

State: PUNJAB

Agriculture Contingency Plan for District: LUDHIANA

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Northern Plain (And Central Highlands) Including Aravallis, Hot Semi-Arid Eco-Region (4.1) Northern Plain, Hot Subhumid (Dry) Eco-Region (9.1)		
	Agro-Climatic Zone (Planning Commission)	Trans Gangetic Plain 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, Barnala, Fatehgarhsahib, Ferozepur, Gurdaspur, Jullundur, Kapurthala, Ludhiana, Moga, Patiala, Sangrur, Tarantaran		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		30°54'20.87" N	75°50'45.35" E	247M
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Main Research Station, PAU, Ludhiana-141004		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra Samrala Dist. Ludhiana-141004		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	PAU, Ludhiana- 141004		

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-September):	589	26	4 th week of June	1 st week of September
	NE Monsoon(October-December):	34	3	-	-
	Winter (January- February)	84	5		
	Summer (March-May)	42	6		
	Annual	749	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)	368	306	10	52	Nil	-	-	-	-	-

1.4	Major Soils	Area (*000 ha)	Percent (%) of total geographical area
	Coarse loamy soils		15
	Coarse loamy and fine loamy soils		85

1.5	Agricultural land use	Area (*000 ha)	Cropping intensity %
	Net sown area	306	194
	Area sown more than once	289	
	Gross cropped area	595	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	306		
	Gross irrigated area	595		
	Rainfed area	-		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals (10% area is canal irrigated)		10	3.2
	Bore wells	94048	296 (with in canal command area?)	96.7
	Total Irrigated Area		306	
	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	11	95	Fit (60 %) and marginal (40 %) water with respect to residual sodium carbonate, no problem of salinity, arsenic and flouride in water.
Critical	1	5		
*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) (2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Rice	254	-	254	-	-	-	-	254
	Maize	17	-	17	-	-	-	-	17
	Arhar (Redgram)	1.4	-	1.4	-	-	-	-	1.4
	Moong (Greengram)	1.2	-	1.2	-	-	-	-	1.2

	Cotton	2	-	2	-	-	-	2
	Wheat	-	-	-	269	-	269	269
	Barley	-	-	-	2	-	2	2
	Rapeseed and Mustard	-	-	-	1	-	1	1
	Sunflower	-	-	-	-	-	1.3	1.3
	Sugarcane	94						94

	Horticulture crops - Fruits	Area (000'ha)	
		Total	
	Guava	0.7	
	Grapes	0.4	
	Mangoes	0.3	
	Kinnow (mandarin)	0.2	
	Ber	0.2	
	Lemon	0.1	
	Pear	0.1	
	Peach	0.1	

	Plum	0.1
	Orange and malta	0.02
	Litchi	0.005
	Misc	0.1
	Vegetables	Total
	Potato	7.9
	Winter Vegetables	1.1
	Summer vegetables	1.0
	Onion	0.2

1.8	Livestock (in number)	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	23.9	13.5	37.4
	Crossbred cattle	17.3	98.4	116.0
	Non descriptive Buffaloes (local low yielding)	0.4	4.5	4.9
	Graded Buffaloes	33.9	466.2	500.2
	Goat	3.3	12.2	15.5
	Sheep	0.8	4.0	4.8
	Others Equine (Horse & Pony)	0.9	1.6	2.6
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial		2823.7	
	Backyard		12.8	
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	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	
	222		00		330	
B. Culture						
		Water Spread Area (ha)		Yield (t/ha)		Production ('000 tons)
ii) Fresh water (Data Source: Fisheries Department)		791.0		6.1		4.9

1.11 Production and Productivity of major crops (2008-09)

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	1135	4470	-	-	-	-	1135	4470	-
	Maize	7	3566	-	-	-	-	7	3566	-
	Arhar (Redgram)	1.1	-	-	-	-	-	1.1	-	-

Moong (Greengram)	0.9	-	-	-	-	-	-	0.9	-	-
Cotton	-	-	1.5	743	-	-	-	1.5	743	-
Wheat	-	-	1137	4392	-	-	-	1137	4392	-
Barley	-	-	5	2441	-	-	-	5	2441	-
Rapeseed and Mustard	-	-	1	1306	-	-	-	1	1306	-
Sunflower	-	-	2.7	2093	-	-	-	2.7	2093	-
Sugarcane	60	675						60	675	
Potato	-	-	202.4							-

Major Horticultural crops (Crops to be identified based on total acreage)			Productivity(kg/ha)
Crop	Production (000't)		
Kinnow	4.969		18540
Orange and malta	0.157		157
Lemon	0.709		709
Mangoes	4.071		4071
Litchi	0.063		63
Guava	15.483		15483

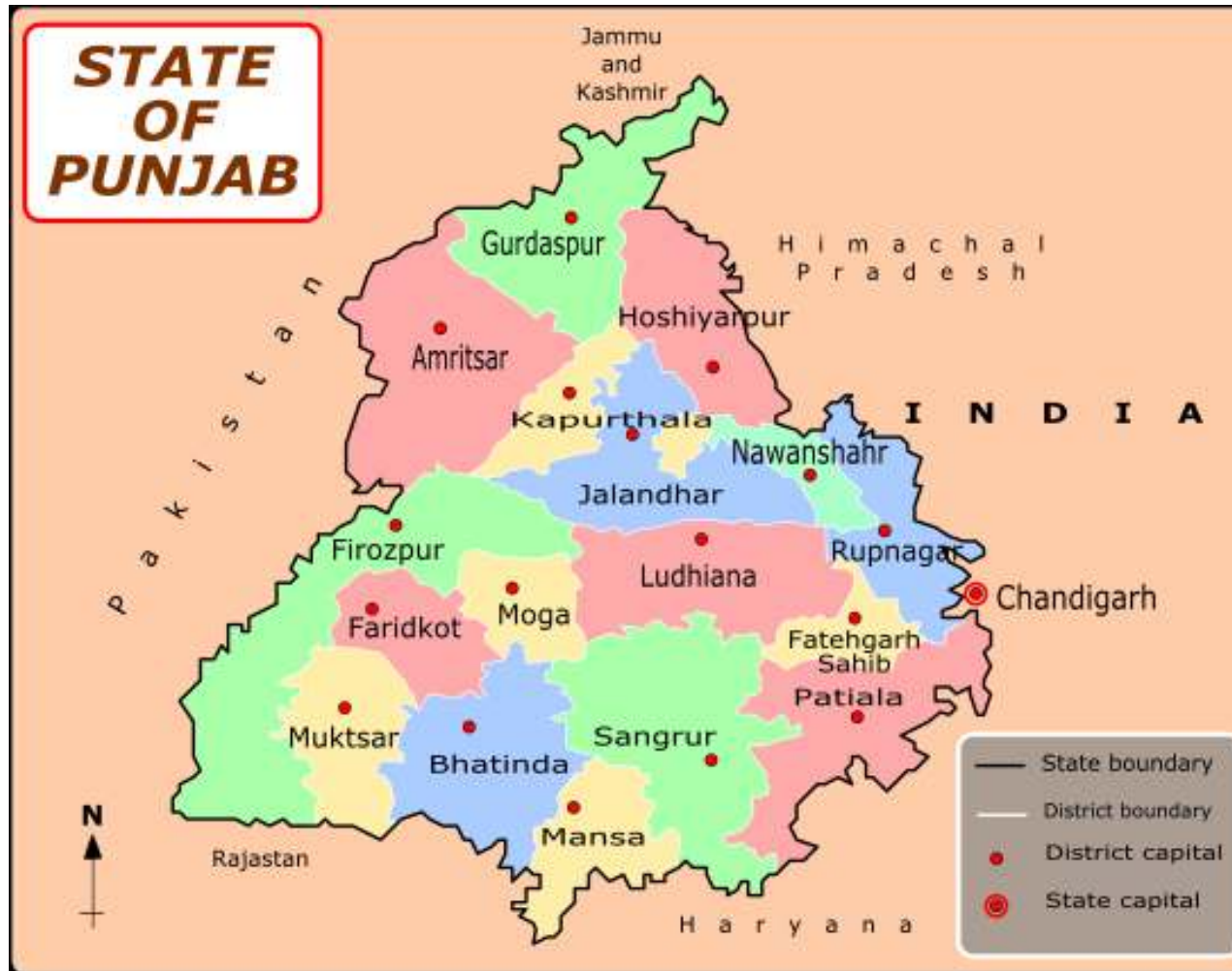
	Pear	3.787	3787
	Peach	2.123	2123
	Plum	0.199	199
	Grapes	1.040	1040
	Ber	3.379	3379

1.12	Sowing window for 5 major field crops	Paddy	Wheat	Cotton	Maize	Oilseeds	Sugarcane
	Kharif- Rainfed	-	-	-	-	-	Mid February to end of March is optimum under Punjab condition.
	Kharif-Irrigated	2 nd week of June to 1 st week of July	-	2 nd week of April to 4 th week of May	4 th week of May to 4 th week of June	-	
	Rabi- Rainfed	-	-	-	-	-	
	Rabi-Irrigated	-	4 th week of October to 1 st week of December	-	-	2 nd week of October to 1 st week of December	

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 1	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: No
		Soil map as Annexure 3	Enclosed: No

Location map of district within State Annexure 1



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation (100 per cent area is irrigated)

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		
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	Tubewell irrigated alluvial soils	Paddy	<ul style="list-style-type: none"> Coarse rice should be replaced with short duration varieties (PR-115) and Basmati rice (Pusa Basmati-1, Pusa 1121, Punjab Basmati-2, Punjab Mehak) Maize 		
		Paddy		Direct seeding of paddy and laser land leveling should be done Direct seeding of Rice saves about 20% of irrigation water and laser leveling of field also saves 20-25 % of irrigation water	(Punseed, PAU, NSC and Progressive farmers)
		Maize			
		Wheat			
		Sugarcane			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Tubewell irrigated alluvial soils	Paddy	Paddy should be replaced with basmati rice, maize. Wheat can be replaced with oilseeds, maize (PMH 2 and JH 3459), Soybean (SL 744 and SL 525) and moongbean (ML 818 and P A U 911), Toria (PBT 37) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2)	Direct seeding of paddy and laser land leveling should be done Direct seeding of rice saves about 20% of irrigation water and laser leveling of field also saves 20-25 % of irrigation water	Punseed, NSC , PAU and Progressive farmers
		Maize			
		Wheat			
		Sugarcane			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Tubewell irrigated alluvial soils	Paddy	Paddy may be replaced by Maize, Soybean and Mungbean Maize (PMH 2 and JH 3459), Soybean (SL 744 and SL 525) and moongbean (ML 818 and PAU 911)	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	Punseed, NSC , PAU and Progressive farmers
		Maize			
		Wheat			
		Sugarcane			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Tube well irrigated alluvial soils				Punseed, NSC , PAU and Progressive farmers

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	Tube well irrigated Alluvial soils	Paddy		<ul style="list-style-type: none"> 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 	Punseed, NSC , PAU and Progressive farmers
		Maize			
		Wheat			
		Sugarcane			

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

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				
Rice	Drain out excess water	Drain out excess water	Drain out excess water	Drain out excess water
Cotton	Drain out the Excess water	Cotton crop is highly sensitive to standing water during early growth stages. Hence, drain out the excess water from the cotton fields	-	-
Maize	-	Do not allow the rain water to stand in the main crop as this crop is highly sensitive to standing water and promotes bacterial stalk rot	-	-
Wheat	-	-	-	Store new grains in clean godowns or receptacles. Plug all cracks, cervices and holes in the godowns thoroughly. Disinfest old gunny bags by dipping them in emulsion of 6 ml Somicidin 20EC or 5 ml Cymbush 25 EC in 10litres of water for 10 minutes and dry them in shade before filling with grains or use new gunny bags.

Sugarcane	-	Earthing up of the sugarcane crop may be done if not done earlier during the first week of July. If sugarcane fields get flooded with water, excess water may be drained out.	-	-
Horticulture crops	Drain out excess water			
Heavy rainfall with high speed winds in a short span				
Wheat	-	-	Do not irrigate on windy or stormy days	-
Sugarcane	If dry weather conditions prevails mite may also cause severe damage to this crop. For its control spray the crop with 400 ml of malathion 50 EC in 100 litres of water/ acre. Remove Baru weed growing around the sugarcane field.	-	To prevent lodging prop up the crop by end of August using trash twist method.	-
Rice	Avoid early planting of rice to keep the incidence of BLB	-	-	-
Horticulture	The excess rain water when stagnates for several days is harmful to the orchard trees. Adopt prompt measures to drain out excess water.			
Outbreak of pests and diseases due to unseasonal rains				
Rice	-	Blight develops more in high humid conditions. Farmers should not allow stagnation of water in the fields.	If high humidity and cloudy weather prevails the crop may be sprayed with Blitox/ Copper oxychloride 50 WP @ 500 g in 200 litres of water/acre to control False smut and after 10 days of its application spray Tilt @ 200 ml/acre in 200 litres of water. Start the spray at the boot stage.	-

Horticulture	In case of occurrence of root damage due to water stagnation in Pear, Peach etc. apply 10 g Bavistin 50 WP + 5g 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 along with 5-8 cm of the live wood.	-	-	-
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2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone

Extreme event type	Suggested contingency measures			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Rice	Apply frequent and light irrigations	Apply frequent and light irrigations	Provide wind breaks	
Wheat	Apply frequent and light irrigations	Apply frequent and light irrigations	Provide wind breaks	
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.	
Horticulture	Apply frequent and light irrigations			
Cold wave				
Wheat	To late sown wheat, apply second dose of N (25 Kg/ acre) with first irrigation.			
Frost				

Wheat				
Mustard	To save the crop from frost damage, apply irrigation.			
Sugarcane	Protect seed crop against frost by giving frequent irrigations at mid December and another at first week of January post 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 first 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.			

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)</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 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>Harvest and use biomass of dried up crops (Paddy Maize, Wheat, barley, Sugar cane, soybean, Mungbean 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 to prevent infertility.</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</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>

	Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.		
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. 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>Procure and stock multivitamins & area specific mineral mixture</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>Rescue of sick and injured animals and their treatment</p> <p>Organize with community, daily lifting of dung from relief camps</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>
Floods			

<p>Feed and fodder availability</p>	<p>In case of early forewarning (EFW), harvest all the crops (paddy/wheat/barley/maize/mungbean 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 disposable 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>
<p>Cyclone</p>	<p style="text-align: center;">Not applicable</p>		
<p>Cold wave</p>	<p>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>	<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>In severe cases, put on the heaters at night times</p> <p>Apply / sprinkle lime powder in the animal shed during cold</p>	<p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p>

		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	Culling of sick birds.	Mixing of Vit. A,D,E, K and B-complex	Hygienic and sanitation of	

<i>management</i>	Deworming and vaccination against RD and fowl pox	including vit C in drinking water	poultry house Disposal of dead birds by burning / burying with lime powder in pit	
Floods				
<i>Shortage of feed ingredients</i>	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	
<i>Drinking water</i>	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water	
<i>Health and disease management</i>	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				
<i>Shelter/environment management</i>	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	

	<p>Cold wave: Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity</p>	<p>Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening</p>	Routine practices are followed	
Health and disease management	<p>Deworming and vaccination against RD and fowl pox</p>	<p>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</p>	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			
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) Aforestation programme iv) conservation of rivers, wetlands/reservoirs/dams v) Re-excavation of local canals and reservoirs 	<ul style="list-style-type: none"> i) use stored water ii) use surface water flow iii) Divert water from unutilized areas iv) Utilize canal water 	<ul style="list-style-type: none"> i) need based monitoring through research plan ii) Intensive aforestation programme in the areas iii) augmentation of surface water flow iv) construction of water reservoirs v) adoption of rain harvesting methods vi) provide help and compensation package to

			the farmers of drought hit areas vii) prepare vulnerability map and place it to management committee
(ii) Changes in water quality	i) dumping of solid, liquid and waste should be stopped ii) store chemicals, disinfectants and therapeutic drugs	i) use disinfectants and therapeutic drugs ii) adoption of bioremedial measures	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.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	i) Critical evaluation of long range forecast for data ii) storage of water iii) Afforestation programme iv) Installation of tubewells v) conservation of rivers, wetlands/reservoirs/dams vi) Re-excavation of local canals and ponds	i) use stored water ii) Re-excavation of local canals and ponds iii) use surface water flow iv) Bring water from unutilized areas vi) maintain water level in ponds	i) need based monitoring through research plan ii) Intensive afforestation programme iii) augmentation of surface water flow iv) Strengthening of water reservoir v) adoption of rain harvesting methods vi) mobilize local communities for protection vii) prepare vulnerability map and place it to management committee
(ii) Impact of salt load build up in ponds/Changes in water quality	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 affected areas. iii) store chemicals, disinfectants and therapeutic drugs	i) immediate examination of water samples ii) use appropriate disinfectants and therapeutic drugs iii) adoption of bio-remedial measures iv) Minimize excess salinity percentage in water with the	i) Need based research data should be generated ii) Cleaning of water bodies iii) Regular water monitoring and bio-monitoring of water bodies

		application of scientific techniques.	
2. Flood			
A. Capture			
Inland			
(i) Average compensation paid due to loss of human life	<ul style="list-style-type: none"> i) Strengthening of river linings at all weak points ii) Cleaning of rivers and flood water channels iii) Be prepared to evacuate at a short notice. iv) preparation of flood control action plan v) warning dissemination and precautionary response vi) formation of flood management committees 	<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 iii) immediate management of relief supplies iv) Govt. support and compensation 	<ul style="list-style-type: none"> i) Loss assessment & insurance claim.
(iii) No. of houses damaged	<ul style="list-style-type: none"> i) Annual repair of houses ii) house insurance 	<ul style="list-style-type: none"> i) coordination of assistance ii) immediate management of relief supplies 	<ul style="list-style-type: none"> i) prepare for the rehabilitation. ii) Loss assessment & insurance claim.

		iii) Govt. support and compensation	
(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) insurance of stock material. 	i) mobilize stocks from emergency reserves.	<ul style="list-style-type: none"> i) locate backup stocks and verify its usability time ii) follow flood control management plan iii) 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, that may improve water quality in affected areas. iii) use appropriate amount of disinfectants, chemicals and therapeutic drugs iv) immediate support of Govt./industrial organization for maintaining the purity and quality of water bodies v) need based bioremediation 	<ul style="list-style-type: none"> i) need based research data should be generated to maintain water quality, ii) dumping of solid, liquid and waste should be stopped. iii) Cleaning and disinfection of water bodies
(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. ii) use appropriate amount of disinfectants, chemicals and therapeutic drugs 	<ul style="list-style-type: none"> i) follow up surveillance and monitoring after disease outbreak ii) biomonitoring and maintaining water quality iii) need based research data should be generated

		iii) Emergency aeration or splashing in water bodies.	vii) Loss assessment & insurance claim.
B. Aquaculture			
(i) Inundation with flood water	<ul style="list-style-type: none"> i) Strengthening of river linings at all weak points ii) Cleaning of rivers and flood water channels iii) proper facility construction for ponds and its stock safety iv) development of flood control management plan v) Arrangement for emergency backup equipment on site vi) Arrangements to prevent the 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) damage and need assessment vi) immediate realize of relief supplies vii) lower the water level to culture facilities 	<ul style="list-style-type: none"> i) reallocate fish to maintain appropriate biomass. ii) reduce or cease feeding because uneaten food and fish wastes causes decrease in dissolved oxygen level. iii) Strengthening of water bodies/ponds iv) 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 point in water bodies/ponds ii) store chemicals, disinfectants and therapeutic drugs iii) develop flood control management plan 	<ul style="list-style-type: none"> i) Do not use water that could be contaminated ii) proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas. 	<ul style="list-style-type: none"> i) need based research data should be generated to maintain water quality, ii) regular water monitoring and bio-monitoring of water bodies for formulation of management plan

		<ul style="list-style-type: none"> iii) use appropriate amount of disinfectants, chemicals and therapeutic drugs iv) immediate support of Govt./industrial organization for maintaining the purity and quality of water bodies iv) need based bioremediation 	
(iii) Health and diseases	<ul style="list-style-type: none"> i) advance planning and preparedness ii) store chemicals, disinfectants and therapeutic drugs iii) Stock sufficient emergency medicines 	<ul style="list-style-type: none"> i) identification of type of disease outbreak, 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 	<ul style="list-style-type: none"> i) Cleaning and disinfection of ponds ii) follow up surveillance and monitoring after disease outbreak iii) Proper disposal of dead fish iv) Loss assessment & insurance claim.
(iv) Loss of stock and input (feed, chemicals)	<ul style="list-style-type: none"> i) Keep the stock/input in safer place for emergency purpose ii) store fuels, food/other item iii) develop flood control management plan iv) insurance of stock material 	<ul style="list-style-type: none"> i) Arrangements for emergency supplies of inputs to affected areas. ii) Mobilize stock/inputs from distant areas/companies/ farmers who are not affected by floods 	<ul style="list-style-type: none"> i) Assessment of total loss ii) Insurance claims
(v) Infrastructure damage (pumps, aerators, huts etc)	<ul style="list-style-type: none"> i) Annual repair of infrastructure ii) Repair of pumps aerators, huts etc iii) infrastructure insurance. 	<ul style="list-style-type: none"> i) damaged infrastructure enumeration and need assessment ii) coordination of assistance iii) immediate arrangement for relief 	<ul style="list-style-type: none"> i) Repair of damaged infrastructure. ii) Loss assessment & insurance claim.

		supplies.	
4. Heat wave and cold wave			
A. Capture			
Inland	<ul style="list-style-type: none"> i) Assessment of long term weather forecasts. ii) Arrange the water aerators iii) Store sufficient water in water bodies iv) Develop heat and cold wave management plans v) Tree plantation around fish ponds 	<ul style="list-style-type: none"> i) Frequent mentoring of fishing sites for heat /cold effects. ii) Use dark materials to cover the water bodies during excessive heat . iii) Aeration of water ponds. vi) Educating the farmers through electronic/ print media about remedial measures. 	<ul style="list-style-type: none"> i) intensive afforestation campaign. ii) Collect physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. iii) Collect information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plans. v) Loss assessment & insurance claim.
B. Aquaculture			
(i) Changes in pond environment (water quality)	<ul style="list-style-type: none"> i) Assessment of long term weather forecasts. ii) Arrange the water aerators iii) Store sufficient water in water bodies iv) Develop heat and cold wave management plans v) Tree plantation around fish ponds 	<ul style="list-style-type: none"> i) Frequent mentoring of fishing sites for heat /cold effects. ii) Use dark materials to cover the water bodies during excessive heat . iii) Aeration of water ponds. vi) Educating the farmers through electronic/ print media about remedial measures. 	<ul style="list-style-type: none"> i) intensive afforestation campaign. ii) Collect physical data of water bodies, water chemistry and seasonal changes, plankton profile and seasonal blooms, topography and soil composition. iii) Collect information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plans. v) Loss assessment & insurance claim.

<p>(ii) Health and disease management</p>	<p>i) advance planning and Veterinary preparedness.</p> <p>ii) Arrange sufficient stores of chemicals, disinfectants and therapeutic drugs</p> <p>iii) Stock sufficient quantities of emergency medicines</p>	<p>i) proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator) or splashing in water bodies.</p> <p>ii) Surveillance and monitoring of fish ponds against any adverse affects of heat/cold waves.</p>	<p>iii) follow up surveillance and monitoring .</p> <p>ii) Proper disposal of any dead fish</p>
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