

State: TAMILNADU

Agriculture Contingency Plan for District: VIRUDHUNAGAR

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Region / Sub Region (ICAR)	Tamil Nadu uplands and leeward flanks of south Sahyadris, hot, dry semi-arid eco-subregion (8.1)		
	Agro-Climatic Region (Planning Commission)	East Coast Plains and Hill Region (XI)		
	Agro Climatic Zone (NARP)	Southern zone (TN-5)		
	List all the districts or part there of falling under the NARP Zone	Ramanathapuram , Tirunelveli , Thoothukudi , Virudhunagar, Dindigul, Madurai and Pudukkottai		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		11° 56'21.84" N	79° 29'51.23" E	53.6m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Research Station, Aruppukottai-626101		
	Mention the KVK located in the district	TNAU-KVK, Regional Research Station Campus, Kovilangulam, Aruppukottai- 626101		
1.2	Rainfall	Average (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	180	1 st Week of June	2 nd week of October
	NE Monsoon(Oct-Dec):	258	3 rd week of October	2 nd Week of December
	Winter (Jan-Feb)	78		
	Summer (Mar-May)	137		
	Annual	653		

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)	424.3	26.5	70.5	0.8	9.6	6.6	4.5	15.2	160.6

1.4	Major Soils	Area (‘000ha)	Percent (%) of total
	Deep Black	193.3	65.7
	Deep Red	65.0	15.3
	Shallow Black	6.6	1.6
	Shallow Red	36.2	8.6
	Misc/WB/Settlement	37.6	8.9
1.5	Agricultural land use	Area (000’ ha)	Cropping Intensity
	Net sown area	137.3	102.6
	Area sown more than once	3.6	
	Gross cropped area	140.9	

1.6	Irrigation	Area ('000' ha)		
	Net irrigated area	59.3		
	Gross irrigated area	63.8		
	Rainfed area	77.9		
	Sources of Irrigation	Number	Area ('000 ha)	Percent (%)
	Canals	-	-	-
	Tanks	997	24.0	41.2
	Open wells	35659	36.5	58.3
	Bore wells	-	-	-
	Lift irrigation	-	-	-
	Other sources	-	-	-
	Total	-	60.5	100.0
	Pumpsets	-	-	-
	Micro-irrigation	-	-	-
	Groundwater availability and use	No. of Blocks	% area	Quality of water
	Over exploited	Nil	-	71% Good 25% medium saline 4% saline
	Critical	2	18.2	
	Semi- critical	4	36.4	
	Safe	5	45.5	
	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 ('000ha)					
		<i>Kharif</i>		<i>Rabi</i>		Summer	Total
		<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>		
	Paddy	11	-	24.3	1.3	2.5	28.2
	Maize	2.4	5.0	3.7	2.0	-	13.2
	Green gram	0.05	4.1	0.05	6.2	-	10.4
	Sorghum	0.09	1.9	0.1	7.2	-	9.3
	Cotton	0.9	4.0	1.1	2.6	-	8.7
	Groundnut	0.3	4.4	1.2	1.7	-	7.7
	Horticulture crops - Fruits	Total area ('000ha)					
	Mango	2.4					
	Banana	0.9					
	Guava	0.6					
	Sapota	0.5					
	Lemon	0.3					
	Horticultural crops - Vegetables	Total area					
	Onion	1.3					
	Tomato	0.2					
	Brinjal	0.2					
	Bhendi	0.1					
	Colacasia	0.05					
	Medicinal and Aromatic crops	Total area					
	Medicinal and Aromatic crops	-					
	Plantation crops	Total area					
	Coconut	8.9					
	Fodder crops	Total area					

	Fodder sorghum	7.1
	Others (CNH)	0.2
	Total fodder crop area	7.4
	Grazing land	-
	Sericulture etc	-

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive cattle(local low yielding)	35.0	63.5	98.6
	Crossbred cattle	31.1	151.2	182.4
	Non descriptive buffaloes (Local Low yielding)	6.8	14.0	20.8
	Graded buffaloes			
	Total Cattle Population			444.8
	Goat			362.2
	Sheep			14.0
	Others (camel, Pig, Yak etc.)			
	Commercial dairy farms (No)	--	--	--
1.9	Poultry	No. of farms	Total No of birds ('000)	
	Commercial	--	890571	
	Backyard	--	--	

1.10	Fisheries						
	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)	
	ii. Inland (Data Source : Fisheries Department)	No. Farmer Owned Ponds		No. of Reservoirs		No. of Village tanks	
		-		4		-	
	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)	32071.2		-		15492.22		
Others	--		--		--		

1.11 Production and Productivity of major crops (Average of last 3 years: 2006, 07, 08)

1.11	Name of crop	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)						
	Paddy	-	-	-	-	-	-	96.1	3778
	Maize	-	-	-	-	-	-	37.7	3691
	Green gram	-	-	-	-	-	-	0.7	595
	Sorghum	-	-	-	-	-	-	6.0	827
	Cotton	-	-	-	-	-	-	16.9	261
	Groundnut	-	-	-	-	-	-	9.0	3613
	Major Horticultural crops								

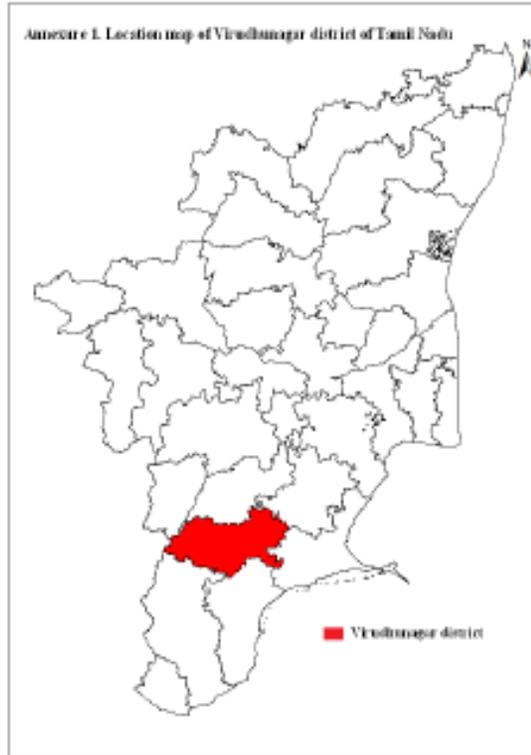
	Mango	-	-	-	-	-	-	11.7	65171
	Banana	-	-	-	-	-	-	45.6	35414
	Guava	-	-	-	-	-	-	7.5	11857
	Onion	-	-	-	-	-	-	5.0	4313
	Tomato	-	-	-	-	-	-	2.5	9318
	Brinjal	-	-	-	-	-	-	1.8	7667
Others	Bhendi	-	-	-	-	-	-	0.7	5015

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

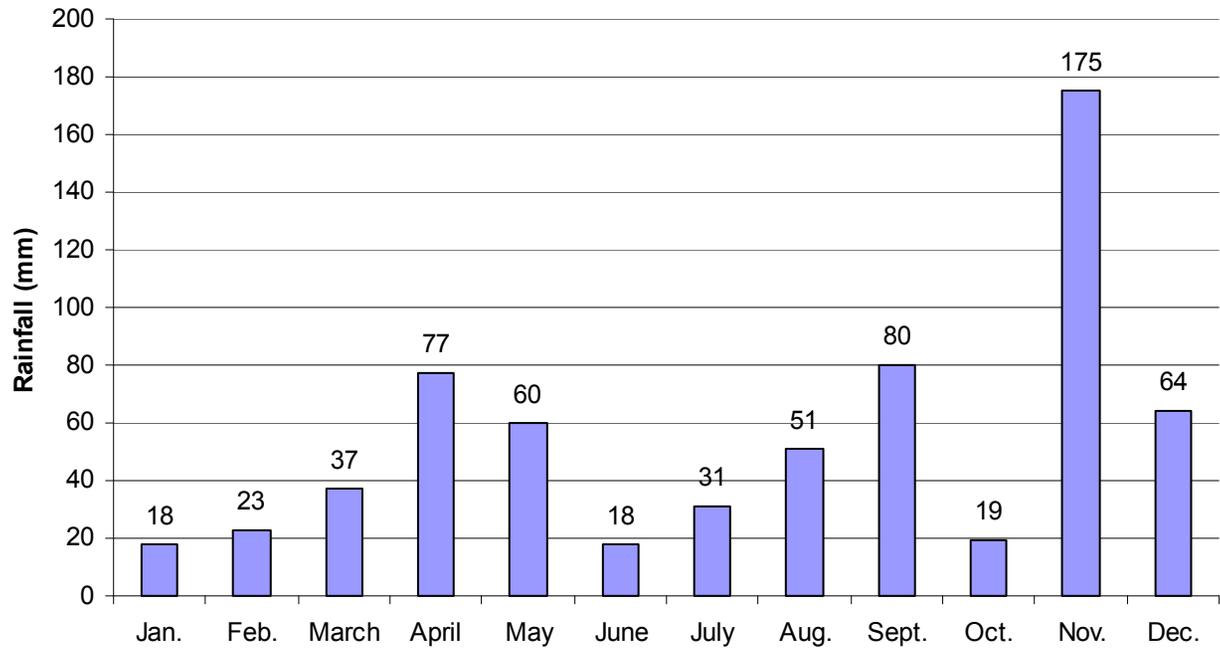
1.12	Sowing window for 5 major crops (start and end of sowing period)	Paddy	Maize	Green gram	Sorghum	Cotton
	Kharif- Rainfed	-	-	1 st week of June-1 st week of July	1 st week of June-1 st week of July	-
	Kharif-Irrigated	-	1 st week of June-1 st week of July	1 st week of June-1 st week of July	1 st week of June-1 st week of July	1 st week of June-1 st week of July
	Rabi- Rainfed	-	3 rd week of Oct.-1 st week of Nov.	3 rd week of Oct.-1 st week of Nov.	3 rd week of Oct.-1 st week of Nov.	3 rd week of Oct.-1 st week of Nov.
	Rabi-Irrigated	2 nd week of Sep-2 nd week of Oct	2 nd week of Sep-2 nd week of Oct	2 nd week of Sep-2 nd week of Oct	2 nd week of Sep-2 nd week of Oct	2 nd week of Sep-2 nd week of Oct

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

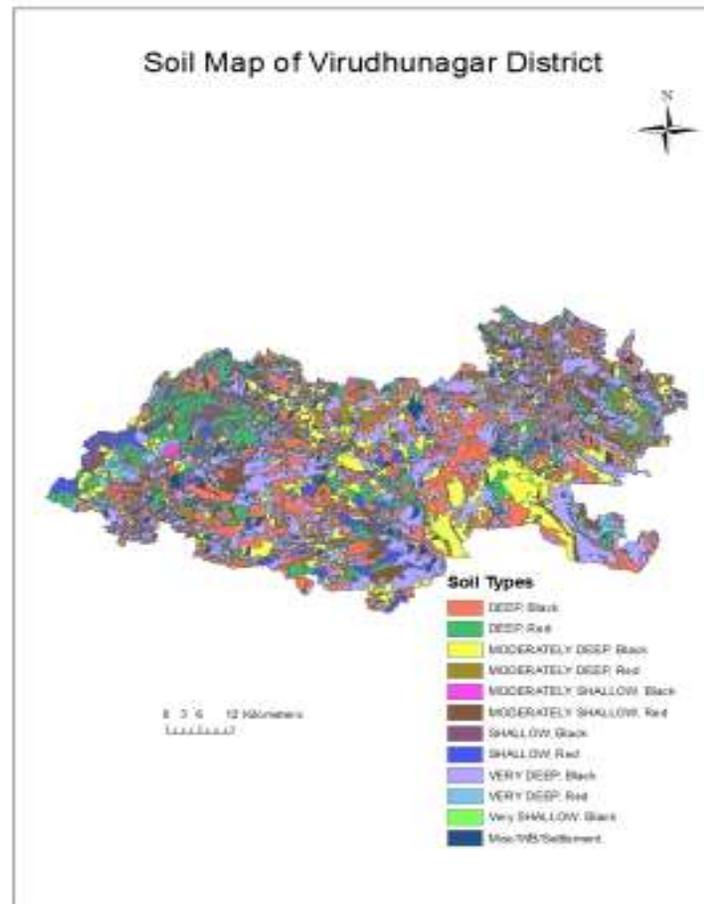
Annexure 1. Location map of Virudhunagar district and the blocks



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



Annexure3. Soil map of Virudhunagar District



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 2 weeks (3 rd week of June)	Vertisols	Cotton + Pulses/Lablab Redgram Black gram Green gram Fodder sorghum/ Sorghum + Redgram/lablab	No change	Seed hardening-(18 h. soaking in water followed by 24 h. shade drying Pre monsoon sowing with Seed drill	Linkage with state Department of Agriculture
	Alfisols	Groundnut + Redgram Maize			
Delay by 4 weeks (1 st week of July)	Vertisols	Cotton + Pulses	Cotton (KC 3)	Seed hardening-(18 hrs. soaking in water followed by 24 hrs. shade drying	
	Alfisols	Sorghum + Cowpea/lablab	Pearlmillet (CO (Cu) 9)	Sowing with Seed drill	
Delay by 6 weeks (3 rd week of July)	Vertisols	Cotton + Pulses	Sunflower (CO (SFV) 5)	Seed hardening-(18 hrs. soaking in water followed by 24 hrs. shade drying	
	Alfisols	Sorghum + Cowpea/lablab	Coriander (PKM1) Senna(KKM1)	Seed drill sowing	
Delay by 8 weeks (1 st week of	Vertisols	Cotton (SVPR 2) + pulses	Horsegram (CO 1)		

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
August)	Alfisols	Sorghum + cowpea/lablab	Horsegram (CO 1)		

Condition			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	Normal Crop/cropping system	Crop management	Soil management	Remarks on Implementation
	Vertisols	Cotton + Pulses/Lablab Redgram, Black gram Green gram Fodder sorghum/ Sorghum + Redgram/lablab	Re sowing/gap filling Thinning to retain one seedling at 30 cm Crop residue mulching	Intercultivation (soil mulching) Conservation Furrow Thinning Tied ridging Recommended doses of FYM 12.5 t/ha and Coirpith compost 12.5 t/ha	Linkage with state Department of Agriculture
	Alfisols	Groundnut + Redgram Maize			
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At vegetative stage	Vertisols	Cotton + Pulses/Lablab Redgram, Black gram, Green gram Fodder sorghum/ Sorghum + Redgram/lablab	Life saving irrigation using microirrigation system 1% KCl spray	Intercultivation (soil mulching) Conservation Furrowat intervals Tied ridging	Linkage with state Department of Agriculture

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Early season drought (Normal onset, followed by	Alfisols	Groundnut + Redgram Maize	3% Kaolin spray 100ppm Salicylic acid Water spray	Recommended doses of FYM 12.5 t/ha and Coirpith compost 12.5	

Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At reproductive stage	Vertisols	Cotton + Pulses/Lablab Redgram (Co5, Co6, Black gram (Co5, Co6, VBN 3, VBN 4, K1) Green gram (VBN 4, Co 6) Fodder sorghum/ Sorghum + Redgram/lablab	Life saving irrigation using microirrigation system 1% KCl spray 3% Kaolin spray	—	Linkage with state Department of Agriculture
	Alfisols	Groundnut + Redgram Maize	100ppm Salicylic acid Water spray		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Terminal drought	Vertisols	Cotton + Pulses/Lablab Redgram (Co5, Co6, Black gram (Co5, Co6, VBN 3, VBN 4, K1) Green gram (VBN 4, Co 6) Fodder sorghum/ Sorghum + Redgram/lablab	Life saving irrigation using microirrigation system Harvest at physiological maturity stage	-	Linkage with state Department of Agriculture
	Alfisols	Groundnut + Redgram Maize			

2.1.2 Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Low land tank/tube well / black soil	Paddy (sub merged condition)	SRI method of rice cultivation Maize Chillies	Alternate wetting and drying method of irrigation Limited irrigation with mulching Drip irrigation with residue mulching	Linkage with state Department of Agriculture
Condition	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	Low land tank/ tube well/ canal irrigated black soil	Paddy (sub merged condition)	Green manure (Sunnhemp) Horsegram	-	Linkage with state Department of Agriculture

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	Low land tank/ tube well canal irrigated black soil	Paddy (sub merged condition)	Rainfed maize, pulses and greenmanure	2% DAP spray for pulses Conservation Furrow Thinning Soil test based integrated nutrient management Recommended doses of FYM 12.5 t/ha and Coir pith compost 12.5 t/ha	Linkage with state Department of Agriculture

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Tube and open well black soil	Paddy	Maize, pulses,vegetables (Chilli, tomota and Brinjal)	Limited irrigation Alternate Furrow irrigation	Linkage with state Department of Agriculture
	Tube and open well red soil	Chillies	Pulses Chillies	Drip irrigation	

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations) - Not applicable

2.3 Floods - Not applicable

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone – Not applicable

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	<ol style="list-style-type: none"> 1. Development of drought resistant fodder crops. 2. Fodder depots should be set up in the State through which fodder will be distributed at subsidized rates. 3. Make your managerial decisions less sensitive to drought. 4. Educate the public about, how drought affects plants, grazing animals, and livestock management, and what options exist. 5. Monitoring of Rainfall and likely drought scenario from the beginning by Natural Disaster Management Division 6. Timely declaration of drought and initiation of drought relief measures 	<ol style="list-style-type: none"> 1. Provide fodder and animal feed to livestock and poultry, as needed. 2. If pasture conditions are extremely poor, producers may consider feeding cows in dry lot. This may be more cost effective than supplementation if large amounts of supplement must be transported and fed to cows daily. In addition, it may allow pastures a much needed rest period to begin recovering from drought. 3. One of the simplest ways to reduce cow nutrient requirements is to wean the calf. This practice can cut nutrient requirements by one-third to one-half depending on milk production of the cow. 4. Consider feeding alternative feeds. 5. Retaining a rotational grazing system during drought is recommended over continuous grazing because periodic rests help plants maintain vigor. Concentrating more animals into a single herd is recommended over having several smaller 	<ol style="list-style-type: none"> 1. At community level, collect and distribute fodder seedlings, as needed. 2. At community level, help negotiate soft-term credits for the poor families to restore economic activities (e.g., Animal Husbandry activities). 3. Provide subsidy for growing fodder and declare support price of fodder.

		<p>herds because by having more animals in a pasture, their entire pasture will be grazed more uniformly, and more use will be made of the less-preferred plants.</p> <p>5. Manufacturing cattle feed at subsidized rate by using damaged grains and oil cake.</p>	
Drinking water	<ol style="list-style-type: none"> 1. Construction of check dams and water reservoirs. 2. Construction of rain harvesting structures. 	<ol style="list-style-type: none"> 1. Cattle water requirements may double during hot weather. If cattle do not meet their water needs, they may refuse to eat, experience lowered production, and become sick. 2. One concern about cattle drinking stagnant pond water during hot, dry weather is that animals can die if water contains certain species of blue-green algae. If concentrations of blue-green algae are suspected, walk around to the windy side of the water body. If any dead animals such as mice, muskrats, birds, snakes, or fish are present, assume a poisonous condition exists. 	<ol style="list-style-type: none"> 1. Educate the farmers about the usage of water for animals and how to save the water.
Health and disease management	<ol style="list-style-type: none"> 1. State should organize a disaster management group in the Department dealing with Animal Husbandry and veterinary service with specially trained staff, epidemiological data & communication facilities. 2. The required field staff should be kept in constant readiness throughout the vulnerable months of the year. During lean period, the team should undertake preparedness and relief exercise to test their efficacy and preparedness 	<ol style="list-style-type: none"> 1. Bring the animals to the cattle protection camps organized by the Animal Husbandry department and get suitable ideas about the draught management practices. 	<ol style="list-style-type: none"> 1. Segregate the ailing, lactating and pregnant animals and fed them with suitable ration to overcome the post draught effect.
Floods			

Feed and fodder availability	<ol style="list-style-type: none"> 1. Make arrangements for safe storage of Feed, fodder, fertilizers and seeds, preferably in a common place where vigilance is possible, even during high floods. 2. In order to reduce the loss burden, it may appear to be necessary to harvest premature standing fodder crops (<i>viz.</i>, fodder sorghum, Co4 etc.) if there is a threat of such crops being inundated. 3. Dissemination the Flood forecast and Weather forecast 4. Activate the ‘Community-level Flood Management Committee’s .If there is none, form such a Committee and assign responsibilities/ duties to the members, individually and/or in small groups. 	<ol style="list-style-type: none"> 1. Opening of cattle camps and subsidized fodder 2. Association of NGOs and UN agencies .Use of Information Technology- web sites e-mail for communication 3. Districts & Block level committees involved in sanctioning and monitoring of relief works 4. Provide fodder and animal feed to livestock and poultry, as needed. 5. Safeguard the feeds and fodder. 	<ol style="list-style-type: none"> 1. In severe food scarcity, livestock can be fed jackfruit leaf, banana leaf, bamboo leaf, <i>Hijol</i> leaf, <i>Babla</i> leaf. Livestock can also be fed Urea Molasses Block.
Drinking water	<ol style="list-style-type: none"> 1. Put name tags or signs & symbols, preferably printed in permanent (water resistant) ink, on each of the items to be stored in a common storage. 	<ol style="list-style-type: none"> 1. Water from contaminated sources can be treated by using commercially available halogen-releasing tablets; freshly released halogen is supposed to kill unwanted bacteria and other microbiological elements present in water. These water purifying tablets are available on the market at affordable costs 2. Provide drinking water to livestock and poultry, as needed. 3. Install a hand pump and obtain enough large containers to water your animals for at least a week 	<ol style="list-style-type: none"> 1. During flood and post flood times, livestock should not drink water of ditches and of polluted cultivable water bodies. After ebbing of flood water, newly grown grass should not be fed, but some rainfall would decrease the toxicity of the grass. 2. Awareness camps on infection through water spread to be conducted.
Health and disease management	<ol style="list-style-type: none"> 1. Quick decision must be taken for relocation and sale of the livestock, depending on the forecast of the magnitude and longevity of flood. 	<ol style="list-style-type: none"> 1. Safeguard livestock and poultry from submergence (placing those on elevated platforms and rafts). 2. Keep recording the state of health of each 	<ol style="list-style-type: none"> 1. Livestock face many epidemic diseases after a flood. The major diseases of animals in the flood affected areas are anthrax, diarrhea,

	<ol style="list-style-type: none"> 2. It is necessary to relocate livestock to the relatives' houses in flood-free areas. If the numbers are many, some can be sold out in the market. 3. It is necessary to buy earlier some of the important medicine for livestock. 4. Make sure every animal has durable and visible identification. 5. It is necessary to relocate livestock to the relatives' houses in flood-free areas. If the numbers are many, some can be sold out in the market. 	<ol style="list-style-type: none"> of the animals. Transfer sick one to nearest animal health care center. 3. Periodically assess the state of health of the domestic animals and birds and arrange for vaccination. 4. Standing in floodwater for a long time may lead to livestock diseases, Particularly 'hoof disease'. Take precautions that livestock do not stand in submerged conditions. Put livestock in dry conditions, preferably by building a raised platform. 5. Disposal of dead animals: Carcass utilization is one method. Many animals in which treatment is unlikely to be beneficial may have to be put to sleep ie. Euthanasia ("mercy killing") 	malnutrition, foot and mouth disease etc.. and provide necessary steps to rectify the above problems.
Cyclone			
Feed and fodder availability	<ol style="list-style-type: none"> 1. Make arrangements for safe storage of Feed, fodder , fertilizers and seeds, preferably in a common place where vigilance is possible, even during high floods. 2. In order to reduce the loss burden, it may appear to be necessary to harvest premature standing fodder crops (<i>viz.</i>, fodder sorgam, Co4 etc.) if there is a threat of such crops being inundated. 3. Dissemination the cyclone forecast and Weather forecast 4. Activate the 'Community-level Flood Management Committee's .If there is none, form such a Committee and assign responsibilities/ duties to the members, individually and/or in small groups. 	<ol style="list-style-type: none"> 1. Opening of cattle camps and subsidized fodder 2. Association of NGOs and UN agencies 8.Use of Information Technology- web sites e-mail for communication 3. Districts & Block level committees involved in sanctioning and monitoring of relief works 4. Provide fodder and animal feed to livestock and poultry, as needed. 5. Safeguard the feeds and fodder 6. Feed blocks and mineral licks can be used for productive animals. 7. Young animals and pregnant animals to be fed adequately. 	1. In severe food scarcity, livestock can be fed jackfruit leaf, banana leaf, bamboo leaf, <i>Babla</i> leaf. Livestock can also be fed Urea Molasses Block.

	5. Field demonstration on paddy straw enrichment, silage making and cultivation of fodder grass.		
Drinking water	1. Install a hand pump and obtain enough large containers to water your animals for at least a week	1. Water from contaminated sources can be treated by using commercially available halogen-releasing tablets; freshly released halogen is supposed to kill unwanted bacteria and other microbiological elements present in water. These water purifying tablets are available on the market at affordable costs 2. Provide drinking water to livestock and poultry, as needed. 3. Install a hand pump and obtain enough large containers to water your animals for at least a week	1. During and after disaster times, livestock should not drink water of ditches and of polluted cultivable water bodies. After ebbing of flood water, newly grown grass should not be fed, but some rainfall would decrease the toxicity of the grass. 2. Awareness camps on infection through water spread to be conducted.
Health and disease management	1. Develop and disseminate public education materials on the care of animal in emergencies, disasters and evacuations that emphasize and encourage self-reliance among owners.	1. Provide care for injured and diseased animals 2. An important problem that has to be faced during disaster management of animals is the disposal of dead animals. This poses acute problems during floods and cyclone, as the number of animals dying would be enormous. Most states have fallen animal management programs and carcass utilization program. Admittedly, one administrative group does not uniformly handle these.	1. Livestock face many epidemic diseases after a flood. The major diseases of animals in the flood affected areas are anthrax, diarrhea, malnutrition, foot and mouth disease etc.. and provide necessary steps to rectify the above problems.
Heat wave and cold wave			
Shelter/environment management	1. Construct the animal house depending upon the geographical location of the particular place, type of animals etc... 2. Grow trees around the shelter.	1. During the heat and cold wave temporary structure should be provided to save the livestock. 2. Take necessary alteration in the feed	1. Providing the livestock with standard veterinary check up after the adverse climatic condition. 2. Ailing animals should be

		<p>provided to the animals depending upon the adverse climatic factor.</p> <p>3. Providing the animals with ad libitum of water and green fodder during the heat wave and provide them with anti stress drugs.</p>	<p>segregated and provide them with necessary care.</p>
Health and disease management	<p>1. Daily check up the health status of the animals.</p> <p>2. Vaccinate the animals periodically.</p> <p>3. Educate the farmers on disease management during the heat wave and cold wave situation.</p>	<p>1. Care must be take to reduce the environmental stress.</p> <p>2. Get advice from the technical persons about the management of stressful environment.</p>	<p>1. Provide the animals with supplemental feeding to regain the body condition which lost during the stressful time.</p>

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	<p>1. Development of poultry strains which are drought resistant.</p> <p>2. Manufacturing poultry feed at subsidized rate by using damaged grains and oil cake.</p> <p>3. Educate the public about, how drought affects plants, grazing animals, and livestock management, and what options exist.</p> <p>4. Monitoring of Rainfall and likely drought scenario from the beginning by Natural Disaster Management Division</p> <p>5. Timely declaration of drought and</p>	<p>1. Provide feed to poultry, as needed.</p> <p>2. Consider feeding alternative feeds.</p>	<p>1. At community level, collect and distribute feed, as needed.</p> <p>2. At community level, help negotiate soft-term credits for the poor families to restore economic activities (e.g., Animal Husbandry activities).</p>

	initiation of drought relief measures		
Drinking water	<ol style="list-style-type: none"> 1. Construction of check dams and water reservoirs. 2. Construction of rain harvesting structures. 3. Practice proper water conserving management systems. 	<ol style="list-style-type: none"> 1. Birds water requirements may double during hot weather. If birds do not meet their water needs, they may refuse to eat, experience lowered production, and become sick. 	<ol style="list-style-type: none"> 1. Educate the farmers about the judicious usage of water for animals and how to save the water. 2. Tree planting to be implemented to a major extent. 3. Repair work in the water channels and water resources to be carried out.
Health and disease management	<ol style="list-style-type: none"> 1. State should organize a disaster management group in the Department dealing with Animal Husbandry and veterinary service with specially trained staff, epidemiological data & communication facilities. 2. The required field staff should be kept in constant readiness throughout the vulnerable months of the year. During lean period, the team should undertake preparedness and relief exercise to test their efficacy and preparedness 	<ol style="list-style-type: none"> 1. Bring the Birds to the protection camps organized by the Animal Husbandry department and get suitable ideas about the draught management practices. 	<ol style="list-style-type: none"> 1. Segregate the ailing birds and fed them with suitable ration to overcome the post draught effect.
Floods			
Feed and fodder availability	<ol style="list-style-type: none"> 1. Collect and store enough feed for birds during flood. 2. The stored feed should have the longer self life. 	<ol style="list-style-type: none"> 1. Feed the birds with uncontaminated feed. 2. Feed storage building or tent should be rodent proof 	<ol style="list-style-type: none"> 1. Shells of snails and other mollusks , rice husks, oil-cake and extra household food may be used as supplementary feed for poultry.
Drinking water	<ol style="list-style-type: none"> 1. Collect and store enough potable water for birds during flood 	<ol style="list-style-type: none"> 1. Water from contaminated sources can be treated by using commercially available halogen-releasing tablets; freshly released halogen is supposed to kill unwanted bacteria and other microbiological elements present in water. These water purifying tablets are available on the market at affordable costs 2. Provide drinking water to livestock and 	<ol style="list-style-type: none"> 1. During flood and post flood times, poultry should not be provide with the drink water of ditches and of polluted cultivable water bodies. After ebbing of flood water, newly grown grass should not be fed, but some rainfall would decrease the toxicity of the grass. 2. Awareness camps on infection through water spread to be

		<p>poultry, as needed.</p> <p>3. Install a hand pump and obtain enough large containers to water your poultry for at least a week</p>	<p>conducted.</p>
Health and disease management	<p>1. Ensure that poultry have access to high areas in which to perch, if they are in a flood-prone area, as well as to food and clean water.</p> <p>2. Maintain the block with proper vaccination</p> <p>3. Essential drugs should be keeping in hand using during the disaster.</p>	<p>1. Disease affected birds and ailing birds should be separated and treated or culled and dispose it properly.</p>	<p>1. Provide the birds with adequate feed and water which is free from contamination.</p> <p>2. Feed the birds with supplemental minerals in order to the bring the birds to its normal productive life.</p>
Cyclone			
Feed and fodder availability	<p>1. If the potential risk for the livestock/poultry is deemed very high, minimize loss by selling before the cyclone, keep the money in a bank and start afresh after the cyclone.</p> <p>2. Be ready at any time to overcome the natural disaster.</p>	<p>1. Transfer the birds from the low lying area to the elevated grounds or a common shelter.</p> <p>2. Dead birds should be disposed in proper way to in order to prevent the disease transmission.</p>	<p>1. Before housing the birds to the original shed, shed should be sanitized.</p> <p>2. The feed fed to the birds should be check for ant contamination.</p>
Drinking water	<p>1. Collect and store enough potable water for birds during flood</p>	<p>1. Water from contaminated sources can be treated by using commercially available halogen-releasing tablets; freshly released halogen is supposed to kill unwanted bacteria and other microbiological elements present in water. These water purifying tablets are available on the market at affordable costs</p> <p>2. Provide drinking water to livestock and poultry, as needed.</p> <p>3. Install a hand pump and obtain enough large containers to water your poultry for at least a week</p>	<p>1. During flood and post flood times, poultry should not be provide with the drink water of ditches and of polluted cultivable water bodies. After ebbing of flood water, newly grown grass should not be fed, but some rainfall would decrease the toxicity of the grass.</p> <p>2. Awareness' camps on infection through water spread to be conducted.</p>
Health and disease management	<p>1. Maintain the block with proper vaccination</p>	<p>1. Disease affected birds and ailing birds should be separated and treated or</p>	<p>1. Provide the birds with adequate feed and water which is free from</p>

	2. Essential drugs should be keeping in hand using during the disaster.	culled and dispose it properly. 2. Tent or temporary shed should free from rodents and predators.	contamination. 2. Feed the birds with supplemental minerals in order to the bring the birds to its normal productive life.
Heat wave and cold wave			
Shelter/environment management	1. Construct the Poultry shed depending upon the geographical location of the particular place, type of Birds (Layer/Broiler), number of birds etc... 2. Grow trees around the shelter which will prevent or reduce the direct heat wave in to the shed.	1. During the heat and cold wave temporary structure should be provided to save the poultry and keep the bird with normal productivity. 2. Take necessary alteration in the feed provided to the birds depending upon the adverse climatic factor. 3. Providing the animals with ad libitum of water during the heat wave and provide them with anti stress drugs.	1. Providing the poultry with standard veterinary check up after the adverse climatic condition. 2. Ailing birds should be segregated and provide them with necessary care.
Health and disease management	1. Routine health check up should be done. 2. Keep an eye on the productive performance of the birds. 3. Vaccinate the birds periodically. 4. Educate the farmers on disease management during the heat wave and cold wave situation.	1. Care must be take to reduce the environmental stress. 2. Get advice from the technical persons about the management of stressful environment.	1. Provide the birds with supplemental feeding to regain the body condition and return to the normal production which lost during the stressful time.

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Negligible changes	Negligible changes	Negligible changes
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ul style="list-style-type: none"> • Harvesting large individuals • Move and enclose • Stacked into pens or in smaller/confined areas 	<ul style="list-style-type: none"> • Harvesting large individuals • Disposable of unwanted excess stock • Stocking of desirable/special individuals in brood stock ponds 	<ul style="list-style-type: none"> • Proper nutrition and management of water bodies to improve remaining stock
(ii) Changes in water quality	Negligible changes in water quality	Negligible changes in water quality	Negligible changes in water quality
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	<ul style="list-style-type: none"> • Harvesting of the stock 	<ul style="list-style-type: none"> • Harvesting of the stock • Transferring of smaller fishes to artificial ponds (if available) for tiding over the drought 	<ul style="list-style-type: none"> • Steps to improve the quality of stocked fishes, via supplementary feed/fertilizer water quality management
(ii) Impact of salt load build up in ponds / change in water quality	<ul style="list-style-type: none"> • Harvesting of the stock 	<ul style="list-style-type: none"> • Harvesting of the stock • Transferring of smaller fishes to artificial ponds (if available) for tiding over the drought with water from other source (less hardness) 	<ul style="list-style-type: none"> • Steps to improve the quality of stocked fishes, via feed/fertilizer water quality management
2) Floods			
A. Capture			
Marine	Proper bunds and strengthening of existing structures to prevent flooding Ensure proper draining works to divert flood water	Netting and strengthening of weaker beach structures to prevent escaping of fishes	Improve the shore structures and beaches
Inland	<ul style="list-style-type: none"> • Proper fencing to prevent escaping of fishes • Increasing bund height and improve bund strength • Improve land drainage to allow easy and quick flow of flood waters 	<ul style="list-style-type: none"> • In extreme conditions, controlled draining of flooded ponds • Thinning of stock by harvesting of larger individuals 	<ul style="list-style-type: none"> • Repair damaged bunds • Collect and preserve existing stock
(i) Average compensation paid due to loss of human life	--	--	--

(ii) No. of boats / nets/damaged	--	--	--
(iii) No. of houses damaged	--	--	--
(iv) Loss of stock	--	--	--
(v) Changes in water quality	<ul style="list-style-type: none"> • Negligible changes 	<ul style="list-style-type: none"> • Flood water can bring parasites, and increased turbidity – repair/correct drainage to improve quick drainage of flood waters 	<ul style="list-style-type: none"> • Turbid waters may be flushed off with fresh bore well/well water
(vi) Health and diseases	--	--	--
B. Aquaculture			
(i) Inundation with flood water	<ul style="list-style-type: none"> • Proper fencing to prevent escaping of fishes • Increasing bund height and improve bund strength • Improve land drainage to allow easy and quick flow of flood waters 	<ul style="list-style-type: none"> • In extreme conditions, controlled draining of flooded ponds • Thinning of stock by harvesting of larger individuals 	<ul style="list-style-type: none"> • Repair damaged bunds • Collect and preserve existing stock
(ii) Water continuation and changes in water quality	<ul style="list-style-type: none"> • Negligible changes 	<ul style="list-style-type: none"> • Water can become turbid due to flood waters, reduce stock to prevent mortality 	<ul style="list-style-type: none"> • Flushing of pond water with bore- well water to improve water quality
(iii) Health and diseases	--	--	--
(iv) Loss of stock and inputs (feed, chemicals etc)	<ul style="list-style-type: none"> • Negligible changes 	<ul style="list-style-type: none"> • Harvesting of stock • Shift reserve of brood stock to ponds at elevated levels 	<ul style="list-style-type: none"> • Selling remaining stock and inundated equipment immediately to minimize losses
(v) Infrastructure damage (pumps, aerators, huts etc)	<ul style="list-style-type: none"> • Dismantling of pumps, aerators and other equipment and shifting to safer zones 	<ul style="list-style-type: none"> • Salvaging of inundated pumps, aerators and other equipment and shifting to safer zones 	<ul style="list-style-type: none"> • Selling remaining stock and inundated equipment immediately to minimize losses

3. Cyclone / Tsunami			
A. Capture			
Marine	Move fisher folk to higher/safer zone	Keep vigil of any trapped person and keep rescue operations on red alert	Assess damage and take up measures to build structures to check beach erosion
(i) Average compensation paid due to loss of fishermen lives	--	--	--
(ii) Avg. no. of boats / nets/damaged	--	--	--

(iii) Avg. no. of houses damaged	--	--	--
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)	--	--	--
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	--	--	--
4. Heat wave and cold wave	--	--	--
A. Capture	--	--	--
Marine	Improve land drainage to control salinity fluctuations	Can release water from reservoirs to maintain salinity	Damage control measure like proper rainwater drainage, removal of municipal waste etc., can be taken
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)	<ul style="list-style-type: none"> Strengthening of pond bund to prevent seepage Shifting of stock to a more sheltered pond 	<ul style="list-style-type: none"> Shifting of stock to a more sheltered pond Improve aeration and water recycling 	<ul style="list-style-type: none"> Shifting of stock to normal ponds to ensure proper growth
(ii) Health and Disease management	-	-	-