State: HARYANA

Agriculture Contingency Plan District: PANCHKULA

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Western Himalayas, Warm Subhumid (To Humid) 14.2		
	Agro-Climatic Region (Planning Commission)	Trans Gangetic Plain region VI		
	Agro Climatic Zone (NARP)*	Eastern Zone (HR-1)		
	List all the districts falling under the NARP Zone	Panchkula, Ambala, Yamunanagar, Kurukshetra, Karnal, Kaithal, Jind, Panipat, Sonipat, Faridabad, Mewat, Palwal and parts of Rohtak, Jhajjar and Gurgaon		
	Geographical coordinates of district	Latitude	Longitude	Altitude
		30º 41' 41.27" N	76º 51' 37.11" E	373 m
	Name and Address of the concerned ZRS/ZARS/RARS/RRTTS	ZRS, Karnal-132001		
	Mention the KVK located in the district	KVK, Krishi Bhawan, Sector-21, Panchkula-134 109		
1.2	**Rainfall**	Average (mm)	Normal Onset (week and month)	Normal Cessation (week and month)
	SW monsoon (June-Sep):	930.3	1st week of July	3rd week of September
	NE Monsoon(Oct-Dec):	43.0	-	-
	Winter (Jan- March)	91.8		
	Summer (Apr-May)	44.1		
	Annual:	1109.2		

* If a district falls in two NARP zone, mention the zone in which more than 50% area falls.

1.3	**Land use pattern of the district** (latest statistics)	Total geographical area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (000 ha)	57	2	18		2	6	3	2	-

(Source: Statistical Abstract Haryana: 2007-08)

1. 4	**Major Soil types**	Area ('000 ha)	Per cent (%) of total area
	Sandy loam soils	-	-
	Loamy sand soils	55	100

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	24	192
	Area sown more than once	22	
	Gross cropped area	46	

1.6	**Irrigation**	Area (‘000 ha)	Percent (%)	
	Net irrigated area	5	-	
	Gross irrigated area	24		
	Rainfed area	19		
	Sources of Irrigation	Number	Area (‘000 ha)	% area
	Canals		1	20
	Tanks	-	-	-

	Open wells	-	-	-
	Bore wells	-	3	60
	Lift irrigation	-		
	Other sources	-	1	20
	Total No. of Tractors		5	
	Pumpsets	5034		
	Micro-irrigation			
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	-	-	-
	Critical	-	-	-
	Semi- critical	-	-	-
	Safe	-	-	-
	Wastewater availability and use	-	-	-
	Total	-	-	-

*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%

1.7 Area under major field crops & Horticulture (as per latest figures (2008-09)

1.7	**Major Field Crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***			**Summer**	**Grand Total**
		Irrigated	***Rainfed***	***Total***	***Irrigated***	***Rainfed***	***Total***		
	Wheat	-	-	-	-	-	16.9	-	16.9
	Maize	-	-	8.2	-	-	-	-	8.2
	Rice	7.3	-	7.3	-	-	-	-	7.3
	Horticulture crops - Fruits	**Total area**							
	Mango	0.9							
	Guava	0.2							

	Chiku	0.1
	Horticultural crops - Vegetables	**Total area**
	Potato	0.9
	Onion	0.9
	cauliflower	0.7
	Radish	0.6
	Medicinal and Aromatic crops	**Total area**
	Lemongrass	0.004
	Others	0.05
	Plantation crops	**Total area**
	Fodder crops	**Total area**
	Total fodder crop area	-
	Grazing land	-
	Sericulture etc	-

* If break-up data (irrigated, rainfed) is not available, give total area

1.8	**Livestock** (2008-09)	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Cattle	-	-	29
	Buffaloes total	-	-	68
	Commercial dairy farms	-	-	NA
	Goat	-	-	14
	Sheep	-	-	2
	Others (Camel, Pig, Yak etc)	-	-	7
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	-	5529	
	Backyard	-	1	

1.10	**Fisheries**							
	A. Capture							
	i) Marine (Data Source: Fisheries Dept.)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**	
			Mechanised	Non-mechnised	Mechnised (Trawl nets, Grill nets)	Non-mechnised (Shore seines, stake & trap nets)		
		-	-	-	-	-		
	ii) Inland (Data Source: Fisheries Dept.)	**No. Farmer owned ponds**		**No. of Reserviors**		**No. of village tanks**		
		-		-		-		
	B. Culture							
		Water Spread Area (ha)		**Yield (t/ha)**		**Production ('000 tons)**		
	i) Brakish water (Data source: MPEDA/Fisheries Dept.)	-		-		-		
	ii) Fresh water (Data source: Fisheries Dept.)	-		-		-		
	Others	-		-		-		

1.11	**Production and Productivity of major crops** (Average of last 3 years: 2006, 07, 08)	**Kharif**		**Rabi**		**Summer**		**Total**	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Wheat	-	-	40	2375	-	-	40	2375
	Maize	18	2237	-	-	-	-	18	2237
	Rice	28	4007	-	-	-	-	28	4007
	Major Horticultural crops								
	Mango	3205	-	-	-	-	-	3205	-
	Guava	900	-	-	-	-	-	900	-
	Chiku	1600	-	-	-	-	-	1600	-

(Source: Statistical Abstract of Haryana)

1.12	**Sowing window for 5 major crops** (start and end of sowing period)	Wheat	Maize	Rice
	Kharif- Rainfed	-	Monsoon onset	-
	Kharif-Irrigated	-	25th June-20th July	15th May – 30th June
	Rabi- Rainfed	-	-	-
	Rabi-Irrigated	October end – 15th Nov	-	-

1.13	**What is the major contingency the district is prone to? (Tick mark)**	**Regular**	**Occasional**	**None**
	Drought	-	√ (May-June)	-
	Flood	-	√ (July-Aug)	-
	Cyclone	-	-	√
	Hail storm	-	√ (Dec - Mar)	-
	Heat wave	√	-	-
	Cold wave	√	-	-
	Frost	-	√ (Jan)	-
	Sea water inundation	-	-	√
	Pests and diseases (specify)	-	√	-

1.14	**Include Digital maps of the district for**	Location map of district with in 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 (No rainfed area)

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks	NA				

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

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

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**

Delay by 8 weeks	NA

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	NA				

Condition			**Suggested Contingency measures**		
Mid season drought **(long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)**	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	NA				

Condition			**Suggested Contingency measures**		
Mid season drought **(long dry spell)**	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At reproductive stage	NA				

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
	NA				

2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed/ limited release of water in canals due to low rainfall	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed	Light sandy loam soil with tubewell/canal irrigated	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters.	Seeds from State, national seed and private seed agencies. The schemes of NREGS,

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
onset of monsoon in catchment	condition prominently tubewell			Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures,	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	**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	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation, Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation, Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Light sandy loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation. Govt. subsidy on

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	sprinkler, drip irrigation systems and laser leveler
		Maize-Wheat	None	As above	
	Medium clay loam soil with tubewell/canal irrigated condition prominently tubewell	Rice-Wheat	No change	10-15% higher seed rate, optimum plant spacing Sprinkler irrigation, Planting on beds, planting with ridger seeder, Laser land leveling, Conjunctive use of canal and ground waters. Split application of fertilizer, Application of organic manures, Straw mulching, Limited ground water use, prefer life saving irrigation Short duration cultivars, Adoption of plant protection measures Soaking of wheat seeds before sowing, seed treatment with biofertilizer, deep ploughing during *kharif* season Shallow irrigation of 4-5 cm depth, weed free environment	
		Maize-Wheat	None	As above	

2.2 Unusual rains (untimely, unseasonal etc)

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Rice		Drainage	Drainage	Shifting to dry place
Wheat	Planting on beds and drainage	-do-	-do-	-do-
Maize	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				

Potato, Onion, Cauliflower and Raddish	1. No adverse effect 2. Removal of unwanted sprouts 3. Spray insecticides & pesticides to control the insect & pest 4. Drain out water if heavy rains	1. Drain out the excess water to avoid flower and fruit drop 2. To control the fruit drop apply foliar application of nutrients and growth regulators 3. Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits 4. Plough the field to increase the root aeration.	Harvest the fruit crops timely and send to the market immediately.	1. Apply fungicide to avoid post harvest diseases. 2. Proper covering of the produce. 3. Proper grading and cleaning of fruits immediately after harvest. 4. Use the damaged fruits for processing 5. Use water proof packaging
Heavy rainfall with high speed winds in a short span[2]				
Rice	Drainage, if stagnant water	Drainage	Drainage	Shifting to dry place
Wheat	Drainage, if stagnant water	-do-	-do-	-do-
Maize	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				
Potato, Onion, Cauliflower and Raddish	Drain out water if heavy rains	1. Drain out the excess water to avoid flower and fruit drop 2. To control the fruit drop apply foliar application of nutrients and growth regulators 3. Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits 4. Plough the field to increase the root aeration.	Harvest the fruit crops timely and send to the market immediately.	1. Apply fungicide to avoid post harvest diseases. 2. Proper covering of the produce. 3. Proper grading and cleaning of fruits immediately after harvest. 4. Use the damaged fruits for processing 5. Use water proof packaging
Outbreak of pests and diseases due to unseasonal rains				
Rice : Bacterial leaf blight, blast	Soak 10 kg of seed in 10 lt. water	Follow recommended control		

disease and false smut increases due to rains	suspension of Emisan / Bavistin 10 gm +1 g Streptocycline for 24 hrs.before sowing. No recommendation at vegetative stage for BLB control	measures		
Wheat : Yellow and brown rust of wheat become severe Powdery mildew intensity becomes low to moderate Karnal bunt increases	Spray 600 – 800 gm Mancozeb 200 lt. of water/acre at the appearance of disease and repeat after 15-20 days For powdery mildew control spray 600-800 gm wettable sulphur/200 lt. of water/acre			
Horticulture				
Potato: Early and late blight of potato increases with rainfall viral disease decreases	Spray Mancozeb @ 0.25% 4-5 times at an interval of 15 days			

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	Drainage, if stagnant water	Drainage	Drainage	Shifting to dry place
Wheat	Drainage, if stagnant water	-do-	-do-	-do-
Maize	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				
Potato, Onion, Cauliflower and Raddish	➢ Drain out the flood water ➢ Spray of nutrients/supplementation ➢ Prefer plantation of water logging resistant crop like Jamun. ➢ Mount planting of fruit trees			Drain out the flood water
Continuous submergence for more than 2 days[2]				
Rice	No adverse effect on crop	No adverse effect on crop	No adverse effect on crop	Shifting to dry place
Wheat	Drainage, if stagnant water	-do-	-do-	-do-
Vegetables	Drainage, if stagnant water	-do-	-do-	-do-

Maize	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				
Potato, Onion, Cauliflower and Raddish	➢ Drain out the flood water ➢ Spray of nutrients/supplementation ➢ Prefer plantation of water logging resistant crop like Jamun. ➢ Mount planting of fruit trees			Drain out the flood water
Sea water inundation	NA			

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone

Extreme event type	Suggested contingency measurer			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Rice	Micro-irrigation, avoid irrigation during hot hours with poor quality waters	Micro-irrigation avoid irrigation during hot hours with poor quality waters	-	
Maize	Micro- sprinkler irrigation avoid irrigation during hot hours	Micro- sprinkler irrigation avoid irrigation during hot hours	Micro-sprinkler irrigation Avoid irrigation during	
Horticulture				
Cold wave				
Wheat	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	
Vegetables	-do-	-do-	-do-	
Maize	-do-	-do-	-do-	
Horticulture				
Frost				
Wheat	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	
Vegetables	Irrigation and proper nutrition, covering the crop with straw or plastic sheet	Irrigation and proper nutrition, covering the crop with straw or plastic sheet	Irrigation and proper nutrition, covering the crop with straw or plastic sheet	
Maize	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	
Horticulture				
Hailstorm				

Horticulture				
Cyclone				
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	1. All Districts should be asked to locate their feed and fodder banks in view of submergence situation arising due to draught. Sufficient care must be taken to sensitize the farmers to protect their feed and fodder much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for production and supply to the identified areas within the shortest possible time. 2. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods. 3. The livestock holders of small ruminants should be educated/ informed to collect sufficient amount of green leaves from edible plants for use during the period of submergence at the earliest, after receipt of draught warning. The district authorities of Animal Husbandry Department should chalk out a complete programme to cater the feed & fodder needs of livestock.	1. The best option is to open fodder depots for milch animals which farmers will never deposit into the cattle camps and establish cattle camps for dry and scrub animals. These camps should be established along assured source of water or canals for drinking and growing fodder. 2. Facilities like storing densified roughages transported from other districts should also be established adjacent to these camps. 3. Complete feed blocks stored in the feed banks should be provided to productive, lactating and pregnant animals for scarcity periods 4. Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing. 5. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders. 6. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly.	1. Immediate efforts are needed to grow fodder crops like oats, barley, *kasni* and *lucerne* etc. in the canal command areas. 2. Farmers might have to be compensated for abandoning food or commercial cash crop to meet contingent fodder requirements.

	4. Increase the sown area under fodder crops 5. Looking to scarcity of crop residues, burning of paddy straw and stubbles should not be allowed in Haryana. This can be properly harvested, baled, densified and fortified using 4% urea with molasses and transported to areas of fodder scarcity. Standardized machinery for harvesting, bailing, densification and fortification is available with Punjab Agro Federation and in the market.		
Drinking water	Prior to the onset of summer all the water ponds/lakes in the villages/cities should be filled up with canal water/tube wells.	1. All the affected livestock should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts. 2. Resorting to alternate day watering to camel, sheep and goats. Experimental evidences show that even watering twice a week did not have much adverse effect on body weight of the sheep. 3. Avoiding long distance grazing, as tired animals need more and frequent watering and feeding.	Normal supply of water should be restored.
Health and disease management	-	-	
Floods			
Feed and fodder availability	1. All Districts should be asked to locate their feed and fodder banks in view of submergence situation arising due to floods. Sufficient care must be taken to sensitize the farmers to protect their feed and fodder much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require	1. The best option is to open fodder depots for milch animals which farmers will never deposit into the cattle camps and establish cattle camps for dry and scrub animals. These camps should be established along assured source of water or canals for drinking and growing fodder. 2. Facilities like storing densified roughages transported from other parts of the country should also be established adjacent to these camps. 3. Immediate efforts are needed to grow fodder	1. Immediate efforts are needed to grow fodder crops like oats, barley, *kasni* and *lucern* etc. in the canal command areas. 2. Farmers might have to be compensated for abandoning food or commercial cash crops to meet contingent fodder requirements. 3. After the sheds have dried, these should be disinfected and regular feed of the animals should be

	action at their level for production and supply to the identified areas within the shortest possible time. 2. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods 3. The livestock holders of small ruminants should be educated/ informed to collect sufficient amount of green leaves from edible plants for use during the period of submergence at the earliest, after receipt of draught warning. The district authorities of Animal Husbandry Department chalk out a complete programme to cater the feed & fodder needs of cattle, buffalo, sheep, goat, pig, dog, poultry birds etc. 4. The livestock holders of livestockare trained regarding shifting of animals before flooding. The farmers are instructed to let loose their animals instead of tieing much before flood. 5. Increase the sown area under fodder crops 6. Looking to scarcity of crop residues, burning of paddy straw and stubbles should not be allowed in Haryana. This can be properly harvested, bailed, densified and fortified using 4% urea with molasses and transported to areas of fodder scarcity. Standardized machinery for harvesting, bailing, densification and fortification is available with Punjab Agro Federation and in the market.	crops like oats, barley, *kasni* and *lucern* etc. in the canal command areas. 4. Farmers might have to be compensated for abandoning food or commercial cash crops to meet contingent fodder requirements. 5. Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing. 6. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders. 7. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly.	introduced gradually.
Drinking water	Tube wells should be installed before monsoon to provide underground water to the livestock during flood period.	All the affected livestock and poultry should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts. The available water may be chlorinated if required with help	Normal supply of water should be restored.

		of Halogen Tablet prior to drinking by livestock and poultry.	
Health and disease management			
Cyclone	-NA-		
Feed and fodder availability	-	-	
Drinking water	-	-	
Health and disease management	-	-	
Heat wave and cold wave			
Shelter/environment management	Necessary arrangement of tatties, gunny bags and tirpal should be made available so as to cover the sheds during heat and cold waves	1. Window of the sheds should be covered with gunny bags, tatties, and tirpal. Electric fans should be provided in the sheds and if possible desert cooler should be provided during heat period. 2. High energy and readily available sources of energy nutrients may be provided in the ration.	Normal shelter should be restored
Health and disease management	-	-	

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	I. All Districts should be asked to locate their feed banks in view of submergence situation arising due to draught. Sufficient	Poultry farmers should be provided with sufficient amount of feed ingredients and complete feed during draught situation from the	Normal feeding should be restored

	care must be taken to sensitize the farmers to protect their feed and fodder much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for production and supply to the identified areas within the shortest possible time. II. The district authorities of Animal Husbandry Department should chalk out a complete programme to cater to feed the poultry birds.	feed banks.	
Drinking water	Necessary arrangement for water storage should be made. Hand pumps should be installed around the sheds. Sufficient quantity of electrolytes should be ensured.	All the affected poultry should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts.	Normal drinking water restored
Health and disease management	-	-	
Floods			
Shortage of feed ingredients	I. All Districts should be asked to locate their feed banks in view of submergence situation arising due to flood. Sufficient care must be taken to sensitize the farmers to protect their feed much ahead of onset of monsoon. The sources for procurement of feed / rice bran (Kunda) within the district and nearest locations should be identified, and the suppliers kept informed about the emergency situation, which might require action at their level for production and supply to the identified areas within the shortest possible time. II. The poultry farmers should be trained regarding shifting of birds before flood. For shifting of poultry birds to safer places, the	Sufficient quantity of feeds stored in the feed banks should be made available to the poultry farmers.	Normal feeding should be restored

	farmer should be educated to make suitable cages from bamboos.		
Drinking water	I. Prior to the onset of monsoon tube wells should be installed in the villages and near to the poultry farms so as to provide underground water during flood.	All the affected poultry should have an access to clean drinking water. Arrangements are required to be made in this regard with the help of concerned Government functionaries of the Districts. The available water may be chlorinated if required with help of Halogen Tablet prior to drinking by livestock and poultry.	Normal drinking water restored
Health and disease management	-	-	
Cyclone	-NA-		
Shortage of feed ingredients	-	-	
Drinking water	-	-	
Health and disease management	-	-	
Heat wave and cold wave			
Shelter/environment management	Necessary arrangement of tatties, gunny bags and tirpal should be made available so as to cover the sheds during heat and cold waves	1. Window of the sheds should be covered with gunny bags, tatties, and tirpal. Electric fans should be provided in the sheds and if possible desert cooler should be provided during heat period. 2. High energy and readily available sources of energy nutrients may be provided in the ration.	Normal shelter should be restored
Health and disease management	-	-	

2.5.3 Fisheries

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**

1) Drought			
A. Capture			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow			
(ii) Changes in water quality			
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Further increase the depth of ponds, store the fish stock in 1 & 2 ponds only.	Sell the big fishes and keep the smaller fishes in one tank.	Stock the young fishes in different tanks, species wise.
(ii) Impact of salt load build up in ponds / change in water quality	Continuously add some water from tube well/water source in fish ponds	Do not allow the water level to go below 3.5 feet in fish ponds.	Stock the young fishes in different tanks and keep the water between 3.5 and 6.0 feet.
2) Floods			
A. Capture			
Marine			
Inland			
(i) No. of boats / nets/damaged			
(ii) No.of houses damaged			
(iii) Loss of stock			
(iv) Changes in water quality			
(v) Health and diseases			
B. Aquaculture			
(i) Inundation with flood water	Boundaries/Bundhs with height >6 feet may be made around fish ponds, will	Netout and stock the fishes in one big tanks and make the bundh >6 feet height	Remove the bundh separately and release

	restrict, escape of fishes from ponds	around the ponds.	the fishes, species-wise in tanks.
(ii) Water contamination and changes in water quality	Add more fresh water in each tank (tube well/canal), grow aquatic weeds.	Repeatedly filter and recirculate water from stocking tanks	Filter, recirculate and add new fresh water every week, will decrease fish mortality.
(iii) Health and diseases	Treat the pond water with $KmNO_4$ @ 10 ppm in each fish tanks. Add new fresh water periodically.	Disinfect fish ponds with $KmNO_4$ @ 10g/10,000 liter water fortnightly.	Treatment with $KmNO_4$ must continue for one month even after flood situation is out. Remove the highly infected fishes from ponds.
(iv) Loss of stock and inputs (feed, chemicals etc)	Store the inputs at safer places.	Move stock and inputs to safer places and acquire fresh stock in shortage.	Retain the normal arrangements.
(v) Infrastructure damage (pumps, aerators, huts etc)	Make alternate arrangements according to the anticipated conditions	Proper maintenance/repairing of damaged infrastructure or make new arrangements.	Proper maintenance/repairing of damaged infrastructure.
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds			
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			

(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			
4. Heat wave and cold wave			
A. Capture			
Marine			
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)	Keep the ponds water fresh by adding fresh tubewell water, regularly.	Showering the water in air and add fresh tube-well water, periodically.	During heat waves, showering is must and also tubewell water. In winter continue adding of tubewell water with $KmNO_4$.
(ii) Health and Disease management	Treatment of KmNO4 @ 10 ppm. Sale out the bigger fishes.	Treatment of KmNO4 @ 10 ppm. Dump the fishes which were heavily infected	Disinfection with $KmNO_4$ continues. Sale out all the fishes except, infected ones. Dump the infected fishes in a ditch in the ground.

Annexure 1

Location map of district in the state of Haryana

Annexure 2

Mean Annual rainfall