

State: PUNJAB

Agriculture Contingency Plan: District- SRI MUKTSAR SAHIB

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Western Plain, Kachhh and Part Of Kathia Marusthali, hot hyper-Arid ESR (2.3)		
	Agro-Climatic Region (Planning Commission)	Trans-Gangetic Plain Region (VI)		
	Agro Climatic Zone (NARP)	Western Zone (PB-5)		
	Districts falling under NARP Zone	Ferozepur, Mansa and Muktsar		
	Geographic coordinates of district headquarter	Latitude	Longitude	Altitude
		30 ^o 28'09.83" N	74 ^o 31' 02.16" E	219.3 m
	Name and address of the concerned ZRS/ZARS/RARS/RRS/RRTTS	Regional Research Station, Bathinda- 151001		
	Mention the KVK located in the District with address	Krishi Vigyan Kendra, Goniana (Muktsar)-152 026		
Name and Address of the nearest Agromet field unit (AMFU, IMD) for agro –advisories in the zone	Regional Research Station, Bathinda- 151001			

1.2	Rainfall (Jan. – Dec. 2009)	Average (mm)	Rainy days	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	299.9	14.8	29 th June in some parts and 1 st week of July in remaining parts	After 2 nd week of September
	NE Monsoon(October-December):	19.0	1.4	-	-
	Winter (January- Feb)	48.1	4.0	December	-
	Summer (March-May)	13.6	1.4	Mid April	-
	Annual:	380.6	21.6		-

1.3	Land use pattern of the district	Geographical area	Forests	Land under non –agri. Use	Permanent pasture	Culturable waste land	Land under miscellaneous tree crops and groves	Current fallow	Permanent pastures	Net area sown	Gross crop area
	Area ('000 ha)	264	2	20	Nil	2	Nil	16	Nil	224	449

1.4	Major Soil types	Area ('000 ha)
	Sandy loam (sl)	224

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	224.0	175
	Area sown more than once	225.0	
	Gross cropped area	449.0	

1.6	Irrigation	Area ('000 ha)
	Gross irrigated area	446.0
	Net irrigated area	222.0
	Rainfed Area	-

Sources of irrigation	Canals	Tanks & other minor irrigations	Open Wells	Borewell/tube wells	Others
Area ('000 ha)	200	nil	nil	22	nil
Percent	90	-	-	10	-
Pump sets (Total)	30988				
No. of tractors (Total)	21750				
Ground water availability and use* (data source : State /central Ground water department /board)	No. of blocks /Tehsil	(%) Area	Quality of water (specify the problem such as high levels of arsenic , fluoride , saline etc)		
Over exploited			Contaminants		
Critical			Salinity EC >3000ms	√	
Semi-critical			Fluoride >1.5mg/lit	√	
Safe	4	100%	Chloride >1000mg/lit	√	
Wastewater availability and use			Nitrate >45mg/lit	√	
Ground water quality					

* over –exploited :ground water utilization >100%; critical: 90-100%; semi critical 70-90% ; safe ,70%

1.7	Area under major field crops ('000ha)	Kharif			Rabi			Summer	Total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Cotton	124.0			-				124.0
	Rice	68.0			-				68.0
	Wheat	-			202.0				202.0
	Rape Seed and Mustard				1				1.0

Horticulture crops	Area ('000 ha)
Fruits	Total
Citrus Kinnow	4.8
Orange and Malta	0.4
Lemon	0.01
Mango	0.006
Litchi	-
Guava	0.5
Pear	0.04
Peach	0.1
Grapes	0.02
Ber	0.2
Misc.	0.03
TOTAL	6.2

Vegetable crops	Total
Potato	0.1
Cucurbits (W. melon, Musk melon)	0.01
Chilli	0.3

	Onion	0.01
	Root crops	0.04
	Others (Tomato, brinjal,okra etc.)	0.1
	Sericulture	NA
	Medicinal and Aromatic crops	NA
	Plantation crops	NA
	Grazing lands (ha)	

Fodder crops (2007-08)	Area (000' ha)
Crops	Total
Jowar	11.6
Fodder Maize	1.0
Bajra	1.0
Mak Chari	0.05
Lucerne (<i>rabi+kharif</i>)	0.08
Berseem	1.6
Oats	9.9
Ryegrass	0.2
Winter maize	0.03
Total	25.7

1.8	Livestock (in number)	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	11.6	22.2	33.8
	Crossbred cattle	10.1	52.0	62.2
	Non descriptive Buffaloes (local low yielding)	0.1	2.7	2.9
	Graded Buffaloes	13.2	131.0	144.3

	Goat	4.7	22.6	27.3		
	Sheep	4.4	17.3	21.8		
	Others Equine (Horse & Pony)	0.4	2.2	2.7		
	Commercial dairy farms (Number)			0.04		
1.9	Poultry	No. of farms	Total No. of birds ('000)			
	Commercial	72	369.1			
	Backyard	-	19.8			
1.10	Fisheries (Data source: Chief Planning Officer of district)					
	A. Capture					
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets	Storage facilities (Ice plants etc.)
			Mechanized	Non-mechanized		
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs	No. of village tanks	
		59			-	225
	B. Culture					
		Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)		
	i) Brackish water (Data Source: MPEDA/ Fisheries Department)	509.3	5.96	3.034		
	ii) Fresh water (Data Source: Fisheries Department)					

1.11	Production and Productivity of 5 major crops (Average of last 3 years)	Kharif		Rabi /		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productiv ity (kg/ha)	Productio n ('000 t)	Productivi ty (kg/ha)	Productio n ('000)	Productivity (kg/ha)
	Cotton (A)	468*	758	-	-	-	-	468*	758
	Rice	402	4232	-	-	-	-	402	4232
	Wheat	-	-	977	4835	-	-	977	4835
	Rape Seed& Mustard	-	-	1	1231	-	-	1	1231
* refers to 000 bales									
1.12	Sowing window (start and end of sowing period)	Cotton		Rice		Wheat		Rape Seed & Mustard	
	<i>Kharif</i> - Rainfed	-		-		-		-	
	<i>Kharif</i> -Irrigated	April / May – October / November		June - October		-		-	-
	<i>Rabi</i> - Rainfed	-		-		-		September / October – March	October-April
	<i>Rabi</i> -Irrigated	-		-		October / November - April	September / October – March	October-April	

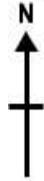
1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Sporadic	None
	Drought	-	-	√
	Flood	-	-	√
	Cyclone	-	-	√
	Hail storm	-	√	-
	Heat wave	√	-	-
	Cold wave	-	√	-
	Frost	-	√	-
	Sea water inundation	-	-	√
	Pests and diseases	√	-	-
	Others (water lodging)	√	-	-

1.14	Include Digital maps of the district for	Location map of district with in State as Annexure I	Enclosed: Yes
		Mean Annuual Rainfall	Enclosed: Yes
		Soil map of the district	Enclosed: No

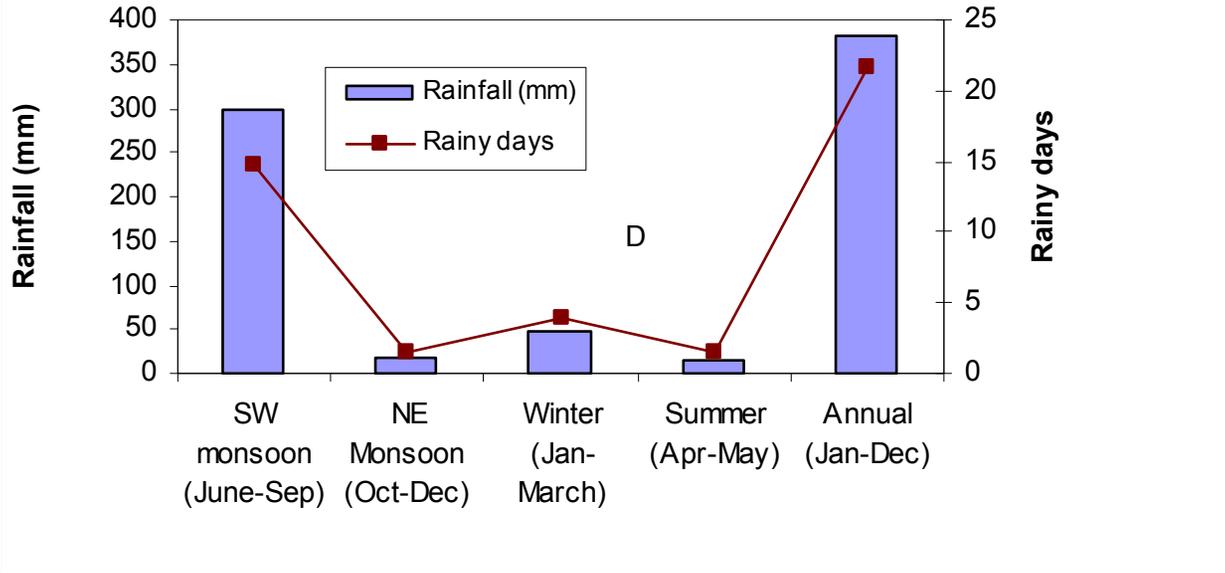
Map of Punjab



MUKTSAR (Punjab)



Normal annual rainfall (mm) of District Muktsar in different seasons



2.0 Strategies for weather related contingencies

2.1 Drought: N A

2.1.1 Rainfed Situation: N A

2.1.2 Irrigated Situation

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Canal / Tubewell irrigated alluvial soils	Cotton – Wheat	No Change	A. Cotton: i. Sowing on ridges with each furrow irrigation ii. First irrigation should be delayed as possible. iii. Irrigation with underground in conjunction with canal water. iv. Gap filling by transplanting 21 days old cotton seedlings. v. Alternate furrow irrigation with poor quality Tube well water after PSI with canal water.	-
		Rice - Wheat	Rapeseed & Mustard Torla (PBT 37) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2)	B Rice: i. Grow short duration varieties (PR 115) ii. Irrigation with underground in conjunction with canal water. iii. Basmati plantation C. Wheat: i. Grow late sown varieties (PBW 590 and 509) ii. Bi-directional sowing / Bed planting iii. Closed spacing (22.5 cms x7.5cms) iv. Seed priming D. Rapeseed & Mustard i. Prefer <i>Raya</i> PBR -97 under scarce water supply	

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	N A				

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	N A				

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	N A				
Water logging Conditions	Canal /tube well irrigated	Rice –wheat	Rice Wheat Cotton	Prefer early transplanting of paddy. Water logging measures like – Skimming well installation. Bio Drainage. Sub Surface drainage. Rational use of Brackish water.	

2.2 Un-timely (un-seasonal) rains

Condition				
Heavy rainfall with high speed winds in a short span	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Cotton	Ridge planting, drain out excess rain water	Drain out excess rain water, application of nitrogenous fertilizer, foliar spray of 2 % KNO ₃	Drain out excess rain water and follow the recommended Practices for the control of insect /pest. And diseases.	Storage of produce at safer place
Rice	Drain out excess rain water in submersing crops , Nitrogen & Zinc fertilizer application	Drain out excess rain water.	Drain out excess rain water	Proper drying of grains to be done before storage.
Wheat	Bed / bidirectional sowing, Drain out excess rain water, apply Nitrogenous fertilizer and Gypsum(100 kg/acre) to check nitrogen & sulphur Deficiency respectively, varieties resistance to lodging should be preferred	Drain out excess rain water, foliar spray of 3%urea solution	Drain out excess rain water	Shifting of produce at safer place for drying
Rape seed & mustard	Drain out excess rain water Nitrogen fertilizer application	Drain out excess rain water		Shifting of produce at safer place for drying
Horticulture				
Citrus	Drainage of excess water, raising of soil surface around the tree trunks, chemical control of foot rot/ phytophthora, remove broken branches	Drain out excess rain water and prune out broken branches	Drain out excess water, Application of growth regulators and fungicides to check the pathological fruit drop	Drain out excess water,
Guava	Drainage of excess water, raising of soil surface around the tree trunks	Drain out excess rain water		Shifting and storage of harvested fruits ate
Chilli	Re transplanting, drain out excess rain water	Wilting: Pumping of access rain water and spray the crop with M -45 or Blitox @ 3 gm		Avoid rotting and discoloring of fruits

		per liter water	
Potato	Manual weed control, earthing up and apply second dose of nitrogen Drainage of excess water	Drain out excess water, spray Ridomil @ 500g/ acre to check late blight	Curing of potatoes should be done properly.
Outbreak of pests and diseases due to un-seasonal rains			
Cotton	Spray Larwin@250g Or Ekalux 800ml/acre to check Mealy bug, white fly	1. Insect/Pests: Spray Imidachlopid 40 ml/ Pride20ml/acre for Jassid; Hostathion 600 ml/acre against white fly; Larwin@250gOr Ekalux 800ml/acre to check Mealy bug; synthetic pyrethroids/Carbamate insecticides against Pink/ spotted /American(small size) boll worm ; Organophosphate/Naturalite/oxadiazine against American (big size) boll worm and Carbamate/ Organochlorinate/ Organophosphates against Tobacco boll worm. 2. Diseases: Grow LH 144/LH 2076 against Leaf curl; Cobalt chloride (COCl ₂) to check para wilt disease, Spray blitox+ streptocycline against Bacterial Blight and Blitox/Captan for control of Anthrenose, leaf blight and leaf spot .	Storage of produce in dry place
Rice	Spray of Butachlor 50 EC @ 1200 ml per acre For the control of weeds, algrip 20Wp @ 30gm per acre for of broad leaf weeds, Spray Nuvacron/Monocil@ 560 ml/acre against leaf folder and stem borer.	1. Insect/Pests: Spray Nuvacron /Monocil@ 560 ml/acre against leaf folder and stem borer; Confidor @40 ml/acre/ Ekalux @ 800 ml/acre against Plant hoppers/ Rice ear cutting caterpillar. 2. Diseases: Grow PR 120, PR 111 against Bacterial leaf blight (BLB); spray Blitox(500ml)/Tilt (200ml) per acre to control False smut; Spray Tilt @ 200m l/acre against sheath blight ,Sheath rot and Bunt diseases.	Storage of produce in dry place
Wheat	Spray pesticide to control Pink boll worm especially in rice fields.	Spray Nuvacron @150ml/acre to control sucking pest (Aphid)	Spray Nuvacron @150ml /acre to control Aphid, Ekalux for Army worm (@400 ml); Boll worm(800 ml) per acre and Tilt @200ml/acre to check Karnal bunt & rusts.
			Treat the produce meant for seed with 250gmMalathion dust (5%)and disinfest 10 gunny bags with 5 ml cymbush/10 litres water ,Godowns with 100 ml sythion/10 litres water.
Rape seed & mustard	Disease: two sprays of Indofil M-45/ Blitox @ 250g /acre at the interval of fifteen days to control the incidence of white rust and alternaria blight Aphid : Spray 40 gm of Actara 25WG or 400 ml Endosulfan 35 EC		Shifting of produce at safer place.

	in 80-100 litre of water			
Horticulture				
Citrus	Chemical control of phytophthora / foot rot with Ridomil-MZ/ Alliette as per recommendation, Control of sucking pests with systemic pesticides	Chemical control of phytophthora / foot rot with Ridomil-MZ/ Alliette as per recommendation, Control of sucking pests with systemic pesticides	Chemical control of phytophthora / foot rot with Ridomil-MZ/ Alliette as per recommendation, Control of sucking pests with systemic pesticides	Application of fungicides/ /growth regulators/nutrients to check post harvest losses
Guava	Chemical control of sucking pests and diseases like Anthracnose/wilt and insects like fruit fly with Fenvelrate	Chemical control of fruit fly with Fenvelrate and diseases like powdery mildew/ anthracnose with Captan/Blitox	Chemical control of fruit fly and Anthracnose of guava. Early harvesting at proper maturity level.	Storage at proper place
Chilli	-	Pumping out of excess rain water to check wilt	Spray Endosulfan @ 1.0 liter /acre to check fruit borer Spray Blitox @ 3 g/ liter water to check rotting of fruit	Keep in dry place
Potatoes	Spray of Rogor @ 300ml / acre for the jassid/ aphids, Spray of Indofil M-45 @500 -700 ml/acre for the control of late blight.		Spray of Ridomil 500g/acre for the control of late blight.	After curing proper storage should be done.

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Cotton	Heavy <i>rauni</i> (irrigation before sowing) (PSI) with canal water, planting of crop on eastern side of N-S ridge, gap filling and light irrigation	Apply light irrigation	-	-
Rice	Correct Iron deficiency with 0.5 per cent iron sulphate spray, light and frequent irrigation	Pounding of water for fifteen days after transplanting to check iron deficiency and for crop establishment	-	-
Wheat	-	-	Apply light irrigation	-
Horticulture				
Citrus	Light and frequent irrigation and shelter from western side to check sun scald and burning injury, application of white wash pint on main stems,	Apply light and frequent irrigation to check drooping of flowers and fruit with growth regulator like 2-4-D/GA.		-
Guava	Frequent irrigation and application of white wash Paint on main stem portion, and apply Shelter on western Side to check the burning of young plants.	Apply frequent irrigation to check drooping of flowers.		-
Chilli	Light and frequent irrigation	Light and frequent irrigation	Light and frequent irrigation	-
Potato	-	-		-
Cold wave				
Horticulture				
Citrus	Apply light and frequent irrigation , protect the plants by providing shelter from North-West direction, smudging	Apply light and frequent irrigation , protect the plants by providing shelter from North-West direction, smudging		-
Guava	Apply light and frequent irrigation , protect the plants by providing shelter from North-West direction		-	-

Chilli	-	-	-	-
Potato	-	Light and frequent irrigation	-	-
Frost				
Rape seed & mustard	-	Apply light irrigation		-
Horticulture				
Citrus	New plantation, and cover the plants with grass or sarkanda polythene etc	Installation of wind breaks, smoking etc.		-
Guava	-	-	-	-
Chilli	Cover the Nursery with polythene sheets, light irrigation	-	-	-
Potato	-	Light irrigation and Frequent irrigation		-
Hailstorm				
Cotton	Re sowing			
Rice	-			
Wheat	Re sowing	Not curable		
Rape seed & mustard	Re sowing	Not curable		
Horticulture				
Citrus	Protection of nursery with sarkanda etc/ growing of nursery Under protected structures.	Removal of broken limbs and sprays fungicide to check fungal infection with blitox, Bordeaux mixture etc.		-
Guava				
Chilli	Re-sowing	-	-	-
Potato	-	-	-	-

2.5 Contingent strategies for Livestock, Poultry & Fisheries.

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<i>Drought</i>			
Feed and fodder availability	<p>Increase area under fodder cultivation.</p> <p>Collection and storage of wheat /paddy straw.</p> <p>Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.</p> <p>Establishing fodder banks and preserving fodder as silage and hay.</p>	<p>Utilizing fodder from fodder bank reserves.</p> <p>Utilizing stored silage/hay.</p> <p>Transporting complete feed/fodder and dry roughages to the affected areas.</p>	<p>Training/educating farmers for feed & fodder storage.</p> <p>Maintenance / repair of silo pits and feed/fodder stores.</p>
Drinking water	<p>Preserving water in the village ponds/ tanks.</p> <p>Excavation of bore wells.</p> <p>Rain water harvesting on individual farm/community basis.</p>	<p>Using water from village ponds/tanks.</p> <p>Ground water resources to be exploited for drinking purposes.</p>	<p>Maintenance/ cleaning and strengthening of water village ponds.</p>
Health and disease management	<p>Preparedness with sufficient stocks of medicines.</p> <p>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 claim for mortalities.</p>
<i>Floods</i>	Not a flood prone district.		
Feed and fodder availability			
Drinking water			
Health and disease management			
<i>Cyclone</i>	Not a cyclone prone district		

Feed and fodder availability			
Drinking water			
Health and disease management			
<i>Heat wave and cold wave</i>			
Shelter/environment management	<p>Plantation of shady trees /wind breakers around animal facilities.</p> <p>Encourage low cost environmentally effective well ventilated shelters.</p> <p>Cleaning of village ponds on community basis.</p> <p>Preponderances for stress related diseases.</p>	<p>Use protective measures to reduce the effects of cold / heat wave with the use of suitable techniques/feed supplements.</p> <p>Use village ponds for wallowing during heat wave.</p> <p>Ensure fresh drinking water supplies.</p> <p>Take special care of high yielding animals.</p>	<p>Plantation of shady trees and wind breakers around animal facilities/farms.</p> <p>Strengthening of water supply sources.</p>
Health and disease management	<p>Provision of community shelters/hospitals for animal treatments</p> <p>Proper & timely vaccination.</p> <p>Ensure sufficient stock of medicines</p>	<p>Testing for immunity.</p> <p>Keep all animals in the area under observation.</p>	<p>Keep the hyper sensitive animals under observation</p> <p>Proper feed and fodder supply for reconditioning the affected animals</p>

2.5.2 Poultry

	Suggested contingency measures			Convergence/ ongoing programs, if any	linkages with
	Before the event	During the event	After the event		
<i>Drought</i>	-	-	-		
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	-		
Health and disease management	Vaccination of birds. Veterinary preparedness with sufficient stocks of medicines.	Critical observation of flocks for any infection on daily basis.	Culling /disposal of affected birds.		
<i>Floods</i>	Not a flood prone district.				
Shortage of feed ingredients					
Drinking water					
Health and disease management					
<i>Cyclone</i>	Not a cyclone prone district.				
Shortage of feed ingredients					
Drinking water					
Health and disease management					
<i>Heat wave and cold wave</i>					
Shelter/environment	Build comfortable shelters.	Ensure supply of fresh drinking water.	Repair/maintenance of		

management	Make provision for cooling devices. Tree plantation/wind breakers around poultry facilities.	Use cooling / heating devices for comfort of birds. Increase or decrease ventilation and air movements as per requirements. Use feed additives as protective measure to reduce the effects of cold or heat.	shelters.	
Health and disease management	Vaccination of birds. Emergency veterinary preparedness with sufficient stock of medicines.	Watch the flocks for any infection critically. Testing the titer against RD. Quick treatment of against any stress related disease outbreak.	Culling and disposal of affected birds. Proper disposal of mortalities.	

2.5.3. Fisheries/ Aquaculture

	Suggested Contingency measures		
	Before the event	During the event	After the event
1. Drought			
A. Capture			
Marine	-	-	-
Inland			
(i) Shallow water depth due to insufficient rains/inflow	I) Critical analysis of long range forecast data. ii) Storage of water. iii) Afforestation program.	i) Use stored water. ii) Use surface water flow. iii) Divert water from unutilized areas. iv) Utilize canal water. v) Aeration of water in ponds/reservoirs.	i) Need based monitoring through research plan. ii) Intensive afforestation program. iii) Augmentation of surface water flow. iv) Strengthening of water sources. v) Rain water harvesting.

	iv) Conservation of rivers/ponds. v) Re-excavation of local canals/village ponds.		vi) Compensation claims. vii) Prepare vulnerability map.
(ii) Changes in water quality	i) Prohibit dumping of solid, liquid and waste in water sources. ii) Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	i) Adopt suitable action plan to reduce salt load in water bodies. ii) Generate scientific research data on the survival and tolerance limit of fish and prawn species in saline water. iii) Use disinfectants and therapeutic drugs. iv) Adoption of bio-remedial measures	i) Need based research data should be generated on water quality. ii) Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	i) Critical analysis of long range forecast data. ii) Storage of water. iii) Afforestation program. iv) Conservation of water. v) Re-excavation of local canals/village ponds.	i) Use stored water. ii) Use surface water flow. iii) Divert water from unutilized areas. iv) Utilize canal water. v) Aeration of ponds.	i) Need based monitoring through research plan. ii) Intensive afforestation program. iii) Augmentation of surface water flow. iv) Adoption of rain harvesting methods. v) Compensation claims . vi) Prepare vulnerability map.
(ii) Impact of salt load build up in ponds/Changes in water quality	i) Prohibit dumping of solid, liquid and waste in water sources. ii) Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.	i) Adopt suitable action plan to reduce salt load in water bodies. ii) Generate scientific research data on the survival and tolerance limit of fish and prawn species in saline water. iii) Use disinfectants and therapeutic drugs. iv) Adoption of bio-remedial measures	i) Need based research data should be generated on water quality. ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation.
2. Flood	Not a flood affected district.		
A. Capture			
Marine	-	-	-
Inland			
(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			
(vi) Health and disease			
B. Aquaculture			
(i) Inundation with flood water			
(ii) Water contamination and changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and input (feed, chemicals)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
3. Cyclone / Tsunami	Not a cyclone affected 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.)	-	-	-
4. Heat wave and cold wave			
A. Capture			
Marine	-	-	-
Inland	<ul style="list-style-type: none"> i) Stay aware of upcoming temperature changes. ii) Arrange the aerators. iii) Ensure sufficient water level in water bodies. vi) Formulate strategic fishing management during the heat/ 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) Educating the farmers through electronic or print media iv) Collect basic weather data on incidence of extremes and physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. 	<ul style="list-style-type: none"> i) Intensive afforestation program for reducing heat waves. ii) Gather information about history of catch per unit effort as well as fish yield rate during heat/ cold wave and accordingly simulate future plan for sustainable fishing. iii) 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 management for the heat /cold waves. v) Tree plantation around fish ponds 	<ul style="list-style-type: none"> i) Adopt suitable action plan to reduce salt load in water bodies. ii) Generate scientific research data on the survival and tolerance limit of fish and prawn species in saline water. iii) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. iv) Use dark materials to cover the water bodies during excessive heat waves. v) Educating the farmers through electronic / print media. vi) Collect basic weather data on incidence of extremes and physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. 	<ul style="list-style-type: none"> i) Intensive afforestation program for reducing heat waves. ii) 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. vi) Loss assessment & insurance claim.

<p>(ii) Health and disease management</p>	<p>i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Develop heat/ cold wave control management plan. iv) Stock sufficient emergency medicines.</p>	<p>i) Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iii) Determination of nature and speed of transmission of diseases. vi) Emergency aeration or splashing in water bodies</p>	<p>i) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. ii) Eradicating the disease. iii) Follow up surveillance and monitoring. iv) Proper disposal of dead fish. v) Loss assessment & insurance claim.</p>
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