State: HARYANA

Agriculture Contingency Plan District: KAITHAL

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Northern Plain (And Central Highlands) (4.1)			
	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	
		29º47'43.59" N	76º23'57.37 E	259 m MSL	
	Name and Address of the concerned ZRS/ZARS/RARS/RRTTS	Zonal Research Station, Karnal-132001			
	Mention the KVK located in the district	Krishi Vigyan Kendra, New Peoda Road, P.B. No. 40 Kaithal-132027			
1.2	**Rainfall**	Average (mm)	Number of rainy days	Normal Onset (week and month)	Normal Cessation (week
	SW monsoon (June-Sep):	444.8	-	1st week of July	3rd week of September
	NE Monsoon(Oct-Dec):	20.8	-	-	-
	Winter (Jan- March)	52.3	-		
	Summer (Apr-May)	33.4	-		
	Annual:	551.3	-		

* 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)	228	3	22	-	-	-	1		-

1. 4	**Major Soil types**	Area ('000 ha)
	Sandy loam soils	44
	Loamy soils	170

(Source: Statistical Abstract Haryana: 2007-08)

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	202	186
	Area sown more than once	175	
	Gross cropped area	377	

1.6	**Irrigation**	Area (‘000 ha)	Percent (%)	
	Net irrigated area	200		
	Gross irrigated area	375		
	Rainfed area	2		
	Sources of Irrigation	Number	Area (‘000 ha)	% area
	Canals		99.0	49.5
	Tanks	-	-	-

	Open wells	-	-	-
	Bore wells	-	89.0	44.5
	Lift irrigation	-	-	-
	Other sources	-	12.0	6.0
	Total	-	200.0	-
	Pumpsets	57120	-	-
	Micro-irrigation		-	-
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited*	5	100	-
	Critical	-	-	-
	Semi- critical	-	-	-
	Safe	-	-	-
	Wastewater availability and use	NA		
	Quality of water	Alkaline in nature		

*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				171.7		171.7		171.7
	Rice	150.6		150.6					150.6
	Bajra			13					13
	Cotton	6.6		6.6					6.6
	Sugarcane	2.5		2.5					2.5
	Horticulture crops - Fruits	**Total area**							

	Guava	0.1
	Ber	0.1
	Aonla	0.04
	Horticultural crops - Vegetables	**Total area**
	Cauliflower	0.8
	Potato	0.5
	Medicinal and Aromatic crops	**Total area**
		-
	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 (in number)**	**Male ('000)**	**Female ('000)**	**Total ('000)**	
	Non descriptive Cattle (local low yielding)	-	-	86	
	Crossbred cattle	-	-	-	
	Non descriptive Buffaloes (local low yielding)	-	-	383	
	Graded Buffaloes	-	-	-	
	Goat	-	-	6	
	Sheep	-	-	22	
	Others Equine (Horse &Pony)	-	-	23	
	Commercial dairy farms (Number)			-	
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**		
	Commercial		564		
	Backyard		62		
1.10	**Fisheries**				
	A. Capture				
	i) Marine (Data Source:	**No. of fishermen**	**Boats**	**Nets**	**Storage facilities**

	Fisheries Dept.)		Mechanized	Non-mechanized	Mechanized (Trawl nets, Grill nets)	Non-mechanized (Shore seines, stake & trap nets)	**(Ice plants etc.)**
		-	-	-	-	-	NA
	ii) Inland (Data Source: Fisheries Dept.)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		NA		NA		NA	
	B. Culture						
		Water Spread Area (ha)		**Yield (t/ha)**		**Production ('000 tons)**	
	i) Brakish water (Data source: MPEDA/Fisheries Dept.)	NA		NA		NA	
	ii) Fresh water (Data source: Fisheries Dept.)						

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			752	4373			752	4373
	Rice	473	3133					473	3133
	Bajra	27	2052					27	2052
	Cotton	6.6	1000					6.6	1000
	Sugarcane (Gur)	13.1	6529					13.1	6529
	Major Horticultural crops								
	Guava							1680	
	Ber							1000	
	Aonla							179	
	Major Vegetable crops								
	Cauliflower	12746	15953					12746	15953
	Potato			7904	16926			7904	16926

(Source: Statistical abstract of Haryana)

1.12	**Sowing window for 5 major crops** (start and end of sowing period)	Wheat	Rice	Bajra	Cotton	Sugarcane
	Kharif- Rainfed	-		Onset of rain	-	
	Kharif-Irrigated	-	15th May – 30th June	1st July -15th July	15th April – 7th July	Mid February – End March
	Rabi- Rainfed	October end – November end		-	-	
	Rabi-Irrigated	October end – 15th 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	-	✓	-

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

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation (No rainfed cultivation)

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 (Specify month)	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 (Specify month)	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 (Specify month)	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 (Specify month)	NA				

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Crop/cropping system**	**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**
Normal onset followed by 15-20	NA				

days dry spell after sowing leading to poor germination/crop stand etc.	

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	Upland Alluvial soils heavy textured, tube well and 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. 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
		Sugarcane	No change	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, Planting on beds, straw mulching Laser land leveling Split application of fertilizer, Application of organics Intercultural operation and earthing, Limited ground water use, prefer life saving irrigation, Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	-do-

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 onset of monsoon in	Upland Alluvial soils heavy textured, tube well	Rice-wheat	No change	10-15% higher seed rate 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

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
catchment	and canal irrigated			short duration cultivars, 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, Plant protection measures	are in operation. Govt. subsidy on sprinkler, drip irrigation systems and laser leveler.
		Sugarcane	No change	Drip/furrow irrigation in sugarcane, paired row planting, optimum plant spacing, planting on beds, straw mulching in sugarcane Laser land leveling, split application of fertilizer, application of organics, intercultural operation and earthing Limited ground water use, prefer life saving irrigation Conjunctive use of brackish ground waters with canal waters Short duration cultivar. Adoption of plant protection measures Weed free environment	-do-

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	Upland Alluvial soils heavy textured, tube well and canal irrigated	Rice-wheat	Cotton-wheat	10-15% higher seed rate, 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, 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 Plant protection measures.	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
		Sugarcane	Bajra	Drip/furrow irrigation, paired row planting, optimum plant spacing, planting on beds, straw mulching Laser land leveling, split application of fertilizer, application of organics, intercultural operation	-do-

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				Limited ground water use, prefer life saving irrigation Conjunctive use of brackish ground waters with canal waters Short duration cultivars. Adoption of plant protection measures 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	Upland Alluvial soils, tube well and canal irrigated	Rice-wheat	Cotton-wheat	10-15% higher seed rate, 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, 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, Plant protection measures.	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
		Sugarcane	Bajra	Drip/furrow irrigation, paired row planting, optimum plant spacing, planting on beds, straw mulching Laser land leveling, split application of fertilizer, application of organics, intercultural operation Limited ground water use, prefer life saving irrigation Conjunctive use of brackish ground waters with canal waters Short duration cultivars Adoption of plant protection measures Weed free environment	-do-

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	Drainage	-do-	-do-	-do-
Bajra	Planting on beds and drainage	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Sugarcane	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				
Give details crop wise	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				
Rice		Drainage	Drainage	Shifting to dry place
Wheat	Drainage, if stagnant water	-do-	-do-	-do-
Bajra	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Sugarcane	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-

Horticulture				
All crops	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 disease and false smut increases due to rains	Soak 10 kg of seed in 10 lt. water suspension of Emisan / Bavistin 10 gm +1 g Streptocycline for 24 hrs. before sowing. No recommendation at vegetative stage for BLB control	Follow recommended 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			
Sugarcane : Red rot becomes severe due to heavy rains	Use disease free setts treated with Emisan containing 6% mercury (Hg) for 4-5 min. or hot steam treated disease free setts			
Bajra : Downy mildew incidence increases	There is no control measure except resistant varieties			
Cotton : Bacterial leaf blight increases due to rainfall from traces to moderate intensity whereas cotton leaf curl virus decreases	Soak 5 -6 kg delimited and limited cotton seed in 10 lt. of water suspension containing 5 g Emisan + 1 gm Streptocycline			

	sulphate for 2 hrs. and 6-8 hrs respectively before sowing..			
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[o]**			
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	-do-	-do-	-do-	-do-
Sugarcane	-do-	-do-	-do-	-do-
Bajra	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Horticulture				
All crops	➢ 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				
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	Drainage	Drainage	-do-
Sugarcane	-do-	-do-	-do-	-do-
Bajra	-do-	-do-	-do-	-do-
Cotton	-do-	-do-	-do-	-do-
Horticulture				
All crops	➢ 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	-	
Sugarcane	-do-	-do-	Micro-sprinkler irrigation Avoid irrigation during hot hours With poor quality waters	
Cotton	-do-	-do-	-do-	
Bajra	-do-			
Horticulture				
Cold wave				
Wheat	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	
Vegetables	-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	
Horticulture				
Hailstorm				
Horticulture	Use of Anti-hail nets			
Cyclone	NA			

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. 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	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 *lucern* 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.

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
	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	Constitution of task force at district and sub division level which will formulate guidelines for action should have a mobile veterinary unit at their disposal. Procurement of mineral and feed supplements, life saving drugs, electrolytes, vaccines etc.	Disbursement of supplements, treatment of affected animals in camps, proper disposal of dead animals, deworming and vaccinations.	Rehabilitation of affected animals, provision of veterinary aid and follow up, provide supplements etc to make up losses for deficiencies.
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 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	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 crops like oats, barley, *kasni* and	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 introduced gradually.

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
	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.	*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.	
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 of Halogen Tablet prior to drinking by livestock and poultry.	Normal supply of water should be restored.
Health and disease	Constitution of task force at district and sub	Evacuate to safe places, provide veterinary	Rehabilitation of affected animals,

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
management	division level which will formulate guidelines for action. Procurement of mineral and feed supplements, life saving drugs, electrolytes, vaccines etc. Workout places for evacuation.	aid to affected animals, proper disposal of dead animals, disainfection of drinking water. If not already done, carry out deworming and vaccinations for HS, FMD, BQ in cattle, PPR, sheep pox, ET in sheep and goats, swine fever in pigs.	provision of veterinary aid and follow up, provide supplements etc. Disinfection of area, control of vectors, prevention of spread of disease/outbreaks. Treatment of affected animals.
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	Provision of shelter/roof/covered and open area to animals, procurement of life saving drugs and vaccines.	Cold waves: Cover the animal with old blanket/gunny bag etc. Heat wave: Sprinkle water/take buffaloes to ponds. Treat affected animals, vaccinate if not done earlier.	Treatment of affected animals, provide veterinary aid and follow up.

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 care must be taken to sensitize the farmers to protect their feed	Poultry farmers should be provided with sufficient amount of feed ingredients and complete feed during draught situation from the feed banks.	Normal feeding should be restored

	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.		
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	Constitution of task force at district and sub division level which will formulate guidelines for action should have a mobile veterinary unit at their disposal. Commercial poultry farms can procure grain/feed in advance.	In backyard birds, put some grains and sufficient water inside the enclosure, provide some vitamin supplement.	In backyard poultry, carry out deworming and vaccination for Ranikhet disease and Gumboro. Provide vitamins and mineral supplement.
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 farmer should be educated to make suitable cages from bamboos.	Sufficient quantity of feeds stored in the feed banks should be made available to the poultry farmers.	Normal feeding should be restored
Drinking water	I. Prior to the onset of monsoon tube wells should	All the affected poultry should have an	Normal drinking water restored

	be installed in the villages and near to the poultry farms so as to provide underground water during flood.	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.	
Health and disease management	Constitution of task force at district and sub division level which will formulate guidelines for action should have a mobile veterinary unit at their disposal. Make provision of shelter for evacuation and arrangement around farm so that flood water does not enter poultry farm/shed. Provision or facilities for disposal of dead birds.	Evacuate the birds to safer places. Carry out deworming and vaccinations. May dispose off/sell birds for meat purpose. Proper disposal of dead birds.	Make the shed dry, sprinkle lime and spray insecticides and disinfectant before placement of birds, use of coccidiostat in feed or water, and proper disposal of dead birds.
Cyclone	-NA-		
Shortage of feed ingredients			
Drinking water			
Health and disease management	Keep arrangements in place in shed for heating during winter/cold waves and for cooling by use of sprinklers/foggers. Procure electrolytes and supplements.	Avoid too much fluctuation below the temperature of 70 ºF and above 100 ºF. Use bukharies, gas burner, secure curtains during winter. Provide a course of antibiotics in feed or water for 3-5 days to combat respiratory problems. Provide vitamin C, electrolyte in drinking water during heat waves and use of foggers, wetting of curtains, sprinkling of water etc. during heat waves. May dispose off/sell birds if heavy mortality occurring.	Treatment of affected birds, vaccination if delayed may be carried out as per schedule.
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

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			
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	NA		
Inland	NA		
(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 restrict, escape of fishes from ponds	Netout and stock the fishes in one big tanks and make the bundh >6 feet height around the ponds.	Remove the bundh separately and release 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: Rainfall map