State: PUNJAB

Agriculture Contingency Plan for District: HOSHIARPUR

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Western Himalayas, Warm Subhumid (To Humid With Inclusion Of Perhumid) Eco-Region. (14.2)		
	Agro-Climatic Zone (Planning Commission)	West Himalayan Region (I)		
	Agro Climatic Zone (NARP)	Sub-Mountainous Undulating Zone (PB-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Gurdaspur, Hoshiarpur, Nawanshahar (Shahid Bhagat Singh Nagar), Ropar, Mohali		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		31º 31' 46. 53" N	75º 55' 12.00" E	336 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Research Station for Kandi Area PAU, Ballowal Saunkhri, pin;146 113		
	Mention the KVK located in the district with address	KVK Bahowal, District: Hosiarpur , pin;146 001		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	AMFU: Salaren IMD: Chandigarh		

1.2	Rainfall	Normal RF(mm)	Normal Rainy days	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	217.2	38	Ist week of July	End of September
	NE Monsoon (Oct-Dec)	20.9	2	1st /2nd week of October	
	Winter (Jan- March)	35.7	6		-
	Summer (Apr-May)	27.6	8		-
	Annual	301.4	54	-	-

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)	340	201	108	28	1	Less than 0.5	Less than 0.5	1	Less than 0.5	-

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area ('000 ha)**	**Percent (%) of total**
	Coarse loamy soils		50
	Coarse loamy and fine loamy soils		25
	Coarse loamy and fine loamy association		25

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	201	182
	Area sown more than once	164	
	Gross cropped area	365	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	152.3		
	Gross irrigated area	278.2		
	Rainfed area	48.6		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals (3 % area under canal irrigation)		15	
	Tanks	235		
	Open wells	3094		
	Bore wells (Tube well)	23891	161	
	Other sources (please specify)		2	
	Pump sets	17286		
	No. of Tractors	9823		
	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	**2**	22	Fit (> 90 %) water with respect to residual sodium carbonate. No problem of salinity, arsenic and flouride in water.
	Semi- critical	2	17	
	Safe	6	61	
*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) (2006-07)

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			*Rabi*				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Maize/Wheat	42.3	16.4	58.7	110	14.0	124	-	182.7
	Paddy/Sarson	44.3	0.5	44.8	2.2	0.2	2.4	-	47.2
	Sugarcane/Taramira	21.0	0.1	21.1	0.06	0.8	0.8	-	21.9
	G.Nut/Fodder	0.2	2.3	2.5	8.5	0.1	8.6	-	11.1
	Lentil	-	-	0	0.182	0.2	0.3	-	0.3

	Horticulture crops - Fruits	**Total Area ('000 ha)**
	Kinnow	4.5
	Mango	1.6
	Guava	0.4
	Litchi	0.2
	Pear	0.2
	Misc.	0.1

	Horticulture crops - Vegetables	Total ('000 ha)
	Potato	8.1
	Onion	0.1
	Winter vegetable	3.3
	Summer vegetable	0.7
	Others (specify) Bee keeping	456 units and 11537 Box

1.8	Livestock (in number)	Male	Female	Total
	Non descriptive Cattle (local low yielding)	11.5	14.5	26.0
	Crossbred cattle	19.7	80.7	100.5
	Non descriptive Buffaloes (local low yielding)	0	0	0
	Graded Buffaloes	26.5	206.4	232.9
	Goat	3.4	11.8	15.3
	Sheep	0.2	0.8	1.0
	Others Equine (Horse &Pony)	0.7	0.5	1.2
	Commercial dairy farms (Number)			70
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	37	594158	
	Backyard	-	34991	
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**	
		141		08		351	

	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)	511.5	5.86	2.998

1.11 Production and Productivity of major crops (2006-07)

1.11	Name of crop	**Kharif**		**Rabi**		**Summer**		**Total**		**Crop residue as fodder** ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Maize/Wheat	172	2612	514	3546			686	6158	
	Rice/Gram	182	2975	0.2	558			182.2	3533	
	G nut / sunflower	2.4	880	5.7	1512			8.1	2392	
	Sesame/ Rapeseed and Mustard	0.2	-	3.5	1132			3.7	1132	

	Sugarcane/Lentil	111	5273	0.1	-			111.1	5273	
Others	/Mash(sathe)					0.1	-	686.1	6158	
Major Horticultural crops (Crops to be identified based on total acreage)										
Others	**Kinnow**	68235	20212					68235	20212	
	Mango	16790	14840					16790	14840	
	Guava	7000	21220					7000	21220	
	Litchi	2190	14642					2190	14642	
	Pear	3740	23184					3740	23184	
	Ber	360	17564					360	17564	
	Misc.	1410						1410		

1.12	**Sowing window for 5 major field crops**					
	Kharif- Rainfed	Maize (June 20th - July 7th)	Bajra (F) (March to May)	Sesame(First fortnight of July)	Mash (Last week of June to 25 July)	Moong (First fortnight of july)
	Kharif-Irrigated	Maize (Last week of May to end of June)	Paddy (15th of May to 15th of June)	Sugarcane (Mid February to end of March)	Sunflower (End of January)	Groundnut (Last week of June)
	Rabi- Rainfed	Wheat (Last week of October to Last week of November)	Raya (Mid October to mid November)	Taramira (whole October)	Lentil (2nd fortnight of October to First week of November)	Chick pea (October 10 to October 25)
	Rabi-Irrigated	Wheat (Last week of October to Last week of November)	Potato last week of (September to Mid October)	Rapeseed and Mustard Taramira (whole October), Raya (mid October to mid November), Toria (First fortnight of September), Gobhi Sarson (October10 to October 20)	Barley (October 15 to November 15)	Chickpea (October 25 to November 25)

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 (From last 2-3 years attack of blister beetle particularly on moong and okra)			√
	Others -Yellow Rust in wheat			√

1.14	**Include Digital maps of the district**	Location map of district within State as Annexure I	Enclosed: No
		Mean annual rainfall as Annexure 2	Enclosed: No
		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**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks **3 rd week of July**	Medium rainfall deep loamy sandy soils	Maize/Moong /fallow-Wheat/Mustard/Chickpea	Moong /Fallow-Wheat/ Mustard/ Chickpea: No change	No change	
		Maize/sesame/fallow-Wheat+Raya /Chickpea/barley/taramira	Maize (F) (-Wheat +raya /barley /chickpea Maize (F) (J1006) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2).)		
		Pearlmillet-Wheat/Barley /Chickpea	Pearlmillet-Barley /Chickpea Pearl millet (FCB 164 and FBC 16)		
	Medium rainfall deep sandy loam to clay loam soils	Maize/Mash/-Wheat /Mustard /Chickpea	No change		
		Maize/mash-Wheat+Raya /Chickpea/barley/taramira			
		Pearlmillet-Wheat/Barley /Chickpea			

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 **2nd week of August**	Medium rainfall deep loamy sandy soils	Maize/Moong/fallow-Wheat/Mustard/Chickpea	Soybean/ Maize fodder Soybean (SL 744 and SL 525), Maize (F) (J1006)	**For Kharif:** 1. Increase row spacing 2. Thinning of crop 3. Use of local available plant material for mulch	
		Maize/sesame/fallow-Wheat+Raya/Chickpea/Barley/Taramira		**For Rabi:** 1. Harvest maize crop at physiological maturity in order to conserve soil moisture immediately ploughing and planking the field. 2. Deep sowing with minimum soil load on seed 3. Prefer presoaked seed for sowing 4. Drill half N and full P before sowing with pora	
		Pearlmillet-Wheat/Barley /Chickpea			
		Maize/Moong/fallow-Wheat/Mustard/Chickpea			
	Medium rainfall deep sandy loam to clay loam soils	Maize/Mash/-Wheat /Mustard /Chickpea			
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira			
		Pearlmillet-Wheat/Barley /Chickpea			
		Maize/Mash/-Wheat /Mustard /Chickpea			
		Maize/mash-Wheat+Raya /Chickpea/Barley/Taramira			

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 **4th week of August**	Medium rainfall deep loamy sandy soils	Maize/Moong/fallow-Wheat/Mustard/Chickpea	Maize (F)/ Pearlmillet (F) /Cowpea (F Maize (F) (J1006) Pearl millet (FCB 164 and FBC 16)	**For Kharif:** 1. Increase row spacing 2. Thining of crop 3.Use of local available plant material for mulch	
		Maize/Sesame/fallow-Wheat+Raya /Chickpea/Barley/taramira		**For Rabi:** 1. Harvest maize crop at physiological maturity in order to conserve soil moisture immediately ploughing and planking the field. 2.Deep sowing with minimum soil load on seed 3.Prefer presoaked seed for sowing 4.Drill half N and full P before sowing with pora	
		Pearlmillet-Wheat/Barley /Chickpea	-	-	
	Medium rainfall deep sandy loam to clay loam soils	Maize/mash/-Wheat /mustard /chickpea	-	-	
		Maize/Mash-Wheat + Raya /Chickpea/Barley/ Taramira	-	-	
		Pearlmillet-Wheat/Barley /Chickpea	-	-	
		Maize/Mash/-Wheat /Mustard /Chickpea	-	-	
		Maize/Mash-Wheat + Raya /Chickpea/Barley/ Taramira	-	-	

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 **2 nd week of september**	Medium rainfall deep loamy sandy soils	Maize/Moong/fallow-Wheat/Mustard/Chickpea	Maize (F)/ Pearl millet (F) /Cowpea (F) Maize (F) (J1006) Pearl millet (FCB 164 and FBC 16)	**For Kharif:** 1.Increase row spacing 2.Thining of crop 3.Use of local available plant material for mulch	
		Maize/Sesame/fallow-Wheat+ Raya /Chickpea/Barley/taramira	Fallow-Toria+ Gobhisarson (Toria in mid september and intercropping of gobhi sarson in mid November) Toria (PBT 37) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2)	**For Rabi:** 1. Harvest maize crop at physiological maturity in order to conserve soil moisture immediately ploughing and planking the field. 2.Deep sowing with minimum soil load on seed 3.Prefer presoaked seed for sowing 4.Drill half N and full P before sowing with pora-	
		Pearlmillet-Wheat/Barley /Chickpea			
	Medium rainfall deep sandy loam to clay loam soils	Maize/Mash/-Wheat /Mustard /Chickpea			
		Maize/Mash-Wheat + Raya /Chickpea/Barley/Taramira			
		Pearlmillet-Wheat/Barley /Chickpea			
		Maize/Mash/-Wheat /Mustard /Chickpea			
		Maize/Mash- Wheat + Raya /Chickpea/ Barley/ Taramira			

Condition			Suggested Contingency measures		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Medium rainfall deep loamy sandy soils	Maize/Moong/fallow-Wheat/Mustard/Chickpea	Resowing of maize Thinning of crop Weeding	Use local available plant material for mulch Apply 50% N through organic and 50% through inorganic source	
		Maize/sesame/fallow-Wheat+Raya /Chickpea /barley/taramira			
		Pearlmillet-Wheat/Barley /Chickpea			
	Medium rainfall deep sandy loam to clay loam soils	Maize/Mash/-Wheat /mustard /Chickpea	Resowing of maize Thinning of crop Weeding	Use local available plant material for mulch Apply 50% N through organic and 50% through inorganic source	
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira			
		Pearlmillet-Wheat/Barley /Chickpea			
		Maize/Mash/-Wheat /Mustard /Chickpea			
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira			

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 measues**	**Remarks on Implementation**
At vegetative stage	Medium rainfall deep loamy sand to sandy soils	Maize/moong/fallow-Wheat/mustard/chickpea	Every third row in case of maiz/bajra can be thinned out and use as fodder(1/3 rd population) Use anti transparent Life saving irrigation, if available	Use local available plant material for mulch Apply 50% N through organic and 50% through inorganic source	
		Maize/sesame/fallow-Wheat+Raya /Chickpea /barley/taramira			
		Pearlmillet-Wheat/Barley /Chickpea			
	Medium rainfall deep sandy loam to clay loam soils	Maize/Mash/-Wheat /mustard /Chickpea			
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira			
		Pearlmillet-Wheat/Barley /Chickpea			
		Maize/Mash/-Wheat /mustard /chickpea			
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira			

Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
At flowering/ fruiting stage	Medium rainfall deep loamy sand to sandy soils	As above	• If grain setting has occurred in maize, the tassels can be cut down to reduce transpiration • Life saving irrigation, if available • Greengram and Blackgram can be incorporated as green manure & conserve moisture for rabi crops • If rain comes Toria can be sown in mid September and intercropping of gobhi sarson in mid November	Use local available plant material for mulch Apply 50% N through organic and 50% through inorganic source	
	Medium rainfall deep sandy loam to clay loam soils				

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
(Early withdrawal of monsoon)	Medium rainfall deep loamy sand to sandy soils	Paddy -Wheat	Harvest whatever crop is available and immediately conserve the soil moisture for rabi	• Intercropping of gobhi sarson in mid November in the Toria sown during mid September • Deep sowing with minimum soil load on seed • Prefer presoaked seed for sowing • Drill half N and full P before sowing with pora	

2.1.2 Drought - Irrigated situation -Not applicable

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	Tank-fed medium deep black soils				

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	Tank-fed medium deep black soils				

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	Tank-fed medium deep black soils				

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	Tank-fed medium deep black soils				

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	Tank-fed medium deep black soils				

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

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Maize/Wheat	Drain out excessive water	It damage the crop	Harvest the crop and shift to safer place and dry place	In case of moong and mash no staking and drying the crop by spreading
Horticulture				
Litchi			Fruit shell splitting	
Heavy rainfall with high speed winds in a short span				
Maize/Wheat	Drain out excessive water and add urea @ 1/3 rd of recommended dose, if not applied with in 15 days before	Spray with chemicals which enhance the photosynthesis	Harvest the crop and shift to safer place and dry place	
Horticulture				
Mango			Fruit shedding	
Outbreak of pests and diseases due to unseasonal rains				
wheat	Leaf blight	Karnal bunt Yellow rust (Feb) with rise in temp.	Karnal bunt	

Raya	Alternaria blight			
Taramira	Alternaria blight			
Lentil	Lentil blight			
Chickpea		Gram blight & gram pod borer		
Horticulture				
Mango	Root rot			

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days				
Maize	Drain out excess water from the field	Drain out excess water from the field	Drain out excess water from the field	Harvest & move the produce to safer and dry place
Horticulture				
Mango	Drain out excess water from the field			

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	Spray anti transparent to reduce transpiration	Spray anti transparent	Life saving irrigation, if available	
Wheat	Spray anti transparent to reduce transpiration	Spray anti transparent	Life saving irrigation, if available	
Horticulture				
Kinnow	Light irrigation preferably with sprinkler	Spray with GA to prevent pre-mature fruit shedding		

		(June drop) in citrus and sweet orange		
Cold wave				
Wheat		Light irrigation, if available. Preferably with sprinkler		
Horticulture				
Kinnow	Watering Covering the plants (with South side open)			
Frost				
Wheat		Light irrigation, if available. Preferably with sprinkler		
Horticulture				
Kinnow	Watering Covering the plants (with South side open) Burn the leaves/ straw in the field to increase the temp			
Hailstorm				
Kinnow		Apply supplemental dose of urea		
Horticulture				
Mango			Fruit drop	

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	As the district is occasionally prone to drought the following measures to be taken to ameliorate the fodder deficiency Motivating the sugarcane farmers to convert green sugarcane tops in to silage by the end of February Avoid burning of wheat/paddy straw and pearl millet stover Establishment of fodder bank at village level with available dry fodder (paddy /wheat straw) Increase area under perennial fodder cultivation with high yielding Hybrid Napier varieties. Conservation of maize green fodder and sugar cane tops as silage Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during North-East monsoon under dry land system for fodder production Encourage fodder production with Maize, Jowar, Bajra , Cowpea, Makkchari, Barseem, Jawi , Rayi grass, Lucerne and Japense grass Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.	Harvest and use biomass of dried up crops (Maize, Wheat, Paddy , Sugar cane, Ground nut, chickpea, cowpea, barley, pearl millet etc.,) material as fodder Utilizing fodder from fodder bank reserves. Utilizing stored silage/hay. Transporting complete feed/fodder and dry roughages to the affected areas. 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 Continuous supplementation of mineral mixture to prevent infertility. Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals	Training/educating farmers for feed & fodder storage. Maintenance / repair of silo pits and feed/fodder stores. Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall etc., Supply of quality fodder seed (multi cut sorghum/bajra/maize varieties) and fodder slips of Napier, guinea grass well before monsoon Replenish the feed and fodder banks

Drinking water	Adopt various water conservation methods at village level to improve the ground water level for adequate water supply. Identification of water resources Desilting of ponds Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Construction of drinking water tanks in herding places/village junctions/relief camp locations Community drinking water trough can be arranged in shandies /community grazing areas	Adequate supply of drinking water. Restrict wallowing of animals in water bodies/resources Add alum in stagnated water bodies	Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources Provide clean drinking water
Health and disease management	Procure and stock emergency medicines and vaccines for important endemic diseases of the area All the stock must be immunized for endemic diseases of the area Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures Procure and stock multivitamins & area specific mineral mixture	Carryout deworming to all animals entering into relief camps Identification and quarantine of sick animals Constitution of Rapid Action Veterinary Force Performing ring vaccination (8 km radius) in case of any outbreak Restricting movement of livestock in case of any epidemic Tick control measures be undertaken to prevent tick borne diseases in animals Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need 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
Floods	**Not applicable**		
Cyclone	**Not applicable**		
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 line powder in pit	
Floods	**Not applicable**			
Cyclone	**Not applicable**			
Heat wave and cold wave	***Not applicable***			

2.5.3. Fisheries/ Aquaculture

	Suggested Contingency measures		
	Before the event[a]	**During the event**	**After the event**
1. Drought			
A. Capture			
Inland			
(i) Shallow water depth due to insufficient rains/inflow	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	i) use stored water ii) use surface water flow iii) Divert water from unutilized areas iv) Utilize canal water	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) Aforestation 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 aforestation 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 application of scientific techniques.	i) Need based research data should be generated ii) Cleaning of water bodies iii) Regular water monitoring and bio-monitoring of water bodies
2. Flood			
A. Capture			
Inland			
(i) Average compensation paid due to loss of human life	i) Strengthening of river linings at all weak points ii) Cleaning of rivers and flood water	i) Human evacuation from the area ii) coordination of assistance iii) damage and need assessment	i) arrangement for rescue and casualty care ii) arrangement for burial control room

	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	iv) immediate management of relief supplies v) Immediate help and compensation delivery during emergency	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	i) Annual Repair of boats/nets and gears ii) insurance of boats/nets/gears	i) coordination of assistance iii) immediate management of relief supplies iv) Govt. support and compensation	i) Loss assessment & insurance claim.
(iii) No. of houses damaged	i) Annual repair of houses ii) house insurance	i) coordination of assistance ii) immediate management of relief supplies iii) Govt. support and compensation	i) prepare for the rehabilitation. ii) Loss assessment & insurance claim.
(iv) Loss of stock	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.	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	i) provision to stop/close the effluent/sewage discharge point in	i) Do not use contaminated water ii) proper preparation and management	i) need based research data should be generated to maintain water quality,

	water bodies ii) store chemicals, disinfectants and therapeutic drugs iii) develop flood control management plan	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	ii) dumping of solid, liquid and waste should be stopped. iii) Cleaning and disinfection of water bodies
(vi) Health and disease	i) advance planning and preparedness ii) store chemicals, disinfectants and therapeutic drugs iii) Stock sufficient stores of medicines	i) Prompt action or immediate removal of disease causing agents/ dead fish. ii) use appropriate amount of disinfectants, chemicals and therapeutic drugs iii) Emergency aeration or splashing in water bodies.	i follow up surveillance and monitoring after disease outbreak ii) biomonitoring and maintaining water quality iii) need based research data should be generated vii) Loss assessment & insurance claim.
B. Aquaculture			
(i) Inundation with flood water	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	i) arrangement for evacuation ii) arrangement for rescue and casuality care iii) arrangement for burial control room iv) restoration of essential services, security and protection of property v) damage and need assessment	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

	management plan v) Arrangement for emergency backup equipment on site vi) Arrangements to prevent the entry of alien/wild organisms through flood water	vi) immediate realize of relief supplies vii) lower the water level to culture facilities	iv) Loss assessment & insurance claim.
(ii) Water contamination and changes in water quality	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	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. 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	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
(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, followed by sterile or landfill disposal	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.

		ii) use appropriate amount of disinfectants, chemicals and therapeutic drugs	
(iv) Loss of stock and input (feed, chemicals)	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	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	i) Assessment of total loss ii) Insurance claims
(v) Infrastructure damage (pumps, aerators, huts etc)	i) Annual repair of infrastructure ii) Repair of pumps aerators, huts etc iii) infrastructure insurance.	i) damaged infrastructure enumeration and need assessment ii)coordination of assistance iii) immediate arrangement for relief supplies	i) Repair of damaged infrastructure. ii) Loss assessment & insurance claim.
4. Heat wave and cold wave			
A. Capture			
Inland	i) Assement 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	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.	i) intensive aforestation 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)	i) Assement 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	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.	i) intensive aforestation 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.
(ii) Health and disease management	i) advance planning and Veterinary preparedness. ii) Arrange sufficient stores of chemicals, disinfectants and therapeutic drugs iii) Stock sufficient quantities of emergency medicines	i) proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator) or splashing in water bodies. ii) Surveillance and monitoring of fish ponds against any adverse affects of heat/cold waves.	iii) follow up surveillance and monitoring . ii) Proper disposal of any dead fish