

State: HARYANA

Agriculture Contingency Plan: KARNAL

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	North Punjab plain, Ganga-Yamuna Doab and Rajasthan upland, hot, dry, semi-arid eco-subregion (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	
		29°41'22.27"N	76°18'13.18" E	257 m	
	Name and Address of the concerned ZRS/ZARS/RARS/RRTTS	CCSHAU, RRS, Uchani - 132 001			
Mention the KVK located in the district	KVK, Uchani, Karnal - 132 001				
1.2	Rainfall	Normal RF (mm)	Normal Rainy days (number)	Normal Onset (week and month)	Normal Cessation (week and month)
	SW monsoon (June-September):	598.8	25	1 st week of July	3 rd week of September
	NE Monsoon(October-December):	37.5	2	-	-
	Winter (January- February)	82.6	5		
	Summer (March - May)	40.6	2		
	Annual:	759.5	34		

* 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	Cultivable 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)	246	220	0.3	15	9	1	1	13	9	-

(Source: Statistical Abstract Haryana: 2007-08)

1.4	Major Soil types	Area ('000 ha)	Per cent (%) of total area
	Loamy soils	155	64
	Sandy loam soils	89	36

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %	
	Net sown area	220.1	175	
	Area sown more than once	0.2		
	Gross cropped area	385.4		
1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	197		
	Gross irrigated area	384		
	Rainfed area	23		
	Sources of Irrigation	Number	Area ('000 ha)	% area
	Canals		73	37
	Tanks	-	-	-
	Open wells	-	-	-

Bore wells	-	124	63
Lift irrigation	-	-	-
Other sources	-	-	-
Total	-	197	-
Pumpsets	65628		
Micro-irrigation			
Groundwater availability and use	No. of blocks	% area	Quality of water
Over exploited*	6	100	-
Critical	-	-	-
Semi- critical	-	-	-
Safe	-	-	-
Wastewater availability and use		-	-
Ground water quality	Alkaline in nature and moderately saline		

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

1.7 Area under major field crops & Horticulture (2008-09)

1.7	Major Field Crops cultivated	Area ('000 ha)*							
		Kharif			Rabi			Summer	Grand Total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Wheat	-	-		-	-	169	-	169
	Rice	-	-	168	-	-	-	-	168
	Sugarcane (Gur)	-	-	12.4	-	-	-	-	12.4
	Rapeseed & Mustard	-	-		-	-	0.7	-	0.7
		-	-		-	-		-	
	Horticulture crops - Fruits	Total area							
	Mango	0.6							
	Guava	0.6							

	Aonla	0.1
	Horticultural crops - Vegetables	Total area
	Tomato	3.6
	Cauliflower	2.4
	Radish	2.4
	Potato	2.4
	Medicinal and Aromatic crops	Total area
	Jatropha	0.03
	Ashwagandha	-
	Aloe vera	0.005
	Lemon grass+palmarosa	-
	Others	0.01
	Plantation crops	-
	Fodder crops	-
	Total fodder crop area	-
	Grazing land	-
	Sericulture etc	--
	Others (Specify)	-

1.8	Livestock (2008-09)	Male ('000)	Female ('000)	Total ('000)
	Cattle	-	-	125
	Buffaloes total	-	-	381
	Commercial dairy farms	-	-	-
	Goat	-	-	11
	Sheep	-	-	17
	Others (Camel, Pig, Yak etc)	-	-	21
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial	NA	4693	
	Backyard	NA	9	
1.10	Fisheries			
	A. Capture			

i) Marine (Data Source: Fisheries Dept.)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
		Mechnised	Non-mechnised	Mechnised (Trawl nets, Grill nets)	Non-mechnised (Shore seines, stake & trap nets)	
	-	-	-	-	-	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.)						
Others						

1.11 Production and Productivity of major crops (Average of 2006-07, 2007-08 & 2008-09)

1.11	Name of crop	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)
1	Wheat	-	-	739	4423	-	-	739	4423
2	Rice	533	3333	-	-	-	-	533	3333
3	Sugarcane (Gur)	87	7253	-	-	-	-	87	7253
4	Rapeseed & Mustard	-	-	1	1341	-	-	1	1341
	Others	-	-	-	-	-	-	-	-
	Major Horticultural crops								
1	Mango	6001						6001	
2	Guava	3147						3147	
3	Aomla	580						580	
	Major Vegetable crops								
1	Tomato			55495	15461			55495	15461
2	Cauliflower	53363	22271					53363	22271
3	Radish	38271	15900					38271	15900
4	Potato			44229	18560			44229	18560

(Source: Directorate of Extension Education, CCSHAU, Hisar)

1.12	Sowing window for 5 major crops (start and end of sowing period)	Wheat	Rice	Sugarcane	Rapeseed & Mustard
	Kharif- Rainfed				
	Kharif-Irrigated		15 May – 30 June	Mid February – End of March	
	Rabi- Rainfed				
	Rabi-Irrigated	October of end – 15 Nov			September end – 20 October

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 inundation	-	-	√
	Pests and diseases (specify)	-	√	-
	Others (Specify)	-	-	-

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 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 (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	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	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Upland Alluvial soils heavy textured, canal irrigated	Rice-wheat	No change	<ul style="list-style-type: none"> • Use 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, Adopt Short duration cultivars • Adoption of plant protection measures • Soaking of wheat seeds before sowing, seed treatment with biofertilizer , deep ploughing during <i>kharif</i> 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	<ul style="list-style-type: none"> • 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 organic manures • Intercultural operation and earthing up, Conjunctive use of brackish ground waters with canal waters • Short duration cultivars • Adoption of plant protection measures • Weed free environment 	-do-

Condition	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Upland Alluvial soils heavy textured, canal irrigated	Rice-wheat	No change	<ul style="list-style-type: none"> • Use 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, 	Seeds from State, national seed and private seed agencies. The schemes of NREGS, RKRY, NFSM, NHM are in operation.

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Straw mulching, Adopt short duration cultivars <ul style="list-style-type: none"> • Adoption of plant protection measures • Soaking of wheat seeds before sowing, seed treatment with biofertilizer , deep ploughing during <i>kharif</i> season • Shallow irrigation of 4-5 cm depth, weed free environment 	Govt. subsidy on sprinkler, drip irrigation systems and laser leveler.
		Sugarcane	No change	<ul style="list-style-type: none"> • 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 organic manures • Intercultural operation and earthing up, Conjunctive use of brackish ground waters with canal waters • Adopt 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
Lack of inflows into tanks due to insufficient /delayed onset of monsoon				NA	

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient	Upland	Rice-wheat	Maize-wheat	<ul style="list-style-type: none"> • Use 10-15% higher seed rate, sprinkler irrigation, planting 	Seeds from State, national

Condition	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
groundwater recharge due to low rainfall	Alluvial soils, tube well irrigated			<p>on beds, planting with ridger seeder, laser land leveling, conjunctive use of canal and ground waters.</p> <ul style="list-style-type: none"> • split application of fertilizer, application of organic manures, straw mulching • Limited ground water use, prefer life saving irrigation • Prefer short duration cultivars • Soaking of wheat seeds before sowing • Seed treatment with biofertilizer, deep ploughing during <i>kharif</i> season, shallow irrigation of 4-5 cm depth • Weed free environment • Plant protection measures. 	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	<ul style="list-style-type: none"> • 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 up • Limited ground water use, prefer life saving irrigation • Conjunctive use of brackish ground waters with canal waters • Prefer short duration cultivars • Adoption of plant protection measures • 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

2.2 Unusual rains (untimely, unseasonal etc)

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Rice		Drainage	Drainage	Shifting to dry place
Wheat	Planting on beds and drainage	-do-	-do-	-do-

Sugarcane	-do-	-do-	-do-	-do-
Vegetables	-do-	-do-	-do-	-do-
Rapeseed-mustard	Drainage, if depth of standing water is > 5-6 cm	Drainage	Drainage	Shifting to dry place
Horticulture				
All Crops	<ul style="list-style-type: none"> • No adverse effect • Removal of unwanted sprouts • Spray insecticides & pesticides to control the insect & pest • Drain out water excess water 	<ul style="list-style-type: none"> • Drain out the excess water to avoid flower and fruit drop • To control the fruit drop apply foliar application of nutrients and growth regulators. • Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits • Plough the field to increase the root aeration. 	Harvest the fruit crops timely and send to the market immediately.	<ul style="list-style-type: none"> • Apply fungicide to avoid post harvest diseases. • Proper covering of the produce. • Proper grading and cleaning of fruits immediately after harvest. • Use the damaged fruits for processing • Use water proof packaging
Heavy rainfall with high speed winds in a short span				
Rice	Drain stagnant water	Drainage	Drainage	Shifting to dry place
Wheat	-do-	-do-	-do-	-do-
Sugarcane	-do-	-do-	-do-	-do-
Vegetables	-do-	-do-	-do-	-do-
Rapeseed-mustard	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				
Crop1 (all crops)	Drain out excess water	<ul style="list-style-type: none"> • Drain out the excess water to avoid flower and fruit drop • To control the fruit drop apply foliar application of nutrients and growth regulators. 	Harvest the fruit crops timely and send to the market immediately.	<ul style="list-style-type: none"> • Apply fungicide to avoid post harvest diseases. • Proper covering of the produce. • Proper grading and

		<ul style="list-style-type: none"> • Apply insecticide & pesticides to control the insect & pest and diseases on young developing fruits • Plough the field to increase the root aeration. 		<p>cleaning of fruits immediately after harvest.</p> <ul style="list-style-type: none"> • Use the damaged fruits for processing • Use water proof packaging
Outbreak of pests and diseases due to unseasonal rains				
Rice	<p>Bacterial leaf blight, blast disease and false smut increases due to rains</p> <p>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</p>	Follow recommended control measures		
Wheat	<p>Yellow and brown rust of wheat become severe Powdery mildew intensity becomes low to moderate</p> <p>Karnal bunt increases</p> <p>Spray 600 – 800 gm Mancozeb 200 lt. of water/acre at the appearance of disease and repeat after 15-20 days</p> <p>For powdery mildew control spray 600-800 gm wettable sulphur/200 lt. of water/acre</p>			
Sugarcane	<p>Red rot becomes severe due to heavy rains</p> <p>Use disease free setts treated with Emisan containing 6% mercury (Hg) for 4-5 min. or hot steam treated disease free setts</p>			

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			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Rice	Drainage, if stagnant water	Drainage	Drainage	Shifting to dry place
Wheat	-do-	-do-	-do-	-do-
Sugarcane	-do-	-do-	-do-	-do-
Vegetables	-do-	-do-	-do-	-do-
Rapeseed-mustard	Drainage, if depth of standing water is > 5-6 cm	Drainage	Drainage	Shifting to dry place
Horticulture				
Crop1 (specify)	<ul style="list-style-type: none"> • 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
Crop2				
Crop3				
Continuous submergence for more than 2 days				
Rice	No adverse effect on crop	No adverse effect on crop	No adverse effect on crop	Shifting the produce to dry place
Wheat	Drainage, if stagnant water	Drainage	Drainage	-do-
Sugarcane	-do-	-do-	-do-	-do-
Vegetables	-do-	-do-	-do-	-do-
Rapeseed-mustard	Drainage, if depth of standing water is > 5-6 cm	-do-	-do-	-do-
Horticulture				

	<ul style="list-style-type: none"> ➤ 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	Micro- sprinkler irrigation avoid irrigation during hot hours with poor quality waters	Micro- sprinkler irrigation avoid irrigation during hot hours with poor quality waters	Micro-sprinkler irrigation Avoid irrigation during hot hours With poor quality waters	
Cold wave				
Wheat	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	
Rapeseed- mustard	-do-	-do-	-do-	
Horticulture				
Vegetables	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	Vegetables
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	
Rapeseed- mustard	Irrigation and proper nutrition	Irrigation and proper nutrition	Irrigation and proper nutrition	
Hailstorm				
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	<ol style="list-style-type: none"> 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. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods. 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. Increase the sown area under fodder crops 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. 	<ol style="list-style-type: none"> 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. Facilities like storing densified roughages transported from other districts should also be established adjacent to these camps. Complete feed blocks stored in the feed banks should be provided to productive, lactating and pregnant animals for scarcity periods Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly. 	<ol style="list-style-type: none"> Immediate efforts are needed to grow fodder crops like oats, barley, <i>kasni</i> and <i>lucern</i> etc. in the canal command areas. Farmers might have to be compensated for abandoning food or commercial cash crop to meet contingent fodder requirements.
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	Normal supply of water should be restored.

	Suggested contingency measures		
	Before the event	During the event	After the event
		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.	
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	<ol style="list-style-type: none"> 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. Complete feed blocks should be prepared and stored in the feed banks for scarcity periods 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. 	<ol style="list-style-type: none"> 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. Facilities like storing densified roughages transported from other parts of the country should also be established adjacent to these camps. Immediate efforts are needed to grow fodder crops like oats, barley, <i>kasni</i> and <i>lucern</i> etc. in the canal command areas. Farmers might have to be compensated for abandoning food or commercial cash crops to meet contingent fodder requirements. Since stall feeding adversely affects the breeding efficiency in case of sheep, therefore, sheep should always be resorted to natural grazing. 	<ol style="list-style-type: none"> Immediate efforts are needed to grow fodder crops like oats, barley, <i>kasni</i> and <i>lucern</i> etc. in the canal command areas. Farmers might have to be compensated for abandoning food or commercial cash crops to meet contingent fodder requirements. After the sheds have dried, these

	Suggested contingency measures		
	Before the event	During the event	After the event
	<p>4. The livestock holders of livestock are trained regarding shifting of animals before flooding. The farmers are instructed to let loose their animals instead of tying much before flood.</p> <p>5. Increase the sown area under fodder crops</p> <p>6. 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.</p>	<p>6. Special care is required for productive, lactating and pregnant animals. These animals must be supplemented with additional concentrates and fodders.</p> <p>7. Most of such animals will be retained by the farmers and arrangements for fodder, feed and drinking water should be made accordingly.</p>	<p>should be disinfected and regular feed of the animals should be introduced gradually.</p>
Drinking water	<p>Tube wells should be installed before monsoon to provide underground water to the livestock during flood period.</p>	<p>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.</p>	<p>Normal supply of water should be restored.</p>
Health and disease management	<p>Constitution of task force at district and sub division level which will formulate guidelines for action. Procurement of mineral and feed supplements, life saving drugs, electrolytes, vaccines etc. Workout places for evacuation.</p>	<p>Evacuate to safe places, provide veterinary aid to affected animals, proper disposal of dead animals, disinfection 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..</p>	<p>Rehabilitation of affected animals, 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.</p>
Cyclone	-NA-		
Heat wave and cold wave			
Shelter/environment management	<p>Necessary arrangement of tatties, gunny bags and tirpal should be made available so as to cover the sheds during heat and cold</p>	<p>1. Window of the sheds should be covered with gunny bags, tatties, and tirpal. Electric fans</p>	<p>Normal shelter should be restored</p>

	Suggested contingency measures		
	Before the event	During the event	After the event
	waves	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.	
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 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.	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
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	<p>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.</p> <p>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.</p>	Sufficient quantity of feeds stored in the feed banks should be made available to the poultry farmers.	Normal feeding should be restored
Drinking water	<p>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.</p>	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	<p>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.</p>	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-		
Heat wave and cold wave			
Shelter/environment	Necessary arrangement of tatties, gunny bags and tirpal should be made	1. Window of the sheds should be covered	Normal shelter

management	available so as to cover the sheds during heat and cold waves	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.	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.
(iii) Any other			
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/Bunds 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 bund >6 feet height around the ponds.	Remove the bund 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 KmNO_4 @ 10 ppm. Sale out the bigger fishes.	Treatment of KmNO_4 @ 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

