

State: PUNJAB

Agriculture Contingency Plan for District: KAPURTHALA

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	Northern Plain, Hot Sub humid (Dry) Eco-Region Punjab and Rohilkand plains, hot dry (9.1)			
	Agro-Climatic Zone (Planning Commission)	Trans-Gangetic Plains Region (VI)			
	Agro Climatic Zone (NARP)	Central Plain Zone (PB-3)			
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Amritsar, Ludhiana, Taran and Jullundhur			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		31 ⁰ 22'31.81"N	75 ⁰ 23'03.02 E	252 m MSL	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Punjab Agricultural University , Ludhiana			
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, J.J. farm, Near New Grain Market, Sultanpur road P.O, Sheikhpur, Kapurthala 144620			
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Punjab Agricultural University , Ludhiana				
1.2	Rainfall	Normal RF(mm)	Normal Rainy days	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	399.7	-	1 st week of July	2 nd week of September.
	NE Monsoon(Oct-Dec):	25.9	-	-	-

	Winter (Jan- Feb)	72.1	-		
	Summer Mar-May)	29.4	-		
	Annual	527.1	-		

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)	163	134	02	31	-	-	-	-	-	-

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)
	Coarse loamy	41.7
	Coarse loamy and fine loamy associations	80.5
	Fine loamy associations	40.7

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	134	205
	Area sown more than once	141	
	Gross cropped area	275	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	134		
	Gross irrigated area	275		
	Rainfed area	-		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals (3% area is canal irrigated)		-	
	Tanks		-	
	Open wells		-	
	Bore wells	47183	134	
	Lift irrigation schemes		-	
	Micro-irrigation		-	
	Other sources (please specify)		-	
	Total Irrigated Area		134	
	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 residual sodium carbonate, no problem of salinity and fluoride 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)

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	114.0	-	114.0	-	-	-	-	114.0
	Maize	3.0	-	3.0	-	-	-	-	3.0
	Pigeonpea	-	-	-	-	-	-	-	-
	Greengram	-	-	-	-	-	-	-	-
	Cotton	-	-	-	-	-	-	-	-
	Wheat	-	-	-	111.0	-	111.0	-	111.0
	Barley	-	-	-	-	-	-	-	-
	Rapeseed and Mustard	-	-	-	1.0	-	1.0	-	1.0
	Sunflower	-	-	-	-	-	-	3.2	3.2
	Sesamum	0.1	-	-	-	-	-	-	0.1

	Horticulture crops - Fruits	Area ('000 ha)
		Total
	Kinnow	0.1
	Orange and malted	0.01
	Lemon	0.01
	Mangoes	0.1
	Litchi	0.004
	Guava	0.2
	Pear	0.03
	Peach	0.01
	Plum	0.003
	Grapes	0.002

	Ber	0.02
	Amla	0.002
	Misc	0.023
	Vegetables	Total
	Potato	13.2
	Onion	0.002
	Winter Vegetables	1.04
	Summer vegetables	0.7
	Medicinal and Aromatic crops	Total
		-
	Plantation crops	Total
		-
	Eg., industrial pulpwood crops etc.	-
	Fodder crops	Total
		-
	Total fodder crop area	-
	Grazing land	-
	Sericulture etc	-

1.8	Livestock (in number)	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	0.2	1.2	1.4
	Crossbred cattle	6.4	45.3	51.7
	Non descriptive Buffaloes (local low yielding)	2.5	18.7	21.3
	Graded Buffaloes	11.4	108.0	119.5
	Goat	1.0	2.9	4.0
	Sheep	0.06	0.2	0.2
	Others Equine (Horse &Pony)	0.4	0.3	0.7
	Commercial dairy farms (Number)			0.1
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial	70	234.9	
	Backyard	-	9.6	

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	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		
		69			01			216		
	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)		470.6			5.4			2.5		

1.11 Production and Productivity of major crops (2009)

1.11	Name of crop	<i>Kharif</i>		<i>Rabi</i>		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 M 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	428	3753	-	-	-	-	428	3753	-
	Maize	11	3608	-	-	-	-	11	3608	-

Pigeonpea	-	-	-	-	-	-	-	-	-	-
Greengram	-	-	-	-	-	-	-	-	-	-
Cotton	-	-	-	-	-	-	-	-	-	-
Wheat	-	-	472	4252	-	-	472	4252	-	-
Barley	-	-	-	-	-	-	-	-	-	-
Rapeseed and Mustard	-	-	1	1187	-	-	1	1187	-	-
Sunflower	-	-	-	-	4.9	1535	4.9	1535	-	-
Potato	-	-	-	-	296	22450	296	22450	-	-

Major Horticultural crops (Crops to be identified based on total acreage)

Crop	Production Metric tonnes	Production (000 t)	Productivity (kg/ha)
Kinnow	1591	-	-
Orange and Malta	74	1.811	18110
Lemon	82	0.075	7530
Mangoes	834	0.090	7520
Litchi	49	0.801	13584
Guava	3633	0.006	1232
Pear	753	3.949	21940
Peach	240	0.820	22790
Plum	51	0.214	17860

	Grapes	56	0.055	18320
	Ber	269	0.085	28314
	Amla	26	0.241	17224
	Misc	279	-	-

1.12	Sowing window for 5 major field crops	Paddy	Wheat	Sunflower	Maize	Potato
	<i>Kharif</i> - Rainfed		-	-		-
	<i>Kharif</i> -Irrigated	2 nd week of June to 1 st week July	-	-	4 th week May to 4 th week June	-
	<i>Rabi</i> - Rainfed	-	-	-	-	-
	<i>Rabi</i> -Irrigated	-	4 th week October to 1 st week December	-	-	Last week of September to mid October.
	Spring-Irrigated	-	-	2 nd week to 4 th week of January.	-	-

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 (Yellow rust on wheat, BLB on paddy, Late blight on potato, Sucking pests like aphids, jassid, whitefly, Mealy bug in cotton)	-	✓	-
	Others Yellow vein mosaic virus in Mungbean	-	✓	-

1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes / No
		Mean annual rainfall as Annexure 2	Enclosed: Yes / No
		Soil map as Annexure 3	Enclosed: Yes / No

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation (100 per cent area is irrigated): Not Applicable

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 2 weeks			NA		
Delay by 4 weeks			NA		
Delay by 6 weeks			NA		
Delay by 8 weeks			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	Soil nutrient & moisture conservation measures	Remarks on Implementation
	NA				

2.1.2 Drought - Irrigated situation

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	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	Prefer 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	Direct seeding of rice saves about 20% of irrigation water. Laser leveling of field also saves 20-25 % of irrigation water
		Maize	Moong (PAU 911 and ML 818), Mash (Mash 114 and Mash 338).		
		Wheat	Gram (PDG \$ and PDG 3) and Toria (PBT 37).		
		Sugarcane	Moong (PAU 911 and ML 818), Mash (Mash 114 and Mash 338)		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	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	Prefer sowing of Basmati rice, Maize, Soybean and other pulses.	Direct seeding of paddy laser land leveling should be done. Sunflower can be grown by transplanting of nursery in February.	Direct seeding of rice saves about 20% of irrigation water. Laser leveling of field also saves 20-25 % of irrigation water.
		Maize			
		Wheat	Wheat can be replaced with oilseeds		
		Sugarcane	Moong (PAU 911 and ML 818), Mash (Mash 114 and Mash 338)		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
		Sunflower	Summer Moong (SML 832 and SML 668) and Summer Mash (Mash 1008 and Mash 414)		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal 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	Tubewell irrigated alluvial soils	Paddy	Maize, Soybean (SL 744 and SL 525) and moongbean	Bed planting of soybean and maize laser land leveling should be done	Bed planting saves 20-25 % irrigation water. Laser leveling of field also saves 20-25 % of irrigation water
		Maize	Moong (PAU 911 and ML 818), Mash (Mash 114 and Mash 338).		
		Wheat	Oilseeds		
		Sugarcane	Sugar cane should be replaced with Moong (P A U 911 and ML 818), Mash (Mash 114 and Mash 338		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal 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	Tube well irrigated alluvial soils		NA		

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	Alternate crops to be sown like pulses (Moong PAU 911 and ML 818), Mash (Mash 114 and Mash 338), Oilseeds in place of predominant crops of rice-wheat.	Laser land leveling should be done.	Laser leveling of field saves 20-25 % of irrigation water. Sowing of wheat with happy seeder immediately after harvest of paddy saves pre sowing irrigation Paired row trench planting of sugarcane saves about 10-15% irrigation water
		Maize		1% FeSO ₄ spray in case of iron deficiency at weekly interval and decrease irrigation interval	
		Wheat		Wheat can be sown with Happy seeder technology immediately after harvesting of paddy.	
		Sugarcane		Paired row trench planting of sugarcane	

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Maize	-	This crop is highly sensitive to standing water so drain out the excess water	-	-
Wheat	Mn deficiency can be corrected by repeated sprays	-	-	Store new grains in clean godowns or receptacles. Plug all cracks, cervices

	of 1% MnSO ₄ in case of Mn deficiency			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. Drain out excess water in case of water stagnation conditions.	-	-
Horticulture crops	-	Drain out excess water	-	-
Heavy rainfall with high speed winds in a short span				
Wheat	-	-	Don't irrigate on windy or stormy days as it will lead to lodging of wheat crop.	-
Sugarcane	If dry weather conditions prevails might 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	Do not apply more than recommended nitrogen. 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.	-
Potato	-	Late blight of potato develops in November-December months	<ol style="list-style-type: none"> 1. Spray the crop with Ridomil @1250 ml/ha. 2. Cut the haulms 	Potato cultivars Kufri Chandermukhi, Kufri Jyoti and Kufri Chipsona-1 can be stored successfully for 5 months at 10±1° C and 90-95 % RH with two consecutive foggings of CIPC at the rate of 40 ml per tonne. The first fogging is given at the first fogging. The stored potatoes maintain low reducing sugars (< 0.25 %) and are suitable for chipping and culinary purpose.
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.	-	-	-

2.3 Floods

In general there are no floods, floods came in 1988 and 1995 in the low lying area of Kapurthala

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Maize	<ul style="list-style-type: none"> The alternate crops can be grown when flooded areas will reach the <i>wattar</i> condition, the mash varieties mash 114, Mash 338 and Mash 1-1 can be sown using 15-20 kg seed rate/ha. This gives us 7.5-8.8 q/ha yield of mash. Fields reaching <i>wattar</i> condition in first week of September can be sown with toria varieties PBT 37 and TL 15 using 3.75 kg/ha seed and maintaining a line to line distance of 30 cm. 	Kill the hibernating larvae of maize borer in plant material like stubbles, stalks, cobs and cores. Use trichoderma cards on 10-15 days old maize crop Spray Fenvalerate @40ml Cypermethrin @40 ml	Spray Monochrotophos @100 ml in 100 L of water against the mite	
	<ul style="list-style-type: none"> In addition to combat the demand of green fodder, green cobs from maize crops can provide good profit to farmers. This crop can be followed with late wheat or sunflower. 	-	-	-
	<ul style="list-style-type: none"> The farmers can also grow toria+gobhi sarson in the middle of September. 	-	-	-
	<ul style="list-style-type: none"> Farmers may grow vegetable: August is suitable for growing radish, cucurbits like bottlegourd, bittergourd and lufa, etc. Lobia (Cowpeas) can also be grown for vegetables. 	-	-	-
	<ul style="list-style-type: none"> Arkel and Matar Ageta-6 can 	-	-	-

	be sown in end September which can yield green pods after 60-65 days. For early peas crop seed treatment with Bavistin 1.0 g per kg seed is must. The crop of chilli growing in the field need protection against fruit rots, anthracnose and wilt diseases which become serious during rainy days.			
Continuous submergence for more than 2 days				
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.	-
Cold wave				
Wheat	To late sown wheat, apply second dose of N with first irrigation.	-	-	-
Mustard	To save the crop from frost damage, apply irrigation.	-	-	-
Sugarcane	The seed crop against frost by giving frequent irrigations. Frost injury results in low germination of	-	-	-

	sugarcane.			
Horticulture	-	The growers are advised to adopt the measures to save their valuable fruit trees from drought, windstorm and sun injury.	-	-
Horticulture				
Tomato	Complete transplanting of tomato seedling in the frost fortnight of this month. Provide Sarkanda/kahi/rice straw to save the plants from frost. Dwarf tomato varieties can be saved from frost injury with 100 gauge thick white plastic bags of 35 x 25 cm size. Twenty five kg bags are sufficient for an acre and these can be used for 2 to 3 years.	-	-	-
Potato	-	-	To save the potato crop from frost damage use the sprinkler irrigation and give light irrigation through sprinkler during frosty nights	-
Frost	NA			
Hailstorm	NA			
Cyclone	NA			

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 reservoirs/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>			
Feed and fodder availability	<p>Collection and storage of wheat /paddy straw.</p> <p>Establishing feed/ fodder reserves at places safe from floods.</p> <p>Processing/ storage of feed/ roughages in the form of complete feed/blocks.</p> <p>Using excess fodder for silage/hay making.</p>	<p>Moving feed and fodder from the reserves to flood affected areas.</p>	<p>Maintenance and strengthening of feed / fodder storage facilities</p> <p>Ensure availability of quality feed and fodder for high yielding animals</p>

Drinking water	Excavation of bore wells.	Supply of clean and safe water to the animals.	Cleaning and disinfection of water reservoir/village ponds/tanks. Repair/maintenance of bore wells.
Health and disease management	Provision of community shelters at safe places. Proper & timely vaccinations. Preparedness with sufficient stock of medicines. Constitution of Rapid Action Veterinary Force.	Shifting animals from affected areas to safe places at short notice. Quick action by Rapid Action Veterinary force for animal treatment.	Proper disposal of carcass of dead animals Culling of sick animals Insurance & govt. relief claims
Cyclone	Not a cyclone prone district		
Feed and fodder availability	-	-	-
Drinking water	-	-	-
Health and disease management	-	-	-
Heat wave and cold wave			
Shelter/environment management	Plantation of shady trees /wind breakers around animal facilities. Encourage low cost environmentally effective well ventilated shelters. Cleaning of village ponds on community basis. Preponderances for stress related diseases.	Use protective measures to reduce the effects of cold / heat wave viz., use of antioxidants etc. Use water ponds for wallowing during heat wave. Ensure fresh drinking water supplies.	Plantation of shady trees and wind breakers around animal facility/farms. Strengthening of water supply sources.
Health and disease management	Provision of community shelters/hospitals for animal treatments Proper & timely vaccination, ensure sufficient stock of medicines	Testing for immunity. Keep all animals in the area under observation.	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	
<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>				
Shortage of feed ingredients	Ensure feed reserves to meet requirements for 2-3 months at places safe from floods.	Use feed from feed reserves. Transport feed to affected areas.	Cleaning & disinfection of feed stores Dispose of fungal contaminated feeds.	
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 areas for emergency treatment.	Culling affected birds. Proper disposal of dead carcasses. Cleaning and disinfection of poultry houses.	
<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 management	Build comfortable shelters. Make provision for cooling devices. Tree plantation/wind breakers around poultry facilities.	Ensure supply of fresh drinking water. 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.		
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 birds against any 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	I) Critical analysis of long range	i) Use stored water.	i) Need based monitoring through

insufficient rains/inflow	<p>forecast data.</p> <p>ii) Storage of water.</p> <p>iii) Afforestation program.</p> <p>iv) Conservation of rivers/reservoir/ponds.</p> <p>v) Re-excavation of local canals and reservoirs.</p>	<p>ii) Use surface water flow.</p> <p>iii) Divert water from unutilized areas.</p> <p>iv) Utilize canal water.</p> <p>v) Aeration of water in ponds/reservoirs.</p>	<p>research plan.</p> <p>ii) Intensive afforestation program.</p> <p>iii) Augmentation of surface water flow.</p> <p>iv) Strengthening of water reservoirs.</p> <p>v) Rain water harvesting.</p> <p>vi) Compensation claims.</p> <p>vii) Prepare vulnerability map and place it to management committee.</p>
(ii) Changes in water quality	<p>i) Prohibit dumping of solid, liquid and waste in water sources.</p> <p>ii) Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.</p>	<p>i) Use disinfectants and therapeutic drugs.</p> <p>ii) Adoption of bio-remedial measures</p>	<p>i) Need based research data should be generated on water quality.</p> <p>ii) Dumping of solid, liquid and waste in water bodies should be stopped through enactment of legislation.</p>
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	<p>i) Critical analysis of long range forecast data.</p> <p>ii) Storage of water.</p> <p>iii) Afforestation program.</p> <p>iv) Conservation of rivers/reservoir/ponds.</p> <p>v) Re-excavation of local canals and reservoirs.</p>	<p>i) Use stored water.</p> <p>ii) Use surface water flow.</p> <p>iii) Divert water from unutilized areas.</p> <p>iv) Utilize canal water.</p> <p>v) Aeration of ponds.</p>	<p>i) Need based monitoring through research plan.</p> <p>ii) Intensive afforestation program.</p> <p>iii) Augmentation of surface water flow.</p> <p>iv) Construction of water reservoirs.</p> <p>v) Adoption of rain harvesting methods.</p> <p>vi) Compensation claims.</p> <p>vii) Prepare vulnerability map and place it to management committee.</p>
(ii) Impact of salt load build up in ponds/Changes in water quality	<p>i) Prohibit dumping of solid, liquid and waste in water sources.</p> <p>ii) Preparedness with stocks of chemicals, disinfectants and therapeutic drugs.</p>	<p>i) Use disinfectants and therapeutic drugs.</p> <p>ii) Adoption of bio-remedial measures</p>	<p>i) Need based research data should be generated on water quality.</p> <p>ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation.</p>
2. Flood			
A. Capture			
Marine	-	-	-
Inland			

(i) Average compensation paid due to loss of human life	<ul style="list-style-type: none"> i) Be prepared to evacuate at a short notice. ii) Preparation of flood control action plan. iii) Warning dissemination and precautionary response. iv) Formation of flood management committee. v) Enhancement in coping capabilities of common people. vi) Insurance for the life of people/fishermen. 	<ul style="list-style-type: none"> i) Human evacuation from the area. ii) Coordination of assistance. iii) Damage and need assessment. iv) Immediate management of relief supplies. v) Immediate help delivery. 	<ul style="list-style-type: none"> i) Arrangement for rescue and casualty care. ii) Arrangement for burial control room. iii) Restoration of essential services, security and protection of property. iv) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan. v) Insurance and compensation claim.
(ii) No. of boats/nets damaged	<ul style="list-style-type: none"> i) Annual repair of boats/nets and gears. ii) Insurance of boats/nets/gears. 	<ul style="list-style-type: none"> i) Coordination of assistance iii) Immediate management of relief supplies. iv) Govt. support and compensation. 	<ul style="list-style-type: none"> i) Education and training for the repair of boats/nets and gears. ii) Loss assessment & insurance claim.
(iii) No. of houses damaged	<ul style="list-style-type: none"> i) Education and training for the repair of houses. ii) Store raw material for emergency repair of houses. iii) House insurance. 	<ul style="list-style-type: none"> i) Arrangement of temporary shelters for homeless people. i) Damaged house enumeration and need assessment. ii) Coordination of assistance. iii) Immediate management of relief supplies. 	<ul style="list-style-type: none"> i) Loss assessment & insurance claim. ii) Govt. assistance claim.
(iv) Loss of stock	<ul style="list-style-type: none"> i) Keep boats, nets/gears ready for emergency use. ii) Store fuels, food/other item iii) Develop flood control management plans. iv) Stock material insurance. 	<ul style="list-style-type: none"> i) Search/locate the stock/input. ii) Mobilize local people for protection. iii) Hire stock/inputs from distant areas/company/ farmers who are not affected by flood. 	<ul style="list-style-type: none"> i) Locate backup stocks and verify its usability time. ii) Follow flood control management plan. 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 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. 	<ul style="list-style-type: none"> i) Need based research data should be generated to maintain water quality, iii) Dumping of solid, liquid and waste should be stopped through enactment of legislation. iv) Contact Govt. and industrial

		<ul style="list-style-type: none"> iv) Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies. v) Need based bioremediation 	<ul style="list-style-type: none"> organization for immediate remedy and cleaning of the water bodies. v) 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 stores of medicines. 	<ul style="list-style-type: none"> i) Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal. ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. iii) Emergency aeration or splashing in water bodies. 	<ul style="list-style-type: none"> i) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. iv) Eradicating the disease where possible. v) Follow up surveillance and monitoring after disease outbreak. vi) Bio-monitoring and maintaining water quality. vii) Need based research data should be generated. vii) Loss assessment & insurance claim.
B. Aquaculture			
(i) Inundation with flood water	<ul style="list-style-type: none"> i) Proper facility construction for ponds and its stock safety. ii) Development of flood control management plan. iii) Preparedness with emergency backup equipment on site. iv) Stock insurance. v) Preventive measures against 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. viii) 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 waste decreases the dissolved oxygen level. iv) Strengthening of water bodies/ponds. v) Loss assessment & insurance claim.
(ii) Water contamination and changes	<ul style="list-style-type: none"> i) Store chemicals, disinfectants and 	<ul style="list-style-type: none"> i) Do not use contaminated water. 	<ul style="list-style-type: none"> i) To maintain water quality, need

in water quality	<p>therapeutic drugs</p> <p>ii) Develop flood control management plan</p>	<p>ii) Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas.</p> <p>iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</p> <p>iv) Maintaining the purity and quality of water bodies.</p> <p>iv) Need based bioremediation.</p>	<p>based research data should be generated</p> <p>ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation.</p> <p>iii) Immediate remedy and cleaning of water bodies.</p> <p>iv) Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.</p>
(iii) Health and diseases	<p>i) Advance planning and preparedness.</p> <p>ii) Store chemicals, disinfectants and therapeutic drugs.</p> <p>iii) Stock sufficient emergency medicines.</p>	<p>i) Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish.</p> <p>ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</p> <p>iii) Determination of nature and speed of transmission of diseases.</p> <p>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.</p> <p>ii) Eradicating the disease.</p> <p>iii) Follow up surveillance and monitoring.</p> <p>iv) Proper disposal of dead fish.</p> <p>v) Loss assessment & insurance claim.</p>
(iv) Loss of stock and input (feed, chemicals)	<p>i) Keep the stock/input at safe place for emergency purpose.</p> <p>ii) Store fuels, food/other item.</p> <p>iii) Develop flood control management plan.</p> <p>iv) Stock material insurance.</p>	<p>i) Search/locate the stock/input.</p> <p>ii) Purchase/hire valuable stock/inputs from distant areas not affected by flood.</p>	<p>i) Strengthening of stocks.</p> <p>ii) Assessment of total loss.</p> <p>iii) Insurance claims.</p>
(v) Infrastructure damage (pumps, aerators, huts etc)	<p>i) Educate and provide training for the repair of infrastructure.</p> <p>ii) Follow flood control management plan.</p> <p>iii) Store raw materials for repairing of pumps aerators, huts etc.</p> <p>iv) Infrastructure insurance.</p>	<p>i) Notify utilities of the critical demand.</p> <p>ii) Coordination of assistance.</p> <p>iii) Immediate management of relief supplies.</p>	<p>i) Damaged infrastructure enumeration and need assessment.</p> <p>ii) Locate backup equipment and verify its operation.</p> <p>iii) Repair of damaged infrastructure.</p> <p>iv) Loss assessment & insurance claim.</p>
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) Stay hydrated by drinking plenty of fluids during fishing/field work. iv) Educating the farmers through electronic or print media 	<ul style="list-style-type: none"> i) Intensive afforestation program for reducing heat waves. ii) Collect basic weather data and incidence of extreme and 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.

			v) 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) 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) Stay hydrated by drinking plenty of fluids during fishing/field work. vi) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths. vi) Educating the farmers through electronic or print media 	<ul style="list-style-type: none"> i) Intensive afforestation program for reducing heat waves. ii) Collect basic weather data and incidence of extreme and 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. vi) Loss assessment & insurance claim.
(ii) Health and disease management	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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.