

State: PUNJAB

Agriculture Contingency Plan for District: FATEHGARH SAHIB

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Punjab and Rohilkhand plains, hot dry, sub humid eco-sub region (9.1)		
	Agro-Climatic Zone (Planning Commission)	Trans Gangetic Plain Region (VI)		
	Agro Climatic Zone (NARP)	Undulating Plain Zone (PB-2)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Nawanshahr, Fatehgarhsahib, Patiala		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		30° 56' 11. 90" N	76° 18' 13 .18" E	279 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	PAU, Ludhiana -141004		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, Shamsheer Nagar, Fatehgarh Sahib- 140406		
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	PAU, Ludhiana- 141004			

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-September):	416.4	25	1 st week of July	2 nd week of Sept
	NE Monsoon(October-December):	9.6	3	1 st week of October	2 nd week of December
	Winter (January- February)	46.5	6		
	Summer (March-May)	16.9	3		
	Annual	489.4	37		

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable 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)	114.8	102.0	2.0	11.3	0.007	-	-	0.24	0.04	-

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)	Percent (%) of total Geographical area
	Fine loamy soils	62.8	55
	Coarse loamy and fine loamy soils	45.6	40
	Coarse loamy soils	5.7	5

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	102.0	187
	Area sown more than once	89.1	
	Gross cropped area	191.1	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	102.0		
	Gross irrigated area	191.0		
	Rainfed area	-		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		0.4	0.4
	Tanks	-	-	
	Open wells	-	-	
	Bore wells/Tube wells	29069	102.2	99.6
	Lift irrigation schemes		-	
	Micro-irrigation		-	
	Other sources (please specify)			
	Total Irrigated Area		102.6	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited	5	100	Fit to unfit water with respect to RSC. No problem of salinity or F in water
	Critical	-		
	Semi- critical	-		
	Safe	-		
Wastewater availability and use	-			
Ground water quality	-			

*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%

1.7 Area under major field crops & horticulture (as per latest figures) (Specify year eg., 2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>				
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	Rice	85	-	85	-	-	-	-	85
	Maize	0.3	-	0.3	-	-	-	-	0.3
	Oilseeds (Sunflower)	5.0	-	5.0	-	-	-	-	5.0
	Wheat	-	-	-	84.0	-	-	-	84.0
	Oilseed	-	-	-	10.0	-	-	-	10.0
	Sugarcane	2.0	-	-	2.0	-	-	-	2.0

	Horticulture crops - Fruits	Area ('000 ha)
		Total
	Guava	0.2
	Kinnow	0.1
	Mango	0.1
	Peach	0.04
	Pear	0.03

Horticulture crops - Vegetables		Total
Potato		4.8
Cauliflower		1.3
Cabbage		0.4
Root vegetables		0.3
Cucurbits		0.
Garlic		0.2
Onion		0.1
Peas		0.1
Medicinal and Aromatic crops		Total
		-
Plantation crops		Total
Eg., industrial pulpwood crops etc.		-
Fodder crops		Total
Sorghum		5.2
Bajra		3.2

	Berseem	6.0
		-
	Total fodder crop area	9.0
	Grazing land	-
	Sericulture etc	-
	Others (specify)	-

1.8	Livestock (in number)	Male (number)	Female (number)	Total (number)	
	Non descriptive Cattle (local low yielding)	3898	1057	4955	
	Crossbred cattle	6118	31934	38052	
	Non descriptive Buffaloes (local low yielding)	81	1285	1366	
	Graded Buffaloes	10015	136220	146235	
	Goat	1458	5325	5783	
	Sheep	187	808	995	
	Others Equine (Horse & Pony)	158	158	316	
	Commercial dairy farms (Number)			252	
1.9	Poultry	No. of farms	Total No. of birds		
	Commercial	100	622000		
	Backyard	-	6498		
1.10	Fisheries (Data source: Chief Planning Officer of district)				
	A. Capture				
	i) Marine (Data Source: Fisheries)	No. of fishermen	Boats	Nets	Storage facilities (Ice

	Department)		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	plants etc.)
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		71		0		368	
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)	451.2		6.541		2.950	

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

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Rice	361	4246	-	-	-	-	361	4246	-
	Wheat	-	-	369	4400	-	-	369	4400	-
	Sugarcane	14	7072 (Gur)	-	-	-	-	14	7072 (Gur)	-
	Rapeseed/mustard	1.0	1312	-	-	-	-	1.0	1312	-
	Others	-	-	-	-	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										

	Potato	152.5	31500	-	-	-	-	152.5	31500	-
	Cauliflower	24.1	19000	-	-	-	-	24.1	19000	-
	Cabbage	7.6	19000	-	-	-	-	7.6	19000	-
	Root vegetables	7.2	25000	-	-	-	-	7.2	25000	-
	Cucurbits	6.9	24800	-	-	-	-	6.9	24800	-
Others	Chilli	3.2	24000	-	-	-	-	3.2	24000	-
	Tomato	10.4	61000	-	-	-	-	10.4	61000	-

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Maize	Paddy	Wheat	Rapeseed-Mustard
	Kharif- Rainfed	-	-	-	-
	Kharif-Irrigated	4 th week of May to 4 th week of June	15 th May to 30 th May	-	-
	Rabi- Rainfed	-	-	-	-
	Rabi-Irrigated	-	-	4 th week of October to End of November	10 th October to Mid November

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought			√
	Flood			√
	Cyclone			√
	Hail storm		√	
	Heat wave	√		
	Cold wave		√	

Frost		√	
Sea water intrusion			√
Pests and disease outbreak (specify)	√		
Others (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: No
		Soil map as Annexure 3	Enclosed: No

Annexure 1



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rain fed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (Specify month)			NA		
Delay by 4 weeks (Specify month)			NA		
Delay by 6 weeks (Specify month)			NA		
Delay by 8 weeks (Specify month)			NA		

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.			NA		

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	NA				

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	NA				

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
	NA				

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 release of water in canals due to low rainfall	Tube well irrigated alluvial soils	Paddy	Coarse Rice should be replaced with short duration varieties (PR-115) and Basmati rice (Pusa Basmati-1, Pusa 1121, Punjab Basmati-2, Punjab Mehak)	Direct seeding of paddy and laser land leveling should be done which saves about 20-25% irrigation water	
		Wheat			
		Sugarcane			
		Maize	Maize (F) (J1006) Pearl millet (FCB 164 and FBC 16) maize (PMH 2 and JH 3459), Soybean (SL 744 and SL 525) and moongbean (ML 818 and P A U 911), Toria (PBT 37) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2)		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Tubewell irrigated alluvial soils	Paddy	Paddy should be replaced with Basmati rice, Maize. Wheat can be replaced with oilseeds	Direct seeding of paddy and laser land leveling should be done which saves about 20-25% irrigation water	
		Maize			
		Wheat			
		Sugarcane			

Condition	Major Farming situation	Normal Crop/ cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Tubewell irrigated alluvial soils	Paddy	Paddy may be replaced by Maize, Soybean and Mungbean	Bed planting of soybean and maize laser land leveling should be done which saves about 20-25% irrigation water	
		Maize			
		Wheat			
		Sugarcane			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon			N A		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Tubewell irrigated alluvial soils	Paddy	Paddy should be replaced with basmati rice, maize. Wheat can be replaced with oilseeds, maize (PMH 2 and JH 3459), Soybean (SL 744 and SL 525) and moongbean (ML 818 and P A U 911), Toria (PBT 37) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2)	<ul style="list-style-type: none"> • Laser land leveling should be done which saves about 20-25% irrigation water • Wheat can be sown with Happy seeder technology immediately after harvesting of paddy. saves pre sowing irrigation • Paired row trench planting of sugarcane 	
		Maize			
		Wheat			
		Sugarcane			

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/ cropping system	Agronomic measures
				Remarks on Implementation
				which saves about 10-15% irrigation water

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
Maize	-	Do not allow the rain water to stand in the main crop as this crop is highly sensitive to standing water and promotes bacterial stalk rot	-	-
Wheat	-	-	-	Store new grains in clean godowns or receptacles. Plug all cracks, cervices and holes in the godowns thoroughly. Disinfest old gunny bags by dipping them in emulsion of 6 ml Sumicidin 20EC or 5 ml Cymbush 25 EC in 10 litres of water for 10 minutes and dry them in shade before filling with grains or use new gunny bags.
Sugarcane	-	Earthing up of the sugarcane crop may be done if not done earlier during the first week of July. If sugarcane fields get flooded with water, excess water may be drained out.	-	-
Horticulture crops				

Chillies	Replanting	Drain out excess rain water and earthing up of ridges.	Wilting and lodging. Pumping of excess rain water and spray the crop with Dithane M -45 or Blitox @ 3 gm per liter water	Avoid Rotting and discoloration of fruits
Potato	Manual weed control , earthing up and apply second dose of Nitrogen fertilizer	Drain out excess water , spray Ridomil @500 g/acre to check late blight		Keep the crop under sheds for curing before storage
Cauliflower	Replanting	Drain out excess rain water		-
Heavy rainfall with high speed winds in a short span				
Wheat			Do not irrigate on windy or stormy days	
Sugarcane	If a dry weather condition prevails, it may also cause severe damage to this crop. For its control spray the crop with 400 ml of malathion 50 EC in 100 litres of water/ acre. Remove Baru weed growing around the sugarcane field.	-	To prevent lodging prop up the crop by end of August using trash twist method.	-
Rice	Avoid early planting of rice to keep the incidence of BLB under check.	-	-	-
Horticulture	The excess rain water when stagnates for several days is harmful to the orchard trees. Adopt prompt measures to drain out excess water.	-	-	-
Outbreak of pests and diseases due to unseasonal rains				
Rice	-	Blight develops more in high humid conditions. Farmers should not allow stagnation of water in the fields.	If high humidity and cloudy weather prevails the crop may be sprayed with blitox/ copper oxychloride 50 WP @	-

			500 g in 200 litres of water/acre to control false smut and after 10 days of its application spray Tilt @ 200 ml/acre in 200 litres of water. Start the spray at the boot stage.	
Horticulture	In case of occurrence of root damage due to water stagnation in pear, peach etc. apply 10 g Bavistin 50 WP + 5 g Vitavax 75 WP in 10 litres of water along the trunk after draining out the excess water and drying of soil. Prune the dried ends of the branches alongwith 5-8 cm of the live wood.			
Chilli	-	Spray Endosulfan @ 1 litre/ acre to check fruit borer and spray the crop with M -45 or Blitox @ 3 gm per liter water		Keep in dry place
Potato	-	Spray Ridomil @500 g/acre to the late blight		-
Cauliflower	Spray Mencozeb @ 3g / litre to check downy mildew			-

2.3 Floods

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

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				
Sunflower			Since the weather is quite hot during April, apply irrigations at 8-10 days interval for good growth of sunflower. The crop should not be under stress at flowering, soft dough and hard dough stages.	NA
Rice	Correct Iron deficiency with 0.5% iron sulphate spray, light and frequent irrigation	Pounding of water for fifteen days after transplanting to check iron deficiency and for crop establishment	NA	NA
Wheat	NA	NA	Apply light irrigation	NA
Rapeseed-mustard	NA	NA	NA	NA
Horticulture				
Ber	Light and frequent irrigation and shelter from western side	Light and frequent irrigation, application of white paint on main stem		NA
Guava	Light and frequent irrigation and shelter from western side	Light and frequent irrigation, application of white paint on main stem		NA
Chilli	Mulching and frequent irrigation	Mulching and frequent irrigation		NA
Cold wave				
Field crops	NA			
Horticulture				

Ber	Light and frequent irrigation and shelter from North-western side, smoking	Installation of wind breaks, apply light irrigation and smoke		NA
Guava	-do-	-do-		NA
Frost				
Rapeseed-mustard	Apply light irrigation	NA		NA
Horticulture				
Ber	Protection of nursery with sarkanda etc/ Growing of nursery under protected structures.	Installation of wind breaks. Apply light irrigation and smoke		NA
Guava	Protection of nursery with sarkanda etc/ growing of nursery under protected structures	-do-		NA
Potato	Burning of leaves and twigs, apply light irrigation frequently or use spriller irrigation system after mid-night Apply light irrigation or use sprinkler irrigation mid night			-
Hailstorm				
Rice	Re-transplanting	Not curable	Not curable	-
Wheat	Re-sowing	-do-	-do-	-
Rapeseed-mustard	-do-	-do-	-do-	-
Horticulture				
Ber	Protection of nursery with sarkanda etc/ growing of nursery under protected structures.	Removal of broken limbs and apply light irrigation		NA
Guava	-do-	-do-		NA
Chillies	Spray fungicides to check the further spread of diseases			
Potato				

Cauliflower	
Peas	

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>Increase area under fodder cultivation.</p> <p>Collection and storage of wheat/paddy straw.</p> <p>Processing & storage of dry roughages in the form of blocks.</p> <p>Establishing fodder banks and preserving excess fodder as silage and hay.</p>	<p>Utilizing fodder from fodder bank reserves.</p> <p>Utilizing fodder stored in silos.</p> <p>Transporting fodder and dry roughages to the affected area.</p> <p>Arrange concentrate feeds.</p>	<p>Educating farmers for feed & fodder storage.</p> <p>Maintenance/repair of silo pits.</p>
Drinking water	<p>Preserving water in the village ponds for drinking purpose.</p> <p>Excavation of bore wells.</p> <p>Rain water harvesting on individual farm/community basis.</p>	<p>Using preserved water from village ponds for drinking.</p> <p>Ground water resources to be exploited for drinking purposes.</p>	<p>Maintenance & cleaning of village ponds.</p> <p>Create rain harvesting facilities.</p>
Health and disease management	<p>Preparedness with sufficient stocks of medicines. Vaccination of animals.</p> <p>Insurance of animals.</p>	<p>Conducting mass animal health camps and treating the affected animals.</p>	<p>Culling sick animals.</p> <p>Insurance claims.</p>

Floods			
Feed and fodder availability	Establishing feed & fodder reserves at places safe from floods. Processing & storage of dry roughages in the form of blocks. Using excess fodder for silage/hay making.	Moving feed and fodder from the reserves to affected areas.	Maintenance and strengthening of feed & fodder storage facilities. Ensure availability of quality feed and fodder for high yielding animals.
Drinking water	Excavation of deep bore wells.	Supply of clean and safe water to the animals.	Cleaning and disinfection of village ponds.
Health and disease management	Provision of community shelters at safe places. Proper & timely vaccination along with sufficient stock of medicines. Constitution of Rapid Action Veterinary force.	Shifting of animals from affected areas to safe places at short notice. Quick action by Rapid Action Veterinary force for animal treatment.	Proper disposal of carcasses of dead animals. Culling of sick animals. Insurance & govt. relief claims.
Cyclone	NA		
Feed and fodder availability			
Drinking water			
Health and disease management			
Heat wave and cold wave	NA		
Shelter/environment management	Shady tree plantation around animal facilities. Encourage low cost environmentally effective well ventilated shelters. Cleaning of village ponds on community basis.	Use protective measures to reduce the effects of cold / heat wave with the use of suitable techniques/feed supplements. Use village ponds for wallowing during heat wave. Ensure fresh drinking water supplies. Take special care of high yielding animals.	Plantation of shady trees and wind breakers around animal facilities/farms. Strengthening of water supply resources/village ponds.

	<i>Preponderances</i> for stress related diseases.		
Health and disease management	Provision of community shelters/hospitals for animal treatments. Proper & timely vaccination. Ensure sufficient stock of medicines.	Visits of rapid action force teams in affected area & treatment of animals. Testing the immunity.	Keep the hyper sensitive animals under observation. Proper feed and fodder supply for reconditioning the affected animals.

2.5.2 Poultry

	Suggested contingency measures			Convergence/ linkages with ongoing programs, if any
	Before the event	During the event	After the event	
Drought	-	-	-	
Shortage of feed ingredients	Establishing feed reserve banks.	Utilizing feed from feed reserve banks.	Strengthening of feed storage facilities.	
Drinking water	Strengthening of water supply sources.	Ensure sufficient drinking water supplies. Judicious use of water.	Creating rain harvesting facilities at individual farms.	
Health and disease management	Vaccination of birds. Veterinary preparedness with sufficient medicine stocks.	Critical observation of flocks for any infection on daily basis.	Culling and disposal of affected birds.	
Floods				
Shortage of feed ingredients	Ensure feed reserves to meet requirements for 2-3 months.	Use feed from feed reserves. Arrange feed from other area.	Cleaning & disinfection of feed stores. Dispose of fungal contaminated	

			feed.	
Drinking water	Excavation of deep bore wells.	Use water from deep bore well.	Maintenance of water supply sources.	
Health and disease management	Emergency veterinary preparedness with sufficient stocks of medicines.	Deworming of birds. Visit of rapid action force to the affected area for emergency treatment.	Culling affected birds. Proper disposal of dead carcasses. Cleaning and disinfection of poultry houses.	
Cyclone				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Heat wave and cold wave				
Shelter/environment management	Build comfortable shelter. Tree plantation/wind breakers around poultry facilities.	Ensure supply of fresh drinking water. Use cooling or heating devices for comfort of birds. Use protective measures to reduce the effects of cold / heat wave with the use of suitable techniques/feed supplements.	Repair/maintenance of shelters.	
Health and disease management	Vaccination of birds. Emergency veterinary preparedness with medicines.	Watch the flocks for any infection critically Testing the titer against RD Quick treatment of birds against any disease outbreak.	Reconditioning of birds. Culling and disposal of affected birds.	

2.5.3. Fisheries/ Aquaculture

	Suggested Contingency measures		
	Before the event	During the event	After the event
Drought			
A. Capture			
Marine	-	-	-
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ul style="list-style-type: none"> i) Critical analysis of long range forecast data. ii) Storage of water. iii) Afforestation program iv) Conservation of rivers, wetlands/village ponds. v) Re-excavation of local canals/ponds. 	<ul style="list-style-type: none"> i) Use stored water. ii) Make judicious use of available water sources. iii) Divert water from unutilized areas. iv) Utilize canal water. v)Aeration of fish ponds. 	<ul style="list-style-type: none"> i) Need based monitoring through research plan. ii) Intensive afforestation program. iii) Augmentation of surface water flow. iv) Construction of water reservoir. v) Adoption of rain harvesting methods. vii) Prepare vulnerability map.
(ii) Changes in water quality	<ul style="list-style-type: none"> i) Dumping of solid, liquid and waste should be stopped. ii)Store chemicals, disinfectants and therapeutic drugs. 	<ul style="list-style-type: none"> i) Use disinfectants and therapeutic drugs. ii) Adoption of bio remedial measures 	<ul style="list-style-type: none"> i) To maintain water quality, need based research data should be generated. ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation.
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	<ul style="list-style-type: none"> i) Critical evaluation of long range 	<ul style="list-style-type: none"> i) Use stored water. 	<ul style="list-style-type: none"> i) Need based monitoring through

	<p>forecast data.</p> <p>ii) Storage of water.</p> <p>iii) Afforestation program.</p> <p>iv) Installation of tube wells.</p> <p>v) Conservation of rivers/wetlands/dams.</p> <p>vi) Re-excavation of local canals and ponds</p>	<p>ii) Make judicious use of available water sources.</p> <p>iii) Divert water from unutilized areas.</p> <p>iv) Utilize canal water.</p> <p>v)Aeration of fish ponds.</p>	<p>research plan.</p> <p>ii) Intensive afforestation program.</p> <p>iii) Augmentation of surface water flow.</p> <p>iv) Construction of water reservoir.</p> <p>v) Adoption of rain harvesting methods.</p> <p>vii) Prepare vulnerability map.</p>
(ii) Impact of salt load build up in ponds/Changes in water quality	<p>i) Store chemicals, disinfectants and therapeutic drugs.</p>	<p>i) Immediate examination of water samples.</p> <p>ii) Use appropriate disinfectants and therapeutic drugs.</p> <p>iii) Adoption of bio-remedial measures.</p> <p>iv)Reduce salinity to moderate levels for increasing survival rate of fish/prawn/other organisms with the application of scientific techniques.</p>	<p>i) Need based research data should be generated.</p> <p>ii) Cleaning of water bodies.</p> <p>iii) Regular water monitoring and bio-monitoring of water bodies.</p>
Flood			
A. Capture			
Marine	-	-	-
Inland			
(i) Average compensation paid due to loss of human life	<p>i) Be prepared to evacuate at a short notice.</p> <p>ii) Preparation of flood control action</p>	<p>i) Human evacuation from the area.</p> <p>ii) Coordination of assistance.</p> <p>iii) Damage and need assessment.</p>	<p>i) Arrangement for rescue and casualty care.</p> <p>ii) Arrangement for burial control room.</p>

	<p>plan.</p> <p>iii) Warning dissemination and precautionary response.</p> <p>iv) Formation of flood management committee.</p> <p>v) Mobilize local committees for protection.</p> <p>vi) Enhancement in coping capabilities of common people.</p> <p>vii) Insurance for the life of people/fishermen.</p>	<p>iv) Immediate management of relief supplies.</p> <p>v) Immediate help and compensation delivery during emergency.</p>	<p>iii) Restoration of essential services, security and protection of property</p> <p>iv) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan</p> <p>v) Insurance claim.</p>
(ii) No. of boats/nets damaged	<p>i) Annual repair of boats/nets and gears.</p> <p>ii) Insurance of boats/nets/gears.</p>	<p>i) Coordination of assistance.</p> <p>iii) Immediate management of relief supplies.</p> <p>iv) Govt. support and compensation.</p>	<p>i) Education/ training for technical knowledge for the repair of boats/nets and gears.</p> <p>ii) Provision for evacuation.</p> <p>iii) Loss assessment & insurance claim.</p>
(iii) No. of houses damaged	<p>i) Educate and provide training for the repair of houses.</p> <p>ii) Store raw materials for repairing of houses.</p> <p>iii) House insurance.</p>	<p>i) Damaged house enumeration and loss assessment.</p> <p>ii) Coordination of assistance.</p> <p>iii) Immediate management of relief supplies.</p> <p>iv) Immediate support and compensation.</p>	<p>i) Repair of damaged houses.</p> <p>ii) Loss assessment & insurance claim.</p>
(iv) Loss of stock	<p>i) Keep boats, nets/gears ready for emergency use.</p> <p>ii) Store fuels, food/other item.</p>	<p>i) Mobilize local people for protection</p> <p>ii) Hire stock/inputs from areas/company/ farmers who are not</p>	<p>i) Locate backup stocks and verify its usability.</p> <p>ii) Follow flood control management</p>

	<ul style="list-style-type: none"> iii) Develop flood control management plans. iv) Stock material insurance. 	<p>affected by flood.</p>	<p>plan.</p> <ul style="list-style-type: none"> iii) Notify utilities of the critical demand about loss of stock and inputs. iv) Loss assessment & insurance claim.
(v) Changes in water quality	<ul style="list-style-type: none"> i) Provision to stop/close the effluent/sewage discharge point in to water bodies. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Develop flood control management plan. 	<ul style="list-style-type: none"> i) Do not use contaminated water. ii) Proper preparation and management through emergency aeration. iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iv) Immediate support of govt./industrial organization for maintaining the purity and quality of water bodies. v) Need based bioremediation. 	<ul style="list-style-type: none"> i) Need based research data should be generated to maintain water quality, ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation. iii) Contact govt. and industrial organization for immediate remedy and cleaning of the water bodies. iv) Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.
(vi) Health and disease	<ul style="list-style-type: none"> i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Stock sufficient stock of medicines. 	<ul style="list-style-type: none"> i) Prompt action or immediate removal of disease causing agents/ dead fish. ii) Proper disposal of dead fish. iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iv) Emergency aeration or splashing in water bodies. 	<ul style="list-style-type: none"> i) Laboratory diagnosis of disease fish, generation of data about type or kind of disease spread. ii) Eradicating the disease where possible. iii) Follow up surveillance and monitoring after disease outbreak. iv) Bio-monitoring and maintaining water quality. v) Need based research data should be

			generated. vi) Loss assessment & insurance claim.
B. Aquaculture			
(i) Inundation with flood water	<ul style="list-style-type: none"> i) Proper facility construction /strengthening for ponds and its stock safety. ii) Development of flood control management plan. iii) Arrangement of emergency backup equipment on site. iv) Insurance of stocks. v) Prevention from entry of alien/wild organisms through flood water. 	<ul style="list-style-type: none"> i) Arrangement for evacuation ii) Arrangement for rescue and casualty care iii) Arrangement for burial control room. iv) Restoration of essential services, security and protection of property. v) Coordination of assistance. vi) Damage and need assessment. vii) Immediate management of relief supplies. viii) Release excess water from height of T. ix) Lower the water level in culture facilities. 	<ul style="list-style-type: none"> i) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan. ii) Reallocate fish to maintain appropriate biomass so that waste assimilation capacity of pond is not exceeded. iii) Reduce or cease feeding because uneaten food and fish wastes causes decrease in dissolved oxygen level. iv) Strengthening of water bodies/ponds. v) Loss assessment & insurance claim.
(ii) Water contamination and changes in water quality	<ul style="list-style-type: none"> i) Provision to stop/close the effluent/sewage discharge into water bodies. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Develop flood control 	<ul style="list-style-type: none"> i) Do not use contaminated water. ii) Proper preparation and management through emergency aeration. iii) Use appropriate amount of 	<ul style="list-style-type: none"> i) Need based research data should be generated to maintain water quality, ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation. iii) Contact govt. and industrial

	management plan.	disinfectants, chemicals and therapeutic drugs. iv) Immediate support of govt./industrial organization for maintaining the purity and quality of water bodies. iv) Need based bioremediation.	organization for immediate remedy and cleaning of water bodies. iv) Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.
(iii) Health and diseases	i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Stock sufficient emergency medicines.	i) Identification of type of disease outbreak, prompt action or immediate removal of disease causing agents/ dead fish. ii) Proper disposal of dead fish. iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iv) Determination of nature and speed of transmission of diseases. v) Proper preparation and management through emergency aeration.	i) laboratory diagnosis of disease fish, generation of data about type or kind of disease occurrence. ii) Eradicating the disease. iii) Follow up surveillance and monitoring after disease outbreak. iv) Proper disposal of dead fish. vii) Loss assessment & insurance claim.
(iv) Loss of stock and input (feed, chemicals)	i) Keep the stock/input in safer place for emergency purpose. ii) Store fuels, food/other items. iii) Develop flood control management plan. iv) Stock material insurance.	i) Search/locate the stock/input, if the condition is good can be used for the purpose otherwise discard it. ii) Mobilize local people for protection. iii) Purchase/hire valuable	i) Strengthening of stock. ii) Assessment of total loss. iii) Insurance claims.

		stock/inputs from areas/company/ farmers who are not affected by flood	
(v) Infrastructure damage (pumps, aerators, huts etc)	i) Training for emergency the repair of infrastructure. ii) Store raw materials for repairing of pumps aerators, huts etc. iii) Infrastructure insurance.	i) Damaged infrastructure enumeration and need assessment. ii) Locate backup equipment and verify its operation. iii) Coordination of assistance. iv) Immediate management of relief supplies.	i) Locate backup equipment and verify its operation. ii) Notify utilities of the critical demand. iii) Repair of damaged infrastructure. iv) Loss assessment & insurance claim.
3. Cyclone / Tsunami	Not a cyclone prone district.	Not a cyclone prone district.	Not a cyclone prone district.
A. Capture	-	-	-
Marine	-	-	-
(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 (freshwater/brackish water ratio)	-	-	-
(iii) Health and disease	-	-	-
(iv) Loss of stock and input (feed, chemicals etc.)	-	-	-
(v) Infrastructure damage (pumps, aerators, shelters/huts etc.)	-	-	-

Heat wave and cold wave			
A. Capture			
Marine			
	-	-	-
Inland	<ul style="list-style-type: none"> i) Listen to local weather forecasts and stay aware of upcoming temperature changes. ii) Arrange the aerators. iii) Ensure sufficient water quantity in water bodies. iv) Formulate strategic fishing management during the heat waves or cold waves. v) Tree plantation around fish ponds 	<ul style="list-style-type: none"> i) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. ii) Use dark materials to cover the water bodies during excessive heat waves. iii) Adopt proper care and management during the fishing period of cold/ heat waves like keeping stock of drinking water and extra cloths. iv) Educating the farmers through electronic / print media 	<ul style="list-style-type: none"> i) Intensive afforestation program. ii) Collect basic weather data on incidence of extreme as well as physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. iii) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing. iv) Loss assessment & insurance claim.
B. Aquaculture			
(i) Changes in pond environment (water quality)	<ul style="list-style-type: none"> i) Listen to local weather forecasts and stay aware of upcoming temperature changes. ii) Arrange the aerators. iii) Ensure sufficient water quantity in water bodies. iv) Formulate strategic fishing 	<ul style="list-style-type: none"> i) Avoid extreme temperature changes as well as low temperature changes for the safety of fishermen life. ii) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. iii) Use dark materials to cover the 	<ul style="list-style-type: none"> i) Intensive afforestation program for reducing heat waves. ii) Collect basic weather data on incidence of extremes as well as physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and

	<p>management during heat/cold waves.</p> <p>v) Tree plantation around fish ponds.</p>	<p>water bodies during excessive heat waves.</p> <p>iv) Adopt proper care and management during the fishing period of cold/ heat waves like keeping stock of drinking water and extra cloths.</p> <p>v) Educating the farmers through electronic/ print media</p>	<p>soil composition.</p> <p>iii) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing.</p> <p>v) Loss assessment & insurance claim.</p>
(ii) Health and disease management	<p>i) Advance planning and preparedness.</p> <p>ii) Store chemicals, disinfectants and therapeutic drugs.</p> <p>iii) Develop heat/cold wave control management plan.</p> <p>iv) Stock sufficient quantities of emergency medicines.</p>	<p>i) Identification of type of disease outbreak, prompt action or immediate removal of disease causing agents/ dead fish.</p> <p>ii) Proper disposal of dead fish.</p> <p>iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</p> <p>iv) Determination of nature and speed of disease transmission.</p> <p>v) Proper preparation and management through emergency aeration or splashing in water bodies.</p>	<p>i) laboratory diagnosis of disease agents, generation of data about type or kind of disease spread.</p> <p>ii) Eradicating the disease where possible.</p> <p>iii) Follow up surveillance and monitoring after disease outbreak.</p> <p>iv) Loss assessment and insurance claim.</p>