State: **PUNJAB**

Agriculture Contingency Plan for District: **Mohali**

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), Northern Plain, Hot Subhumid (Dry) Eco-Region (9.1)		
	Agro-Climatic Zone (Planning Commission)	West Himalayan Region (I)		
	Agro Climatic Zone (NARP)	Sub-Mountainous Undulating Zone (PB-1)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		30^{o}57’58. 51’’ N	76^{o}31’59. 62’’ E	6 MSL
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Gurdaspur, Hoshiarpur, Nawanshahar (Shahid Bhagat Singh Nagar), Ropar, Mohali		
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Research Station for Kandi Area PAU, Ballowal Saunkhri, Tehsil: Balachaur, District: Shahid Bhagat Singh Nagar		
	Mention the KVK located in the district with address	KVK Ropar, District: Ropar 141001		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	AMFU: Ballowal Saunkhri and Patiala-ki-Rao IMD: Chandigarh		

1.2	**Rainfall**	**Normal RF (mm)**	**Normal Rainy days**	**Normal Onset**	**Normal Cessation**
	SW monsoon (June-Sep):	217.2	36	Ist week of July	Last week of September
	NE Monsoon(Oct-Dec):	20.9	3	IIIrd /IVth week of December	
	Winter (Jan- March)	35.7	8	-	IVth week of March
	Summer (Apr-May)	27.6	5	-	-
	Annual	301.4	52	-	-

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)	144	78	37	14	1	1	-	6	2	-

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)**	**Area ('000 ha)**	**Percent (%) of total**
	Coarse loamy soils	-	40
	Coarse loamy and fine loamy soils	-	20
	Coarse loamy and fine loamy association	-	35
	Fine loamy soils	-	5

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	78	181
	Area sown more than once	64	
	Gross cropped area	143	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	100.0		
	Gross irrigated area	139.9		
	Rainfed area	22		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals (3% area is canal irrigated)			
	Tanks	108		
	Open wells	2568		
	Bore wells (Tube well)	10622	71	
	Pump sets	9690		
	No. of Tractors	7786		
	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**	16	Fit (70 %) and marginal (30 %) water with respect to residual sodium carbonate, no problem of salinity, arsenic and flouride in water.
	Critical	1	14	
	Safe	4	70	
*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	2.9	19.7	22.6	27.3	2.6	29.9	-	52.5
	Paddy/Sarson	16.5	0.149	16.649	0.654	0.059	0.713	-	17.362
	Sugar cane/Taramira	1.5	0.018	1.518	0.027	0.278	0.305	-	1.823
	Arhar/Gram	0.03	0.036	0.066	0.084	0.129	0.213	-	0.279
	Fodder/Fodder	1.8	7.013	8.813	1.766	0.044	1.81	-	10.623
	Sesame/Lentil	0.008	-	0.008	0.029	0.073	0.102	-	0.11

	Horticulture crops - Fruits	**Area ('000 ha)**	**Production (000 t)**	**Productivity (kg/ha)**
		Total		
	Guava	0.697	8.651	21520
	Mango	1.136	117.71	14844
	Kinnow	0.673	170.06	19570
	Peach	0.068	0.780	17328
	Litchi	0.095	0.049	1334

	Misc.	0.174		
	Horticulture crops - Vegetables	Total		
	Potato	0.466		
	Onion	0.026		
	Winter vegetable	0.054		
	Summer vegetable	0.455		
	Others (specify) Bee keeping	162 units and 802 box		

1.8	**Livestock (in number)**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	6190	1990	8180
	Crossbred cattle	4288	23226	27514
	Non descriptive Buffaloes (local low yielding)	1263	18837	20100
	Graded Buffaloes	7656	127138	134794
	Goat	1495	5135	6630
	Sheep	62	200	262
	Others Equine (Horse & Pony)	222	119	371
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial		73000	
	Backyard		5003	
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**	
		112		**06**		**178**	

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)	357.96	6.98	2.5

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	59	2790	212	3591					
	Rice/sunflower	128	3455	-	1510					
	Sugarcane/ Rapeseed and Mustard	18	5976	21	1109					

	Arhar /potato	0.1	-	9.1	18219					
Major Horticultural crops (Crops to be identified based on total acreage)										
	Guava	12197								
	Mango	11360								
	Kinnow	10095								
	Peach	1030								
	Litchi	950								
	Pear	760								
	Ber	420								
Others	**Misc.**	1740								

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 25th July)	Moong (First fortnight of July)
	Kharif-Irrigated	Maize (Last week of May to End of June)	Paddy (May 15th to June 5th)	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)	Chickpea (October 10th to October 25th
	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 (October 10th to October 20th)	Barley (October 15th to November 15th)	Chickpea (October 25th to November 25th)

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 for**	Location map of district within State as Annexure I	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Mean annual rainfall as Annexure 2	Enclosed: No
		Soil map as Annexure 3	Soil map as Annexure 3	Enclosed: No

Annexure I
Location map of Mohali district within Punjab State

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 (PMH 2 and JH 3459), gram (PDG 4 and PDG 3)	-	-
		Pearlmillet-wheat/barley /chickpea	Pearlmillet-barley /chickpea gram (PDG 4 and PDG 3)	-	-
	Medium rainfall deep sandy loam to clay loam soils	Maize/mash/-wheat /mustard /chickpea	Maize/mash/-wheat /mustard /chickpea/ gram (PDG 4 and PDG 3) Maize (PMH 2 and JH 3459) and Moongbean (ML 818 and P A U 911)	No change	-
		Maize/mash-wheat+raya /chickpea/Barley/Taramira	Toria (PBT 37) raya (PBR 210 and PBR 97) gobhi sarson (PGSH 51 and GSL 2), gram (PDG 4 and PDG 3)	-	-
		Pearlmillet-wheat/barley /chickpea	Pearlmillet (FCB 164 and FBC 16), PBW 509 and PBW 590 gram (PDG 4 and PDG 3)	-	-

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	-	**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) J 1006 / pearlmillet (F) FCB 1 and PCB 164 /cowpea (F)	**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 plough and plank 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 2nd week of September	Medium rainfall deep loamy sandy soils	Maize/moong/fallow-wheat/mustard/chickpea	Maize (F)/ pearl millet (F) /cowpea (F)	**For *Kharif*:** 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)	**For *Rabi*:** 1. Harvest maize crop at physiological maturity. In order to conserve soil moisture immediately plough and plank 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-	-
		Pearl millet-wheat/barley /chickpea	-	-	-
	Medium rainfall deep sandy loam to clay loam soils	Maize/mash/-wheat /mustard /chickpea	-	-	-
		Maize/mash-wheat + raya /chickpea/barley/taramira	-	-	-
		Pearl millet-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	Re-sowing 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	-	-	-
		Pearl millet-wheat/barley /chickpea	-	-	-
	Medium rainfall deep sandy loam to clay loam	Maize/mash/-wheat /mustard /chickpea	Re-sowing 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	-	-	-
		Pearl millet-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 measures**	**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 maize/bajra can be thinned out and use as fodder(1/3 rd population) Use anti transpirant 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	-	-	-
		Pearl millet-wheat/barley /chickpea	-	-	-
	Medium rainfall deep sandy loam to clay loam	Maize/mash/-wheat /mustard /chickpea	-	-	-
		Maize/mash-wheat + raya /chickpea/barley/taramira			
		Pearl millet-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	Maize/moong/fallow-wheat/mustard/chickpea	If grain setting has occurred in maize, the tassels can be cut down to reduce transpiration life saving irrigation, if available Green gram 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	-
		Maize/sesame/fallow-wheat + raya /chickpea /barley/taramira			
		Pearl millet-wheat/barley /chickpea			
	Medium rainfall deep sandy loam to clay loam soils	Maize/mash/-wheat /mustard /chickpea	-	-	-
		Maize/Mash-wheat + raya /chickpea/barley/taramira			
		Pearl millet-wheat/barley /chickpea			
		Maize/mash/-wheat /mustard /chickpea			
		Maize/mash-wheat + raya /chickpea/barley/taramira			

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	Not Applicable			

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**	Not Applicable			

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	Drain out excessive water	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
Mash / Raya	-do-	-do-	-do-	-do-
Moong / Taramira	-do-	-do-	-do-	-do-
Sesame / Lentil	-do-	-do-	-do-	-do-
Bajra / Chickpea	-do-	-do-	-do-	-do-
Horticulture				
Amla	-do-	-do-	-do-	-do-
Guava	-do-	-do-	-do-	-do-
Mango	-do-	-do-	-do-	-do-
Ber	-do-	-do-	-do-	-do-
Galgal	-do-	-do-	-do-	-do-
Kinnow	-do-	-do-	-do-	-do-
Litchi	-do-	-do-	-do-	-do-
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	
Mash / Raya	-Do-	-Do-	-Do-	
Moong / Taramira	-Do-	-Do-	-Do-	
Sesame / Lentil	-Do-	-Do-	-Do-	
Bajra / Chickpea	-Do-	-Do-	-Do-	

Horticulture				
Amla	-Do-	-Do-	-Do-	
Guava	-Do-	-Do-	-Do-	
Mango	-Do-	-Do-	-Do-	
Ber	-Do-	-Do-	-Do-	
Galgal	-Do-	-Do-	-Do-	
Kinnow	-Do-	-Do-	-Do-	
Litchi	-Do-	-Do-	-Do-	
Outbreak of pests and diseases due to unseasonal rains				
Wheat	Leaf blight (Thiram 3 gm / kg of seed)	Karnal bunt Yellow rust (Feb) with rise in temp Karnal bunt (Tilt 25 EC @ 200ml) Yellow rust (Feb) (Tilt 25 EC @ 200ml) with rise in temp.	Karnal bunt- Karnal bunt (Tilt 25 EC @200ml) Yellow rust (Feb) (Tilt 25 EC @200ml) with rise in temp.	
Mash / Raya	Alternaria blight Alternaria blight (Blitox 250g)	-	-	-
Moong / Taramira	Alternaria blight (Blitox 250g)	-	-	-
Sesame / Lentil	Lentil blight	-	-	-
Bajra / Chickpea	-	Gram blight & gram pod borer	-	-
Horticulture	-	-	-	-
Amla	-	-	-	-
Guava	-	-	-	-
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
Green gram	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
Black gram	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
Sesame	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
Bajra	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			
Guava	-	-	-	-
Amla	-	-	-	-

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone: Not Applicable

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	-	-	-	-
Horticulture	-	-	-	-
Cold wave	-	-	-	-
Horticulture	-	-	-	-
Frost	-	-	-	-
Horticulture	-	-	-	-
Hailstorm	-	-	-	-
Horticulture	-	-	-	-

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 Avoid burning of wheat/paddy straw 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 as silage	Harvest and use biomass of dried up crops (Maize, wheat, paddy, sugar cane, barley, gram, lentil mungbean, chickpea, cowpea, 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	Training/educating farmers for feed & fodder storage. Maintenance / repair of silo pits and feed/fodder stores. Encourage 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.,

	Processing & storage of feed/fodder and roughages in the form of complete feed/blocks. Encourage farmers to grow fodder crops like maize, jowar, bajra , cowpea, makkchari, barseem, jawi , rayi grass, lucerne and japense grass	& 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	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	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	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

	mixture	Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	
Floods	**Not applicable**		
Cyclone	**Not applicable**		
Heat and Cold wave	**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	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	-

	and fowl pox		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	**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) Afforestation program 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 afforestation program 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	i) Use disinfectants and therapeutic drugs ii) Adoption of bioremedial measures	i) To maintain water quality, need based research data should be generated

	ii) Store chemicals, disinfectants and therapeutic drugs		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	i) Critical evaluation of long range forecast for data ii) Storage of water iii) Afforestation programme iv) Installation of tube wells 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 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 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	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	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	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 water bodies ii) Store chemicals, disinfectants and therapeutic drugs iii) Develop flood control management plan	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	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	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) Bio-monitoring 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	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	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) 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	v) Damage and need assessment 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	i) Identification of type of disease outbreak, prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill	i) Cleaning and disinfection of ponds ii) Follow up surveillance and monitoring after disease outbreak iii) Proper disposal of dead fish

	medicines	disposal ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs	iv) 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 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			
Marine	-	-	-
Inland	i) Assessment of long term weather forecasts. ii) Arrange the water aerators iii) Store sufficient water in water bodies	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.	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.

	iv) Develop heat and cold wave management plans v) Tree plantation around fish ponds	vi) Educating the farmers through electronic/ print media about remedial measures.	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) 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	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 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.
(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