State: PUNJAB

Agriculture Contingency Plan for District: SHAHID BHAGAT SINGH NAGAR

Earlier Nawanshahr)

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Northern Plain, Hot Subhumid (Dry) Eco-Region (9.1)		
	Agro-Climatic Zone (Planning Commission)	West Himalayan Region (I)		
	Agro Climatic Zone (NARP)	Undulating Plain Zone (PB-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Nawanshahar (Shahid Bhagat Singh Nagar)		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		$31^0$07'39.27'N	$76^0$07'11.79" E	283 m MSL
	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 Langroya, District: Shahid Bhagat Singh Nagar		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	AMFU: Ballowal Saunkhri 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	4th week of December	
	Winter (Jan- March)	35.7	8	-	
	Summer (Apr-May)	27.6	5	-	-
	Annual	1094	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)	119	91	16	11	-	2	-	2	4	-

1. 4	Major Soils	Area ('000 ha)	Percent (%) of total
	Coarse loamy	23.8	20
	Coarse loamy and fine loamy	5.9	5
	Coarse loamy and fine loamy association	41.6	35
	Fine loamy	47.6	40

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	95	194
	Area sown more than once	89	
	Gross cropped area	184	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	86		
	Gross irrigated area	173.2		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals (10% area is canal irrigatred)		1	
	Bore wells	22837	85	
	Total Irrigated Area		86	
	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	3	61	Fit (85 %) and marginal (15 %) water with respect to residual sodium carbonate. No problem of salinity, arsenic and flouride in water. There is problem of selenium in about 5 % of underground waters.
	Safe	2	39	
	Wastewater availability and use			
*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	6.3	2.9	9.2	20.6	0.7	21.3	-	30.5
	Paddy/Sarson	8.1	-	8.1	0.26	0.04	0.31	-	8.4

	Sugarcane/Taramira	1.1	-	1.1	0.04	0.4	0.4	-	1.5
	Arhar/Gram	0.01	0.01	0.02	0.001	0.008	0.009	-	0.03
	Fodder/Fodder	1.8	7.01	8.8	1.7	0.04	1.8	-	10.7
	Sesame	0.008	-	0.008	-	-	-	-	0.008

	Horticulture crops - Fruits	**Area ('000 ha)**
		Total
	Guava	0.1
	Mango	0.1
	Kinnow	0.07
	Pear	0.06
	Litchi	0.02
	Misc.	0.04
	Horticulture crops - Vegetables	**Total**
	Potato	1.9
	Onion	0.07
	Winter vegetable	1.02
	Summer vegetable	0.3

	Others (specify) Bee keeping	12 units and 259 Box

1.8	**Livestock (in number)**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	1.8	0.7	2.6
	Crossbred cattle	6.6	31.7	38.3
	Non descriptive Buffaloes (local low yielding)	-	-	-
	Graded Buffaloes	11.1	119.9	131.0
	Goat	0.7	4.0	4.8
	Sheep	0.1	0.2	0.2
	Others Equine (Horse &Pony)	0.2	0.1	0.3
	Commercial dairy farms (Number)			0.04
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	70	111.5	
	Backyard	-	3.8	

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**	
		40		01		215	
	B. Culture						

		Water Spread Area (ha)	Yield (t/ha)	Production (‘000 tons)
	i) Fresh water (Data Source: Fisheries Department)	309.4	5.6	1.7

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	48	2844	303	4203	-	-	-	-	-
	Rice/sunflower	171	3491	25	1579	-	-	-	-	-
	Sugarcane/ Rapeseed and Mustard	36	5757	1.6	1085	-	-	-	-	-
	Pigeonpea/Potato	0.1	-	32.9	16440	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Peach	3375	18120	-	-	-	-	-	-	-
	Guava	2678	21370	-	-	-	-	-	-	-
	Mango	1430	13340	-	-	-	-	-	-	-
	Pear	1300	22320	-	-	-	-	-	-	-
	Kinnow	1140	18570	-	-	-	-	-	-	-
	Litchi	200	1245	-	-	-	-	-	-	-
	Ber	165	17124	-	-	-	-	-	-	-

Others	Misc.	440		-	-	-	-	-	-	-

1.12	**Sowing window for 5 major field crops**	Maize			Wheat
	Kharif- Rainfed	June 20th - July 7th	Bajra (F) (March to May)	Sesame First fortnight of July	
	Kharif-Irrigated	Last week of May to end of June	Paddy (15th of May to 15th of June)	Sugarcane (Mid February to end of March)	
	Rabi- Rainfed		Raya (mid October to mid November)	Taramira (whole October)	Last week of October to Last week of November
	Rabi-Irrigated		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)	Last week of October to Last week of November

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	-	Yellow Rust in wheat	-

	potato, Sucking pests like aphids, jassid, whitefly, Mealy bug in cotton)			
	Others (specify)	-	From last 2-3 years attack of blister beetle particularly on moong and okra	-

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

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

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 3rd week of July	Medium rainfall deep loamy sand to sandy soils	Maize/Moong/Fallow-Wheat/Mustard/Chickpea	No Change	All routine/normal agronomic practices	PUNSEED, NSC, PAU and Progressive Farmers
		Maize/Sesame/fallow-Wheat + Raya /Chickpea/Barley/ Taramira	No Change		
		Pearlmillet-Wheat/Barley /Chickpea	No Change		
	Medium rainfall deep sandy loam to	Maize/Mash/-Wheat /mustard	No Change	All routine/normal agronomic practices	

	clay loam	/Chickpea			
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		
		Pearlmillet-Wheat/Barley /Chickpea	No Change		

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 4 weeks 1st week of August	Medium rainfall deep loamy sand to sandy soils	Maize/moong/fallow-Wheat/mustard/chickpea	Moong/Fallow-Wheat/ Mustard/ Chickpea Moong (ML 818 and PAU 911) Wheat PBW 509 and PBW 590 Toria (PBT 37) Raya (PBR 210 and PBR 97) Gobhi Sarson (PGSH 51 and GSL 2)	**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	Maize (F)-Wheat +Raya /Barley /Chickpea Maize (F)-J 1006 Raya (PBR 210 and PBR 97) Gram (PDG 4 and PDG 3)	**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	Pearlmillet-Barley /Chickpea Gram (PDG 4 and PDG 3)		

			FCB 164 and FBC 16		
		Maize/Moong/fallow-Wheat/Mustard/Chickpea	No Change		
	Medium rainfall deep sandy loam to clay loam	Maize/Mash/-Wheat /Mustard /Chickpea	Maize/mash/-Wheat /Mustard /Chickpea Short duration maize varieties like PMH2, Gram (PDG 4 and PDG 3)		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		
		Pearlmillet-Wheat/Barley/Chickpea	No Change		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		

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 6 weeks 3rd week of August	Medium rainfall deep loamy sand to sandy soils	Maize/Moong/fallow-Wheat/Mustard/Chickpea	Maize (F)/ Pearlmillet (F) /Cowpea (F)	**For Kharif:** 1. Increase row spacing 2. Thinning of crop 3. Use of local available plant material for mulch	PUNSEED, NSC, PAU and Progressive Farmers
		Maize/Sesame/fallow-Wheat+Raya /Chickpea/Barley/Taramira	No Change	**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	No Change		
	Medium rainfall deep sandy loam to clay loam	Maize/Mash/-Wheat /mustard /Chickpea	No Change		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		
		Pearlmillet-Wheat/Barley /Chickpea	No Change		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		

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 8 weeks 1st week of September	Medium rainfall deep loamy sand to sandy soils	Maize/Moong/Fallow-Wheat/Mustard/Chickpea	Maize (F)/ Pearl millet (F) /Cowpea (F)	**For Kharif:** 1.Increase row spacing 2.Thining of crop 3.Use of local available plant material for mulch	PUNSEED, NSC, PAU and Progressive Farmers
		Maize/Sesame/Fallow-Wheat+Raya /Chickpea/Barley/Taramira	Fallow-Toria+ Gobhi sarson (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 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	No Change		
	Medium rainfall deep loamy sand to sandy soils	Maize/Mash/-Wheat /Mustard /Chickpea	No Change		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		
		Pearlmillet-Wheat/Barley /Chickpea	No Change		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		

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.	Medium rainfall deep loamy sand to sandy soils	Maize/Moong/Fallow-Wheat/Mustard/Chickpea	1. Resowing of maize 2. Thinning of crop 3. Weeding	1. Use local available plant material for mulch 2. Apply 50% N through organic and 50% through inorganic source	
		Maize/Sesame/Fallow-Wheat+Raya /Chickpea /Barley/Taramira	No Change		
		Pearlmillet-Wheat/Barley /Chickpea	No Change		
	Medium rainfall deep loamy sand to sandy soils	Maize/Mash/-Wheat /Mustard /Chickpea	1. Resowing of maize 2. Thinning of crop 3. Weeding	1.Use local available plant material for mulch 2.Apply 50% N through organic and 50% through inorganic source	
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		

		Pearlmillet-Wheat/Barley /Chickpea	No Change		
		Maize/Mash-Wheat+Raya /Chickpea/Barley/Taramira	No Change		

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	1. Every third row in case of maize/bajra can be thinned out and use as fodder (1/3 rd population) 2. Use antitranspirant 3. Life saving irrigation, if available	1.Use local available plant material for mulch 2.Apply 50% N through organic and 50% through inorganic source	
		Maize/sesame/fallow-Wheat+Raya /Chickpea /barley/taramira	Life saving irrigation	Use local available plant material for mulch	
		Pearlmillet-Wheat/Barley /Chickpea	Life saving irrigation	Apply 50% N through organic and 50% through inorganic source	
	Medium rainfall deep loamy sand to sandy 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		
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 flowering/ fruiting stage	Medium rainfall deep loamy sand to sandy soils	Maize/moong/fallow-Wheat/mustard/chickpea	1. If grain setting has occurred in maize, the tassels can be cut down to reduce transpiration 2. Life saving irrigation, if available 3. Green gram and black gram can be incorporated as green manure & conserve moisture for rabi crops 4. If rain comes Toria can be sown in mid September and intercropping of gobhi sarson in mid November	1.Use local available plant material for mulch 2.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 loamy sand to sandy 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		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
	Medium rainfall deep loamy sand to sandy soils	Maize/moong/fallow-Wheat/mustard/chickpea	1. Harvest whatever crop is available and immediately conserve the soil moisture for rabi	1. Intercropping of gobhi sarson in mid November in the Toria sown during mid September 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	
		Maize/Sesame/Fallow-Wheat+ Raya /Chickpea /Barley/Taramira			
		Pearlmillet -Wheat/Barley /Chickpea			
	Medium rainfall deep loamy sand to sandy 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			

2.1.2 Drought - Irrigated situation:

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Tankfed 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	Tankfed 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	Tankfed 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	Tube well irrigated medium red 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	Tankfed 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
Mash / Raya				
Moong / Taramira				
Seasme / Lentil				
Bajra / Chickpea				
Horticulture				
Amla				
Guava				
Mango				
Ber				
Galgal				
Kinnow				
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 nitrogen is not applied before 15 days	Spray with chemicals which enhance the photosynthesis	Harvest the crop and shift to safer place and dry place	
Mash / Raya				
Moong / Taramira				
Seasme / Lentil				
Bajra / Chickpea				
Horticulture				
Amla				
Guava				
Mango			Fruit shedding	
Ber				
Galgal				
Kinnow				
Outbreak of pests and diseases due to unseasonal rains				
Wheat	Leaf blight (Thiram 3 gm / kg of seed)	Karnal bunt (Tilt 25 EC @200ml) Yellow rust (Feb) (Tilt 25 EC @200ml) with rise in temp.	Karnal bunt (Tilt 25 EC @200mi)	
Raya	Alternaria blight (Blitox 250g)			
Taramira	Alternaria blight (Blitox 250g)			
Lentil	Lentil blight (Captan 3 gm / kg of seed)			
Chickpea		Gram blight &		

		gram pod borer		
Horticulture				
Amla				
Guava				
Mango	Root rot			
Ber				
Galgal				
Amla				

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				
Black gram				
Sesame				
Bajra				
Horticulture				
Mango	Drain out excess water from the field			
Guava	Drain out excess water from the field			
Amla				

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 transpirant to reduce transpiration	Spray anti transpirant	Life saving irrigation	
Maize				
Moong				
Mash				
Wheat	Spray anti transparent to reduce transpiration	Spray anti transpirant	Life saving irrigation	
Raya				
Horticulture				
All crops	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		
Raya				
Lentil				
Horticulture				
	Watering Covering the plants (with South side open)			
Frost				
Wheat		Light irrigation, if available. Preferably with sprinkler		

Raya				
Lentil				
Horticulture				
All crops	Watering Covering the plants (with South side open) Burn the leaves/ straw in the field to increase the temp			
Hailstorm				
All crops		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	Increase area under fodder cultivation Plantation of perennial grasses/trees on waste lands. Collection and storage of wheat/rice straw, sugarcane tops Processing & storage of dry roughages in the form of blocks Establishing fodder banks and preserving fodder as silage and hay.	Utilizing fodder from fodder bank reserves Utilizing fodder stored in silos Transporting fodder and dry roughages to the affected area Arrange concentrate feeds.	Educating farmers for feed & fodder storage Maintenance / repair of silage
Drinking water	Preserving water in the village ponds for drinking purpose Excavation of Bore wells Rain water harvesting on individual farm basis	Using preserved water from village ponds for drinking Ground water resources to be exploited for drinking purposes	Maintenance & cleaning of water reservoirs

Health and disease management	Preparedness with sufficient stocks of medicines and vaccination of animals	Conducting mass animal Health Camps and treating the affected animals	Culling sick animals
Floods			
Feed and fodder availability	Establishing Feed & fodder reserves at places safe from floods. Processing & storage of dry roughages in the form of blocks Using excess fodder for silage/hay making	Moving feed and fodder from the reserves to affected areas	Maintenance and strengthening of feed & fodder storage facilities Ensure availability of quality feed and fodder for high yielding animals
Drinking water	Not a problem	Supply of clean and safe water to the animals	Cleaning and disinfection of water reservoirs
Health and disease management	Provision of community shelters at safe places Proper & timely vaccination along with sufficient stock of medicines Constitution of Rapid Action Veterinary force	Shifting of animals from affected areas to safe places at short notice Quick action by Rapid Action Veterinary force for animal treatment	Proper disposal of carcass of dead animals Culling of sick animals Insurance & Govt. relief claims
Heat wave and cold wave			
Shelter/environment management	Shady tree plantation around animal facilities. Encourage low cost environmentally effective well ventilated shelters. Cleaning of village ponds on community basis. **Preponderances** for stress related diseases.	Use protective measures to reduce the effects of cold or heat viz., use of antioxidants as feed additives etc. Use water ponds for wallowing during heat wave Ensure fresh water supplies	Plantation of shady trees and wind breakers around animal facility/farms Strengthening of water supply resources
Health and disease management	Provision of community shelters/hospitals for animal treatments Proper & timely vaccination, ensure sufficient stock of medicines	Visits of rapid action force teams in affected area & treatment of affected animals Testing the immunity	Keep the hyper sensitive animals under observation Proper feed and fodder supply for reconditioning the affected animals

2.5.2 Poultry

	Suggested contingency measures			Convergence/ linkages with ongoing programs, if any
	Before the event	**During the event**	**After the event**	
Drought	-	-	-	
Shortage of feed ingredients	Establishing feed reserve banks	Utilizing feed from feed reserve banks	Strengthening of feed storage facilities	
Drinking water	Strengthening of water sources	Ensure sufficient drinking water supplies	-	
Health and disease management	Vaccination of birds Veterinary preparedness with sufficient medicine stocks.	Critical observation of flocks for any infection on daily basis	Culling and disposal of affected birds	
Floods				
Shortage of feed ingredients	Ensure feed reserves to meet requirements for 2-3 months	Use feed from feed reserves& transport feed to affected area	Cleaning & disinfection of feed stores Dispose of fungal contaminated feed	
Drinking water	Excavation of deep bore wells	Use water from deep bore well.	Maintenance of water supply	
Health and disease management	Emergency Veterinary preparedness with sufficient stocks of medicines	Deworming of birds Visit of rapid action force to the affected area for emergency treatment	Culling affected birds Proper disposal of dead carcasses Cleaning and disinfection of poultry houses.	
Heat wave and cold wave				
Shelter/environment	Build comfortable shelter Tree plantation/wind breakers around	Ensure supply of fresh drinking water Use cooling or heating devices for comfort		

management	poultry facilities	of birds Increase or decrease ventilation and air movements as per requirements Use protective measures to reduce the effects of cold or heat viz.,use of antioxidants etc. as feed additives		
Health and disease management	Vaccination of birds Emergency Veterinary preparedness with medicines	Watch the flocks for any infection critically Testing the titre against RD. Quick treatment of birds against any disease outbreak	Reconditioning of birds Culling and disposal of affected birds	

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) 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	i) Use disinfectants and therapeutic	i) To maintain water quality, need

	should be stopped ii) Store chemicals, disinfectants and therapeutic drugs	drugs ii) Adoption of bioremedial measures	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 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 ii) Immediate management of relief supplies iii) 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) 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	i) Arrangement for evacuation ii) Arrangement for rescue and	i) Reallocate fish to maintain appropriate biomass.

	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	casuality 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	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	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 ii) Use appropriate amount of disinfectants, chemicals and therapeutic drugs	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)	i) Keep the stock/input in safer place for emergency purpose ii) Store fuels, food/other item iii) Develop flood control management	i) Arrangements for emergency supplies of inputs to affected areas. ii) Mobilize stock/inputs from distant areas/companies/ farmers who are not	i) Assessment of total loss ii) Insurance claims

	plan iv) Insurance of stock material	affected by floods	
(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 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) 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 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	i) Proper preparation and management	iii) Follow up surveillance and

	preparedness. ii) Arrange sufficient stores of chemicals, disinfectants and therapeutic drugs iii) Stock sufficient quantities of emergency medicines	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.	monitoring. ii) Proper disposal of any dead fish