

State: PUNJAB

Agriculture Contingency Plan for District: JALANDHAR

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Punjab and Rohilkhand plains, hot dry, subhumid eco-subregion (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, Jullundur, Kapurthala, Ludhiana, Taran		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		31°19'26.74" N	75°34'39.46" E	262 M
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Central Potato Research Institute, Badshapur, Jalandhar - 144201		
	Mention the KVK located in the district with address	KVK Nurmahal, Uppal Jagir, Jalandhar - 144201		
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 (number)	Normal Onset	Normal Cessation
	SW monsoon (June-September):	538.3	26	1 st week of July	2 nd week of September
	NE Monsoon(October-December):	33.8	3	-	-
	Winter (January- February)	84.8	5		
	Summer (March-May)	41.6	6		
	Annual	698.4	40		

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)	266.2	237.6	5.6	22.8	-	-	-	-	0.2	-

1.4	Major Soils	Area (*000 ha)	Percent (%) of total geographical area
	Coarse loamy soils		20
	Coarse loamy and fine loamy soils		45
	Fine loamy associations		35

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	237.6	178
	Area sown more than once	184.8	
	Gross cropped area	422.4	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	237.1		
	Gross irrigated area	413.7 as per central ground water board report		
	Rainfed area	-		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals (3% area is canal irrigated)		4	
	Tube wells	2,33,000		
	Open wells	-	-	
	Bore wells	73522	-	-
	Lift irrigation schemes	-	-	-
	Micro-irrigation			
	Other sources (please specify)	-	-	
	Total Irrigated Area			
	Pump sets	65977		
	No. of Tractors	25,000		
	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			
	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 2009-10)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>				
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	Paddy	161.6	-	-	-	-	-	-	161.6
	Maize	9.7	-	-	-	-	-	-	9.7
	Sugarcane (Gur)	7.3	-	-	-	-	-	-	7.3
	Wheat	-	-	-	170.4	-	-	-	170.4
	Oilseed (Mustard)	-	-	-	1.2	-	-	-	1.2

	Horticulture crops - Fruits	Area ('000 ha)
		Total
	Guava	0.5
	Pear	0.2
	Kinnow	0.2
	Mango	0.2
	Peach	0.1
	Horticulture crops - Vegetables	Total
	Potato	19.1

Chilli	1.2
Peas	0.9
Muskmelon	0.8
Tomato	0.7
Medicinal and Aromatic crops	-
Plantation crops	-
Eg., industrial pulpwood crops etc.	-
Fodder crops	Total
Bajra	20.8
Cheri/Jowar	12.7
Mukcheri/ Teosinte	0.2
Barseem	15.9
Javi	6.6
Rai Ghah	0.1
Total fodder crop area	56.3
Grazing land	-
Sericulture etc	-

1.8	Livestock (in number)	Male ('000)	Female	Total		
	Non descriptive Cattle (local low yielding)	1.2	8.4	9.6		
	Crossbred cattle	14.2	96.7	40.9		
	Non descriptive Buffaloes (local low yielding)	0.1	1.6	1.7		
	Graded Buffaloes	23.9	223.4	247.2		
	Goat	3.2	10.8	13.9		
	Sheep	0.6	1.8	2.5		
	Others Equine (Horse & Pony)	0.6	0.5	1.1		
	Commercial dairy farms (Number)			2.5		
1.9	Poultry	No. of farms	Total No. of birds			
	Commercial	168	2872.8			
	Backyard	-	12.3			
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
		192		-		346
	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)	617.5	6.2	3.8

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)							
Major Field crops (Crops to be identified based on total acreage)										
	Paddy	563.6	3688.1	-	-	-	-	-	-	-
	Maize	40.6	3434.8	-	-	-	-	-	-	-
	Sugarcane	61.0	3782.8	-	-	-	-	-	-	-
	Wheat	-	-	726.2	4316.5	-	-	-	-	-
	Mustard	-	-	1.5	1169.7	-	-	-	-	-
	Sunflower	-	-	10.2	1671.0	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Guava	9.1	19626.5	-	-	-	-	9.1	19626.5	-
	Pear	5.2	22340.0	-	-	-	-	5.2	22340.0	-
	Kinnow	3.4	16752.5	-	-	-	-	3.4	16752.5	-
	Mango	2.0	12122.3	-	-	-	-	2.0	12122.3	-
	Potato	445.2	23034.0	-	-	-	-	445.2	23034.0	-
	Chilli	2.3	1701	-	-	--	-	2.3	1701	-

1.12	Sowing window for 5 major field crops	Paddy	Wheat	Sunflower	Maize	Potato
	Kharif- Rainfed	-	-	-	-	-
	Kharif-Irrigated	2 nd week of June to 1 st of week July			4 th week of May to 4 th week of June	
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	4 th week of October to 1st week of December	-	-	Last week of September to mid of 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 (specify)		√	
	Others (specify)			

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

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed 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				

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

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

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
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 Drought - 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		Rice/Wheat	Maize (PMH 2 and JH 3459), /wheat	Direct seeding of paddy and laser land leveling should be done which saves 20-25% irrigation water	Punseed, NSC, PAU and Progressive farmer
		Rice/Wheat	Fodder/Wheat		
		Rice/Wheat	Groundnut (SG99 and M522)/ wheat (PBW 509 and PBW 590)		

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	Eg. Canal irrigated Alluvial soils	Rice/wheat	Paddy should be replaced with Basmati rice, Maize, Soybean and other Pulses Wheat can be replaced with oilseeds Varieties: Basmati rice (Pusa Basmati-1, Pusa 1121, Punjab Basmati-2, Punjab Mehak) Oilseed: Raya PBR 97,RLM 619	Direct seeding of paddy and laser land leveling should be done which saves 20-25% irrigation water Sunflower can be grown by transplanting of nursery in February which gives higher yield and takes less time to maturity	Punseed, NSC, PAU and Progressive farmer
		Rice/Wheat			
		Rice/Wheat			

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures
Non release of water in canals under delayed onset of monsoon in catchment	NA			

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

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall		Rice/wheat	Maize or Soybean/wheat	Laser land leveling should be done which saves 20-25 % of irrigation water. 1%FeSO ₄ spray in case of iron deficiency at weekly interval and decrease irrigation interval <ul style="list-style-type: none"> • Wheat: • Wheat can be sown with Happy seeder technology immediately after harvesting of paddy. • Paired row trench planting of sugarcane saves about 10-15% irrigation water 	Punseed, NSC, PAU and Progressive farmer
		Rice/wheat	Moong or Mash/wheat or Barley or Taramira (<i>Eruca sativa</i>) or sarson		
		Rice/wheat			

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				
Wheat	Water drain, 3% urea spray for correcting Fe deficiency	Drain Stagnant water	Drain stagnant water	Drain stagnant water
Paddy	-	-	Drain stagnant water	
Horticulture				
Vegetable	Drain stagnant water	Drain stagnant water	Early harvest to salvage whatever is available	Quality deterioration
Fruits	-do-	-do-		
Kinnow				
Guava				
Heavy rainfall with high speed winds in a short span				
Wheat	Drain water, 3% urea spray for correcting Fe deficiency	Drain water	Drain water	Drain water
Paddy	Drain water	-do-	-do-	-do-
Horticulture				
Vegetables	Grow on raised beds	Protect against winds using sarkanda thatches	Wind breaks	Early disposal
Fruits	Proper drainage & wind breaks	Proper drainage & wind breaks	Proper drainage & wind breaks	Proper storage
Outbreak of pests and diseases due to unseasonal rains				
Paddy	Bacterial leaf blight, Minimize Nitrogen use	False smut, Use proper fungicides (spray Blitox (500ml)/Tilt (200ml) per acre to control False	Spray Tilt as recommendation Spray Tilt @ 200m l/acre	Storage pest control

		smut;)	against sheath blight, Sheath rot and Bunt diseases.	
wheat	Blight, rust; Use fungicides	Use proper fungicides	-do-	-do-
Horticulture				
Vegetables & Fruits	Heliothis, DBM, Spodoptera Downy mildews, foliar Blight; Adopt recommended Measures	Downy mildews, foliar Blight, Adopt recommended measures	Fruit and vegetable rots, Adopt recommended Measures	Early disposal

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Crop1 (specify)				
Horticulture				
Crop1 (specify)				
Continuous submergence for more than 2 days				
Crop1				
Horticulture				
Crop1 (specify)				

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				
Wheat	Frequent light irrigations, straw mulching	Frequent light irrigations	Frequent light irrigations	
Paddy	No effect	-	-	
Horticulture				
Vegetable	Change micro-environment	Change micro-environment	Change micro-environment	Change micro-environment
Fruits	-	-	-	-
Cold wave				
Wheat	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations
Paddy	NA			
Horticulture				
Vegetable	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations
Fruits	Wind breaks (Papaya), Smoke	Wind breaks, Smoke	Wind breaks, Smoke	Wind breaks, Smoke
Frost				
Wheat	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations
Paddy	NA			
Horticulture				
Vegetable	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations	Frequent light irrigations
Fruits	Wind breaks, Smoke	Wind breaks, Smoke	Wind breaks, Smoke	Wind breaks,

				Smoke
Hailstorm				
Wheat	-	-	-	-
Paddy	-	-	-	-
Horticulture				
Vegetables	-	-	-	-
Fruits	-	-	-	-
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
Drought			
Feed and fodder availability	<p>As the district is occasionally prone to drought the following measures to be taken to ameliorate the fodder deficiency</p> <p>Avoid burning of wheat/paddy straw</p> <p>Motivating the sugarcane farmers to convert green sugarcane tops in to silage by the end of February</p> <p>Establishment of fodder bank at village level with available dry fodder (paddy /wheat straw/groundnut haulms)</p> <p>Increase area under perennial fodder cultivation with high yielding Hybrid Napier varieties.</p> <p>Conservation of maize green fodder and sugar cane tops as silage</p> <p>Sowing of cereals (Sorghum/Bajra) and leguminous</p>	<p>Harvest and use biomass of dried up crops (Paddy, Maize, Wheat, Sugar cane, soybean, Mungbean , Ground nut etc..) material as fodder</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>Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding as supplement for high productive animals during drought</p> <p>Continuous supplementation of mineral mixture</p>	<p>Training/educating farmers for feed & fodder storage.</p> <p>Maintenance / repair of silo pits and feed/fodder stores.</p> <p>Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall etc.,</p> <p>Supply of quality fodder seed (multi cut sorghum/bajra/maize varieties) and fodder slips of Napier, guinea grass well before monsoon</p> <p>Replenish the feed and fodder banks</p>

	<p>crops (Lucerne, Berseem, Horse gram, Cowpea) during North-East monsoon under dry land system for fodder production</p> <p>Encourage fodder production with Maize, Jowar, Bajra , Cowpea, Makkchari, Barseem, Jawi , Rayi grass, Lucerne and Japense grass</p> <p>Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.</p>	<p>to prevent infertility.</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</p>	
Drinking water	<p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p> <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p> <p>Community drinking water trough can be arranged in shandies /community grazing areas</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water bodies/resources</p> <p>Add alum in stagnated water bodies</p>	<p>Watershed management practices shall be promoted to conserve the rainwater.</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>
Health and disease management	<p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p> <p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures</p>	<p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p> <p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Tick control measures be undertaken to prevent tick borne diseases in animals</p>	<p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p> <p>Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer</p>

	Procure and stock multivitamins & area specific mineral mixture	Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	
Floods			
Feed and fodder availability	<p>In case of early forewarning (EFW), harvest all the crops (Paddy, Maize, Wheat, Sugar cane, soybean, Mungbean, Ground nut etc.) that can be useful as feed/fodder in future (store properly)</p> <p>Keeping sufficient of dry fodder to transport to the flood affected villages</p> <p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>Keep stock of bleaching powder and lime</p> <p>Carry out Butax spray for control of external parasites</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations</p>	<p>Transportation of animals to elevated areas</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe storms, un-tether or let loose the animals</p> <p>Use of unconventional and locally available cheap feed ingredients for feeding of livestock.</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Encouraging farmers to cultivate short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,</p> <p>Deworming with broad spectrum dewormers</p> <p>Proper disposal of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p> <p>Drying the harvested crop material and proper storage for use as fodder.</p>
Cyclone	Not applicable		
Cold wave	Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	<p>Allow for late grazing between 10AM to 3PM during cold waves</p> <p>Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves</p>	<p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p>

		In severe cases, put on the heaters at night times Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation	
Heat wave	Arrangement for protection from heat wave i) Plantation around the shed ii) H ₂ O sprinklers / foggers in the shed iii) Application of white reflector paint on the roof iv) Thatched sheds should be provided as a shelter to animal to minimize heat stress	Allow the animals early in the morning or late in the evening for grazing during heat waves Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves Put on the foggers / sprinklers/fans during heat waves in case of high yielders (Jersey/HF crosses) In severe cases, vitamin 'C' and electrolytes should be added in H ₂ O during heat waves.	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive 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	Storing of house hold grain like maize, broken rice, barley etc, Culling of weak birds	Supplementation for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds	Supplementation to all the birds	
Drinking water	Rain water harvesting	Sanitation of drinking water	Give sufficient water as per the bird's requirement	

Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit	
Floods				
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging	Routine practices are followed	
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water	
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD	
Cyclone	Not a cyclone prone district.			
Heat wave and cold wave				
Shelter/environment management	Heat wave: Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged Don't allow for scavenging during mid day	Routine practices are followed	
	Cold wave: Provision of proper shelter	Close all openings with polythene sheets	Routine practices are	

	Arrangement for brooding Assure supply of continuous electricity	In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	followed	
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	Routine practices are followed	

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	<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 forecast data. ii) Storage of water. iii) Afforestation program. iv) Installation of tube wells. v) Conservation of rivers/wetlands/dams. vi) Re-excavation of local canals and 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) Impact of salt load build up in ponds/Changes in water quality	<ul style="list-style-type: none"> i) Store chemicals, disinfectants and therapeutic drugs. 	<ul style="list-style-type: none"> i) Immediate examination of water samples. ii) Use appropriate disinfectants and therapeutic drugs. iii) Adoption of bio-remedial measures. iv) Reduce salinity to moderate levels for increasing survival rate of fish/prawn/other organisms with the application of scientific techniques. 	<ul style="list-style-type: none"> i) Need based research data should be generated. ii) Cleaning of water bodies. iii) Regular water monitoring and bio-monitoring of water bodies.

(iii) Any other	-	-	-
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) Mobilize local committees for protection. vi) Enhancement in coping capabilities of common people. vii) 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 and compensation delivery during emergency. 	<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 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. ii) Immediate management of relief supplies. iv) Govt. support and compensation. 	<ul style="list-style-type: none"> i) Education/ training for technical knowledge for the repair of boats/nets and gears. ii) Provision for evacuation. iii) Loss assessment & insurance claim.
(iii) No. of houses damaged	<ul style="list-style-type: none"> i) Educate and provide training for the repair of houses. ii) Store raw materials for repairing 	<ul style="list-style-type: none"> i) Damaged house enumeration and loss assessment. ii) Coordination of assistance. 	<ul style="list-style-type: none"> i) Repair of damaged houses. ii) Loss assessment & insurance claim.

	<p>of houses.</p> <p>iii) House insurance.</p>	<p>iii) Immediate management of relief supplies.</p> <p>iv) Immediate support and compensation.</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>iii) Develop flood control management plans.</p> <p>iv) Stock material insurance.</p>	<p>i) Mobilize local people for protection</p> <p>ii) Hire stock/inputs from areas/company/ farmers who are not affected by flood.</p>	<p>i) Locate backup stocks and verify its usability.</p> <p>ii) Follow flood control management plan.</p> <p>iii) Notify utilities of the critical demand about loss of stock and inputs.</p> <p>iv) Loss assessment & insurance claim.</p>
(v) Changes in water quality	<p>i) Provision to stop/close the effluent/sewage discharge point in to water bodies.</p> <p>ii) Store chemicals, disinfectants and therapeutic drugs.</p> <p>iii) Develop flood control management plan.</p>	<p>i) Do not use contaminated water.</p> <p>ii) Proper preparation and management through emergency aeration.</p> <p>iii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</p> <p>iv) Immediate support of govt./industrial organization for maintaining the purity and quality of water bodies.</p> <p>v) Need based bioremediation.</p>	<p>i) Need based research data should be generated to maintain water quality,</p> <p>ii) Dumping of solid, liquid and waste should be stopped through enactment of legislation.</p> <p>iii) Contact govt. and industrial organization for immediate remedy and cleaning of the water bodies.</p> <p>iv) Regular water monitoring and bio-monitoring of water bodies for formulation of management plan.</p>
(vi) Health and disease	<p>i) Advance planning and preparedness.</p> <p>ii) Store chemicals, disinfectants and therapeutic drugs.</p> <p>iii) Stock sufficient stock of</p>	<p>i) 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</p>	<p>i) Laboratory diagnosis of disease fish, 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>

	medicines.	therapeutic drugs. iv) Emergency aeration or splashing in water bodies.	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 disinfectants, chemicals and 	<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 water bodies.

	management plan.	therapeutic drugs. iv) Immediate support of govt./industrial organization for maintaining the purity and quality of water bodies. iv) Need based bioremediation.	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 stock/inputs from areas/company/ farmers who are not affected by flood	i) Strengthening of stock. ii) Assessment of total loss. iii) Insurance claims.

(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.
(vi) Any other			
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.)			
(vi) Any other	-	-	-
4. 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 management during heat/cold 	<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 water bodies during excessive heat 	<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 soil composition. iii) Gather information about history of catch per

	waves. v) Tree plantation around fish ponds.	waves. iv) Adopt proper care and management during the fishing period of cold/ heat waves like keeping stock of drinking water and extra cloths. v) Educating the farmers through electronic/ print media	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.
(ii) Health and disease management	i) Advance planning and preparedness. ii) Store chemicals, disinfectants and therapeutic drugs. iii) Develop heat/cold wave control management plan. iv) Stock sufficient quantities of 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 disease transmission. v) Proper preparation and management through emergency aeration or splashing in water bodies.	i) laboratory diagnosis of disease agents, 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) Loss assessment and insurance claim.
(iii) Any other	-	-	-

ANNEXURE – 2

Mean Annual Rainfall of district JALANDHAR

Month	Rainfall (mm)			
	2006	2007	2008	2009
January	5.3	13.9	15.9	15.8
February	4.8	51.2	2.5	21.3
March	22.5	44	0	19.3
April	3.8	10.7	25.1	27.7
May	25.8	2.5	27.4	6.4
June	84.8	64.3	236.6	15
July	192.4	124.4	164.5	229.7
August	171.9	125	274.1	187.3
September	115.1	14.2	24.1	25.2
October	17.21	0	12.7	0
November	0	0	0	3
December	10.4	6.7	5.3	0
Total	654.01	456.9	788.2	550.7
MEAN	612.45			