening, Dry sowing, broad bed furrow	--
		Pulses	Sesame (TMV3 and Co1)	--	--

Rainfed situation Kharif (Tenkasi and Shenkottai block only)

Condition	Kharif season		Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Early season drought (Normal onset, followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.)	All Red soils	Sorghum and Bajra	No change	Nursery can be raised and gap filling can be done. Apply phorate 10 G 180 g or Carbofuran 3 G 600 g mixed with 2 kg of moist sand, spread on the beds and work into the top 2 cm of soil to protect the seedlings from shootfly infestation.	Broad bed furrow implements can be obtained from Agrl. Engg. Dept.
At vegetative stage				Spray 3% Kaolin (30 g in one litre of water) during periods of stress.	
At reproductive stage				Supplemental irrigation if possible from harvested water	
Terminal drought					

Rainfed situation Rabi

Condition	Rabi		Suggested Contingency measures		
Early season drought (Normal onset, followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.)	**Major Farming situation**	**Crop /cropping system**	**Crop management**	**Soil management**	**Remarks on Implementa-tion**
	All Red soils	Sorghum / Bajra / Maize	Resowing in broad bed furrow with Increased seed rate by 1.5 times if the plant population is very low Thinning	--	Implements can be obtained from Agri. Dept.
		Pulses		--	
	All Black soil	Minor millets	-do-		
		Cotton		Intercultivation	
		Maize	Thinning and leave only one healthy and vigorous seedling per hill on the 7th or 8th day of sowing.	Form ridges and furrows, 6 m long and 60 cm apart before sowing	
		Pulses	If the population is very poor re-sowing can be taken up		
At vegetative stage	All Red soil	Sorghum / Bajra	Sow the seeds in flat bed and form furrows between crop rows during intercultivation during on third week after sowing. Apply phorate 10 G 180 g or Carbofuran 3 G 600 g mixed with 2 kg of moist sand, spread onthe beds and work into the top 2 cm of soil to protect the seedlings from shootfly infestation		Implements can be obtained from Agri. Dept.
		Maize		Ensure optimum moisture availability during the most critical phase (40 to 65 days after sowing) by conserving	

Condition	Rabi		Suggested Contingency measures		
Early season drought (Normal	**Major Farming situation**	**Crop /cropping system**	**Crop management**	**Soil management**	**Remarks on Implementa-tion**
				moisture by weed mulching and supplemental irrigation if possible	
		Pulses	Spray 2 per cent Diammonium phosphate at the time of first appearance of flowering.		
	All Black soils	Minor millets			
		Cotton	-	Intercultivation	
		Maize	-		
		Pulses	Spray 2 per cent Diammonium phosphate at the time of first appearance of flowering.		

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation**	**Crop /cropping system**	**Crop management**	**Soil management**	**Remarks on Implementation**
At reproductive stage	All Red soils	Sorghum / Bajra	Thinning and weeding	Soil and Weed mulching	Implements can be obtained from Agri. Dept.
		Maize		Soil and weed mulching to conserve soil moisture	
		Pulses	Spray 2 per cent Diammonium phosphate at the time of first appearance of flowering and repeat after 15 days of first spraying. Spray NAA 40 ppm twice at first appearance of flowers and after a fortnight.		

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation**	**Crop /cropping system**	**Crop management**	**Soil management**	**Remarks on Implementation**
	Black soil	Minor millets	Thinning, Life saving irrigation, Weeding	Weed mulching	
		Cotton	Thinning (Remove 30 % of week seedlings)	Soil and weed mulching	
		Maize	Thinning (Remove 10 % of week seedlings)	Soil and weed mulching	
		Pulses			

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Red soils	Sorghum / Bajra	Life saving irrigation or harvest for fodder	Soil and weed mulching to conserve soil moisture	--
		Maize			
		Pulses	Life saving irrigation Weeding		
	Black soils	Minor millets	Harvest for fodder	Soil and Weed mulching	
		Cotton			
		Maize			
		Pulses			

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**

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	Low land tube well canal irrigated red and black soil	Paddy (sub merged condition)	Maize (Pioneer, Rasi, Nuzuveeds and Kaveri Hybrids)and Aerobic Rice (ASD 18, ADT 36, MDU 5)	Limited irrigation Alternate Furrow irrigation Drip irrigation (Hybrid rice)	Seeds can be sourced from Agri. Dept.

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of monsoon in catchment	Red soil	Paddy	Maize	Ridges and furrow	Seeds can be sourced from Agri. Dept.
	Black soil		Ragi/Bajra	Beds and channel	
	Red soil	Maize	Ragi/Bajra		
	Black soil		Ragi/Bajra		
	Red soil	Ragi	Bajra		
	Black soil		Sesame		
	Red soil	Bajra	Green manure / Pulse Sesame		
	Black soil				
	Red soil	Groundnut			
	Black soil				

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	Red soil	Paddy	Bajra / Ragi	Beds and channel	Seeds can be sourced from Agri. Dept.
		Maize			
		Bajra / Ragi	-		
	Black soil	Paddy (Sep-Dec)	Maize/Vegetables (Sep-Dec)		
		Maize	Bajra / Ragi		
		Bajra / Ragi	-		

Condition			Suggested Contingency measures

	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation[j]
Insufficient groundwater recharge due to low rainfall	Tube well red and black soil	Paddy	Aerobic Rice, Maize and Vegetables (Tomato, Chilli and Brinjal)	1.Limited irrigation 2. Alternate Furrow irrigation 3. Drip irrigation	Seeds can be sourced from Agri. Dept.
Any other condition (specify)	Water logging in the coastal area	Paddy	Paddy with salt tolerant and long duration varieties (TRY 1, Co 43)	Nutrition through foliar application (K + Zn @ 1% and 0.5 % respectively)	

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

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Paddy	Drainage	Drainage	Drain out excess water Harvesting at physiological maturity	Shift to safer place
Maize			Drain out Harvesting at physiological maturity stage or Harvest for fodder	Shift to safe place dry in shade and turn frequently
Ragi			Drain out Harvest for fodder purpose	Safe storage against storage pest and disease
Sorghum / Bajra			Drain out excess water	Safe storage against storage pest and disease
Groundnut / Sesame	Drainage	Drainage	Drain out excess water	Safe storage against storage pest and disease
Horticulture				
Mango	-	-	-	-
Guava	-	-	-	-
Heavy rainfall with high speed winds in a short span[2]				
Horticulture				
Banana, Mango, Sapota	-Drainage	Form the drainage trenches along the slope	Form the drainage trenches along the slope -	Spray copper oxy chloride @ 0.05 %

Outbreak of pests and diseases due to unseasonal rains				
Paddy (Army worm and Stem borer)	Release egg parasites	Spray systemic pesticide (Dimethoate)	Spray systemic cum contact pesticide (Chlorpyriphos)	Safe storage against storage pests and diseases
Horticulture				
Mango weevil, mango hopper	-	Spray contact pesticide with rocker sprayer	-	
Sooty mould and fruit rot	Release bio-control agents Application of Trichoderma	Spray systemic fungicide (Copper oxy chloride) with rocker prayer	Cut and remove the affected and dried portions and Apply boreaux mixture paste on the cut end.	

2.3 Floods : Not applicable for Thirunelveli district

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days	NA			
Sea water inundation				

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	NA			
Cold wave				
Frost				
Hailstorm				

Sugarcane			Propping the matured cane	
Cyclone				
Banana			Fix the supporter	

2.5 Contingent strategies for Livestock, Poultry & Fisheries

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	Assess the requirement of reserve fodder and promote conservation of dry fodder, fodder grasses and sugarcane tops. Promote preparation of urea molasses licks, bricks made of fodder, urea, molasses and fortification of paddy straw with urea molasses Manufacturing of concentrate feed at subsidised rate using damaged grains should be encouraged Creation of fodder banks at village levels based on the livestock population. Encouraging farmers to cultivate short-term fodder crops like sun hemp. Curbing the movement of crop residues from the district. Popularization of chaff cutters to reduce wastage of precious fodder sources. Provide transport subsidy for transporting fodder to camps from other districts Keeping sufficient stock of mineral	Feeding unconventional and locally available cheap feed ingredients and crop residues by sprinkling sodium chloride. Feeding urea molasses blocks, total mixed rations; Make available at least 1 compact feed block and 5 kg treated dry fodder per cow per day Use of salt licks for goats calves etc. Feeding of tree fodder should be encouraged. Chaffing of green and dry fodder to avoid wastage. Regular supplementation of Minerals to prevent infertility. Advising to feed concentrates during cooler parts of the day. Advising not to graze during hotter parts of the day. Supplementation of probiotics and vitamins to improve feed utilisation	Feeding ad libitum green fodder including legumes to restore the normal production levels. Mineral supplementation for heifers and cows should be regularised. Supply of quality seeds of COFS 29, AT Maize, Stylo etc. well before monsoon and motivating the farmers to cultivate maximum fodder utilising monsoon Motivating farmers to produce fodder seeds and slips. Farmers should be advised to breed their cows during July-August-September so that the peak milk production does not coincide with peak summer. Hence the feed and fodder requirements could be kept under control.

	mixture. Earmarking forest bead areas to allow for grazing animals during scarcity		
Drinking water	Creation of drinking water facilities in the veterinary institutions and common grazing areas in the villages Collection of particulars regarding availability of potable water in adverse conditions.	Provide clean drinking water treated with Sanitizers. Filling of community water tank on daily basis. Transportation of potable water to the needy areas.	Digging of bore wells and creation of water reservoirs.
Health and disease management	**Anthrax** **Bovines** Vaccination against Anthrax during, January, April, May, and October in Melaneellithanallur, Shengottai, Manur, Kadayanallur, Sankarankoil and Keelapavur blocks. **Ovines** Vaccination during February, May, June, August and November in Sankarankoil, and Manur blocks. **Foot and Mouth Disease** Vaccination against FMD during September and October, in Sankarankoil, Kuruvikulam, Nanguneri, Sengottai, Kalakad, Ambasamudram, Palayamkottai, Kadayam, Vallioor, Radhapuram, Pavoorchatram, Vasudevanallur and Manur blocks. **Sheep pox** Vaccination against sheep pox during March and April in Kadayam, Kalakad,Vallioor, Radhapuram and Manur blocks.	**Anthrax** • Reporting to local Veterinarian, ADIU and VUTRC. • Segregation of affected animals and treat them. • Incineration or deep burial of dead animals. • Disinfection with formaldehyde. • Proper hygienic measures while handling the dead or affected animals. **FMD** • Reporting to local Veterinarian, ADIU and VUTRC. • Segregation of affected animals and treat them. • Avoiding affected animals for grazing. • Disinfection of animal sheds, equipments and surroundings with sodium carbonate.	Sending disease outbreak annual and completion report. Keeping vigil on the disease outbreak. General: Nutritional supplementation Breeding management

	Blue Tongue Vaccination against Blue tongue disease during October and November in Manur, Palayamkottai, Kuruvikulam, Melaneelithanallur, Sankarankoil, Kalakad, Vasudevanallur, Alankulam, Keelapavur, Kadayanallur, Nanguneri, Sengottai, Radhapuram, Cheranmahadevi, Pappakudi and Ambasamudram blocks. **PPR** Vaccination against PPR disease during October and November in Manur, Kadayanallur, Kuruvikulam and Pavoorchathiram block. **Enterotoxaemia** Vaccination against Enterotoxaemia during January and September in Sankarakoil, Palayamkottai and Kuruvikulam blocks. **Haemorrhagic septicaemia** Vaccination against Haemorrhagic septicaemia during November in Sengottai blocks. **Brucellosis** Calfhood vaccination against Brucellosis in Vasudevanallur, Kadayanallur, Sengottai, Tenkasi and Ambasamudram blocks.	• Avoid feeding calf with milk from affected animals. **Blue tongue** • Isolation of affected animals. • Reporting to local Veterinarian, ADIU and VUTRC. • Spraying insecticides against Culicoides. • Disinfection of animal sheds, equipments and surroundings • Avoid stagnation of water aroung animal houses. **PPR** • Reporting to local Veterinarian, ADIU and VUTRC. • Segregation of affected animals and treat them. • Proper disposal of fomites. General: • Entering the data and information in the electronic media at the NIC Centre at the district Collectorate. • Preparation of disease investigation report and sending collected specimens to CRL and CUL. • Deployment of vaccination squad for performing ring vaccination (8 k.m. radius). • Preventing movement of	

		livestock in the affected area. • Nutritional supplementation • Summer management of livestock. • Snail control measures in the water bodies.	
Floods			
Rescue and Rehabilitation	A control room should be established in the headquarters for information exchange, co ordination of veterinary support and should be manned by Veterinary Public relations officer Rapid response teams with Veterinary and Para Veterinary staff should be established to reach the flooded areas for emergency treatments The personnel in the mobile hospitals should be adequately trained in animal rescue operations, CPR, first aid etc. Preparations for shifting/evacuation of livestock from flooded areas should be readied with sufficient equipments, first aid kits, portable corrals, communication gadgets etc. Creation of contingency fund with the officer in charge for vehicle hiring charges, rescue, rehabilitation of marooned animals and birds Farmers should be advised to house their livestock in elevated areas with proper drainage facilities Advise the farmers to bring their livestock under Insurance cover against natural calamities	Animals are untied and released from cages to allow them to swim, escape drowning and reach safer places Rescue, transport, transfer of rescued animals to temporary sheds in elevated places.	Flooded areas to be toured and temporary camps should be conducted to provide veterinary aid to animals The loss of livestock should be assessed for providing compensation to the livestock farmers Insurance claims could be prepared for compensating the loss of insured livestock Provision of interest free loans to purchase animals and replenish the livestock numbers in the district Mobilising the services of private organisations in the district to provide support to sustain livestock farming activity
Feed and fodder availability	Farmers should be advised to protect the feed and fodder resources before	The livestock should be fed in temporary shelters with hay, silage,	Feeding ad libitum green fodder including legumes to restore the normal production levels.

	the onset of monsoon The sources within and outside the district should be alerted of the emergency situation for the supply of dry fodder, crop residues, Urea molasses salt licks, mineral mixtures etc. Educating farmers to collect sufficient green fodder, tree leaves and other edible plants on receipt of flood warning The requirements and complete programme of catering to feed and fodder supply should be kept ready with the officer in charge of the action during floods	concentrate feed, Urea molasses blocks, total mixed rations brought in from other places	Mineral supplementation for heifers and cows should be regularised. Supply of quality seeds of COFS 29, AT Maize, Stylo etc. and motivating the farmers to cultivate and harvest well before onset of monsoon
Drinking water	The requirements of drinking water needed in the affected areas should be assessed and arrangements to be made to provide clean, sanitised water for the livestock	Clean chlorinated drinking water should be provided in required quantities to livestock in the temporary shelters and pens	
Health and disease management	**Anthrax** **Bovines** Vaccination against Anthrax during, January, April, May, and October in Melaneellithanallur, Shengottai, Manur, Kadayanallur, Sankarankoil and Keelapavur blocks. **Ovines** Vaccination during February, May, June, August and November in Sankarankoil, and Manur blocks. **Foot and Mouth Disease** Vaccination against FMD during September and October, in Sankarankoil, Kuruvikulam, Nanguneri, Sengottai, Kalakad, Ambasamudram, Palayamkottai,	**Anthrax** • Reporting to local Veterinarian, ADIU and VUTRC. • Segregation of affected animals and treat them. • Incineration or deep burial of dead animals. • Disinfection with formaldehyde. • Proper hygienic measures while handling the dead or affected animals. **FMD** • Reporting to local Veterinarian, ADIU and	Sending disease outbreak annual and completion report. Keeping vigil on the disease outbreak. General: Nutritional supplementation Breeding management

	Kadayam, Vallioor, Radhapuram, Pavoorchatram, Vasudevanallur and Manur blocks. **Sheep pox** Vaccination against sheep pox during March and April in Kadayam, Kalakad,Vallioor, Radhapuram and Manur blocks. **Blue Tongue** Vaccination against Blue tongue disease during October and November in Manur, Palayamkottai, Kuruvikulam, Melaneelithanallur, Sankarankoil, Kalakad, Vasudevanallur, Alankulam, Keelapavur, Kadayanallur, Nanguneri, Sengottai, Radhapuram, Cheranmahadevi, Pappakudi and Ambasamudram blocks. **PPR** Vaccination against PPR disease during October and November in Manur, Kadayanallur, Kuruvikulam and Pavoorchathiram block. **Enterotoxaemia** Vaccination against Enterotoxaemia during January and September in Sankarakoil, Palayamkottai and Kuruvikulam blocks. **Haemorrhagic septicaemia** Vaccination against Haemorrhagic septicaemia during November in Sengottai blocks. **Brucellosis** Calfhood vaccination against Brucellosis in Vasudevanallur,	VUTRC. • Segregation of affected animals and treat them. • Avoiding affected animals for grazing. • Disinfection of animal sheds, equipments and surroundings with sodium carbonate. • Avoid feeding calf with milk from affected animals. **Blue tongue** • Isolation of affected animals. • Reporting to local Veterinarian, ADIU and VUTRC. • Spraying insecticides against Culicoides mosquitoes • Disinfection of animal sheds, equipments and surroundings • Avoid stagnation of water around animal houses. **PPR** • Reporting to local Veterinarian, ADIU and VUTRC. • Segregation of affected animals and treat them. • Proper disposal of fomites. General: • Preparation of disease investigation report and sending collected specimens	

	Kadayanallur, Sengottai, Tenkasi and Ambasamudram blocks.	to CRL and CUL. • Deployment of vaccination squad for performing ring vaccination (8 k.m. radius). • Preventing movement of livestock in the affected area. • Regular disinfectant and insecticide spraying of livestock premises • Entering the data and information in the electronic media at the NIC Centre at the district Collectorate.	
Cyclone			
Heat wave and cold wave			

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought				
Feeding, Health and Disease management	Vaccination against Ranikhet disease and IBD. Deworming Provision of foggers and sprinklers to reduce heat load. Supplementation of vitamins, minerals and antistress formula. Planning to avoid laying period from 15th April to	Feeding during cooler parts of the day (early morning and evening). Mixing water in the concentrate mash and feeding Increasing the height of deep litter. Reducing the number of birds per shed. Provision of ceiling fan	1. Nutritional supplementation of poultry. 2. Preparation of road map for increasing the feed ingredients production. 3. Ensuring enough stock of ingredients in the future. Disease Outbreak:	TANUVAS Agro Meteorological Advisory Centre, Namakkal. Linked to the regular vaccination programmes of the Department of Animal Husbandry.

	15th June. Avoiding purchase of chicks between October to January.	@ one per 1000 sq.ft. Anticoccidial supplementation. Supplementation of vitamins and minerals. Avoiding vaccination and debeaking. Reducing the energy density of ration and increasing the lysine, methionine and Vitamin C in the ration. Adding potassium chloride and sodium bicarbonate in the ration @ 38 g per Tonne of feed. Storing the feed only for short duration to avoid loss of vitamins. **Disease Outbreak**: Reporting the outbreak to the local veterinarian. Isolation and treatment affected stock. Proper disposal of dead birds. Collection of samples and send to CRL and CUL.	1. No poultry should be introduced in the area for next 3 months. 2. Compensation for forced culling. 3. Sending the disease outbreak annual and completion report.	
Drinking water	The requirements of drinking water needed in the affected areas should be assessed and arrangements to be made to provide clean, sanitised water	Continuous supply of cool potable water by increasing the number of waterers. Providing water with ice cubes. Proper water sanitation.		

		Filling overhead tanks with water in the afternoons. Providing B-Complex and Vitamin C in water.		
Floods				
Rescue and Rehabilitation	Preparations for shifting/evacuation of Poultry from flooded areas should be readied with sufficient equipments, first aid kits, portable corrals, communication gadgets etc. Creation of contingency fund with the officer in charge for vehicle hiring charges, rescue, rehabilitation of marooned animals and birds Farmers should be advised to house their poultry in sheds constructed in elevated areas with proper drainage facilities	Rescue, transport, transfer of rescued animals to temporary sheds in elevated places. Birds are rescued with bamboo baskets and transferred to temporary pens	The loss of poultry should be assessed for providing compensation to the farmers Provision of interest free loans to establish new poultry units in the district	
Feeding, Health and Disease management	Vaccination against Ranikhet disease and IBD. Deworming Supplementation of vitamins, minerals and antistress formula.	Provision of Supplementation of vitamins and minerals. **Disease Outbreak**: Reporting the outbreak to the local veterinarian. Isolation and treatment affected stock. Proper disposal of dead birds. Collection of samples	1. Nutritional supplementation of poultry. 2. Preparation of road map for increasing the feed ingredients production. 3. Ensuring enough stock of ingredients in the future. Disease Outbreak:	TANUVAS Agro Meteorological Advisory Centre, Namakkal. Linked to the regular vaccination programmes of the Department of Animal Husbandry.

		and send to CRL and CUL.	1. No poultry should be introduced in the area for next 3 months. 2. Compensation for forced culling. 3. Sending the disease outbreak annual and completion report.	
Drinking water	The requirements of drinking water needed in the affected areas should be assessed and arrangements to be made to provide clean, sanitised water	Provision of sanitised water in the temporary sheds. Providing B-Complex and Vitamin C in water.		
Cyclone				
Heat wave				
Shelter/environment management	Before Heat wave: Plantation of trees around the poultry shed. Purchase of new or regular upkeep of the existing sprinklers/foggers. Hanging the wet gunny bags on the sides of the shelter to provide a cooler environment.	During Heat wave: Keep the shelter fully aerated. Use water sprinklers and foggers. Use of industrial fans. Use of wet gunny bags along the sides of the shelter. Trees must not be pruned during the heat wave. Reduce the stock density in deep litter system. Supplementation of anti-stress formulation in the feed.		
Health and disease management	Before Heat wave: Assessment of RD titre	During Heat wave: Continuous supply of		

	and vaccination against RD and IBD. Deworming of poultry. Provision of foggers and sprinklers to reduce heat load. Supplementation of vitamins and minerals. Proper planning and disposal of batch between September to January to avoid mortality during the summer. Provision of cooler environment in the farm premises by tree plantation.	cool potable water. Feeding during cooler part of the day (early morning and evening). Increasing the height of deep litter. Reducing the number of birds per shed. Provision of ceiling fan @ one per 1000 sq.ft. Anticoccidial measures. Summer management of poultry- use of foggers and sprinklers Supplementation of vitamins and minerals. Avoiding vaccination and debeaking during summer. Storing the feed only for short duration to avoid loss of vitamins. Avoiding having stock of layers between 21 to 36 weeks of age. **Disease Outbreak**: Reporting the outbreak to the local veterinarian. Isolation and treatment affected stock. Proper disposal of dead birds. Collection of samples and send to CRL and CUL.		

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	Repairing the crafts and gears	Repairing the crafts and gears.	Training the fishermen in hygienic handling of fishes and fish processing.
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Drying and disinfecting the ponds	Drying and disinfecting the ponds	Training the fish farmers in fish culture practices
(ii) Changes in water quality	Analysing the water quality parameters	---	Assessing the microbial load of the sediment and water.
(iii) Any other	---	---	---
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Harvesting the fish tanks	Desilting the tanks for rectifying disease problem.	Training the fish farmers in composite fish culture practice
(ii) Impact of salt load build up in ponds / change in water quality	Assessment of water hardness and salinity check.	Assessing the environmental parameters for algal check.	Conducting awareness camps in fish culture practices.
(iii) Any other	---	---	---
2) Floods			
A. Capture			
Marine	Repairing the crafts and gears.	Keep the crafts and gears in safe condition.	Training the fishermen in hygienic handling of fishes, fish preservation and processing.
Inland			
(i) Average compensation paid due to loss of human life	Keep the flood warning systems in alert condition	Keep the inlets and outlets in alert condition to tackle flood water rush.	Survey the human loss for paying compensation benefits.
(ii) No. of boats / nets/damaged	---	---	---
(iii) No.of houses damaged	Alert the fish farmers before floods	Warning systems to be alerted	Survey on the houses damaged

(iv) Loss of stock	Sampling the fish stock in tanks and ponds.	---	Sampling the tanks and ponds for loss of fish stock.
(v) Changes in water quality	Environmental monitoring of the aquatic systems	Analysing the environmental parameters of the tanks and ponds	Assess the plankton productivity of tanks and ponds.
(vi) Health and diseases	Check the microbial load of the sediment and water	---	Check the presence of microbial pathogens in water and sediment.
B. Aquaculture			
(i) Inundation with flood water	Harvesting the farms.	Keeping the ponds without stocking	Making the ponds ready for stocking
(ii) Water continuation and changes in water quality	Water quality check	Water quality check.	Assessing the water quality for seed stocking.
(iii) Health and diseases	Checking the microbial load.	Checking the microbial load.	Water treatment for control of microbes.
(iv) Loss of stock and inputs (feed, chemicals etc)	---	---	---
(v) Infrastructure damage (pumps, aerators, huts etc)	---	---	---
(vi) Any other	---	---	---
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	Safety of fishermen and fishing accessories.	Safety of fishermen and fishing accessories.	Estimating the loss of lives for compensation.
(ii) Avg. no. of boats / nets/damaged	Safety of boats and nets.	Keeping the boats and nets in safe condition.	Assessing the damages to boats and nets.
(iii) Avg. no. of houses damaged	Safety of houses	Safety of houses	Estimating the loss for damaged houses.
Inland			
B. Aquaculture	---	---	---
(i) Overflow / flooding of ponds	---	---	---

(ii) Changes in water quality (fresh water / brackish water ratio)	---	---	---
(iii) Health and diseases	---	---	---
(iv) Loss of stock and inputs (feed, chemicals etc)	Training of fish farmers for safety of farm accessories	Safety of feeds, chemicals *etc.*	Estimate the losses.
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Alertness for safety of infrastructure.	Safety of infrastructure.	Renovation and reconstruction of infrastructure.
(vi) Any other	---	---	---
4. Heat wave and cold wave			
A. Capture			
Marine	Studying the temperature of water and assessing mass mortality of fishes.	Studying the environmental characters and removing the dead fishes.	Assessing the fish catches and provide compensation for fishermen.
Inland	---	---	---
B. Aquaculture			
(i) Changes in pond environment (water quality)	Studying the water temperature periodically.	Studying the water temperature periodically.	Take measures for control rise/fall of water temperature.
(ii) Health and Disease management	Monitoring the disease problem in cultured fishes.	Control mortality of fishes by providing disease treatment.	Remove infected animals and provide disinfection and treatment.
(iii) Any other			