

State: BIHAR

Agriculture Contingency Plan for District: BEGUSARAI

1.0 District Agriculture profile			
1.1	Agro-Climatic/Ecological Zone		
	Agro Ecological Sub Region (ICAR)	Eastern Plain, Hot Subhumid (moist) Eco-sub region (13.1)	
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)	
	Agro Climatic Zone (NARP)	South Bihar Alluvial Plain Zone (BI-3) (59%), North East Alluvial Plain Zone (BI-2) (29.1%)	
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Begusarai, Saharsa, Supaul, Madhepura, Purnea , Kishanganj, Araria, Katihar	
	Geographic coordinates of district headquarters	Latitude	Longitude
		25 ⁰ 25' N	86 ⁰ 7' E
		Altitude	
		41.0 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ARI, Mithapur , Patna	
	Mention the KVK located in the district with address	KVK, Khodabandpur	
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	M.B. Agriculture College, Agwanpur, Saharsa	

1.2	Rainfall	Normal RF (mm)	Normal Rainy days	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	930	45	1 st week of June – 2 nd week of June	2 nd week of October- 3 rd week of October
	NE Monsoon(Oct-Dec)	58	1		
	Winter (Jan- Feb)	26	4		
	Summer (Mar-May)	55	9		

	Annual	1069	59		
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1.3	Land use pattern of the district	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	187.8	159.5	2.4	44.0	.01	10.1	3.5	18.0	6.0	22

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Sandy Soils	12.486	7.25
	Coarse Sandy Loam Soils	33.516	19.46
	Fine Sandy Loam Soils	65.484	38.02
	Clayey Soils	37.141	21.56
	Saline/ Calcareous Soils	23.587	13.69

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	117.2	137
	Area sown more than once	74.0	
	Gross cropped area	159.5	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	86.1		
	Gross irrigated area	91.1		
	Rainfed area			
	Sources of Irrigation	Number	Area ('ha)	Percentage of total irrigated area
	Canals		6,013	
	Tanks	230	0.9	
	Open wells		77,615	

	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)		84,611	
	Total Irrigated Area			
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe	17	100%	Arsenic- 0-0.4 ppm or 0-400 ppb
	Wastewater availability and use			
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Rice	-	-	-	-	-	-	-	-
	Wheat	-	-	-	-	-	-	-	-
	Maize	-	-	-	-	-	-	-	-
	Potato	-	-	-	-	-	-	-	-
	Sugarcane	-	-	-	-	-	-	-	-
	Horticulture crops - Fruits	Area ('000 ha)							
		Total			Irrigated			Rainfed	
	Banana	0.9							
	Mango	4.011							
	Gauva	0.508							
	Litchi	0.598							
	Lemon	0.404							
	Horticulture crops - Vegetables	Total			Irrigated			Rainfed	

	Potato	7.6		
	Onion	1.9		
	Tomato	1.8		
	Brinjal	2.6		
	Ladiesfinger	2.3		
	Medicinal and Aromatic crops			
	Plantation crops			
	Fodder crops			
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	14457	54259	68716
	Improved cattle			
	Crossbred cattle			
	Non descriptive Buffaloes (local low yielding)	26988	183681	210669
	Descript Buffaloes	10657	89956	100613
	Goat	43552	104354	147906
	Sheep	923	328	444
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			

1.9	Poultry	No. of farms	Total No. of birds ('000)
	Commercial		32527
	Backyard		68328

1.10	Fisheries (Data source: Chief Planning Officer)			
	A. Capture			
	i) Marine (Data Source: Fisheries)	No. of fishermen	Boats	Nets
				Storage facilities

Department)		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	(Ice plants etc.)
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
	80		230		150	

B. Culture			
	Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)
i) Brackish water (Data Source: MPEDA/ Fisheries Department)			
ii) Fresh water (Data Source: Fisheries Department)	1033.96	3.2/ ha	1537.560
Others			

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops identified based on total acreage)										
	Rice	35.8	2000					35.8	2000	
	Pigeonpea	2.9	1050					2.9	1050	
	Blackgram	0.7	610					0.7	610	
	Greengram	0.5	645					0.5	645	
	Sesame	0.07	710					0.07	710	
	Castor	0.2	850					0.2	850	
	Sunflower	0.1	900					0.1	900	

	Wheat			194.8	3000			194.8	3000	
	Sugarcane			134.3	78000			134.3	78000	
	Maize			14.8	2500			14.8	2500	
Major Horticultural crops (Crops identified based on total acreage)										
	Banana							41.8		
	Mango							37.4		
	Gauva							4.5		
	Litchi							4.2		
	Lemon							2.9		

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Maize	Wheat	Green gram	Pigeonpea
	Kharif- Rainfed	1 st week of June - 1 st week of July	July –September	-	-	1 st week of June – 2nd week of August
	Kharif-Irrigated	-	-	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	4 th week of October - 2 nd week of November	2 nd week of November - 4 th week of December	4 th week of October - 2 nd week of November	-

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		√	
	Flood		√	
	Cyclone			√
	Hail storm			√
	Heat wave		√	
	Cold wave		√	
	Frost		√	
	Sea water intrusion			√

	Pests and disease outbreak		√	
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1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

Annexure I

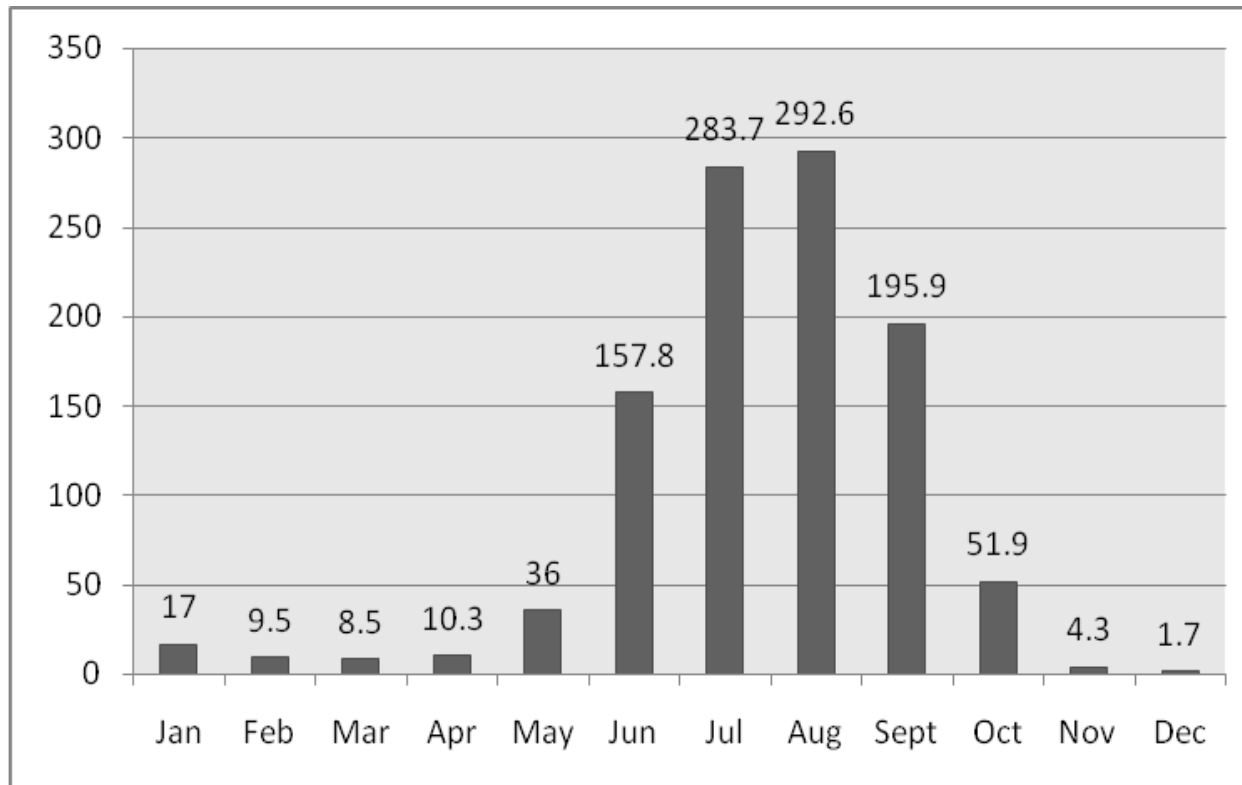
Agro climatic Zones of Bihar



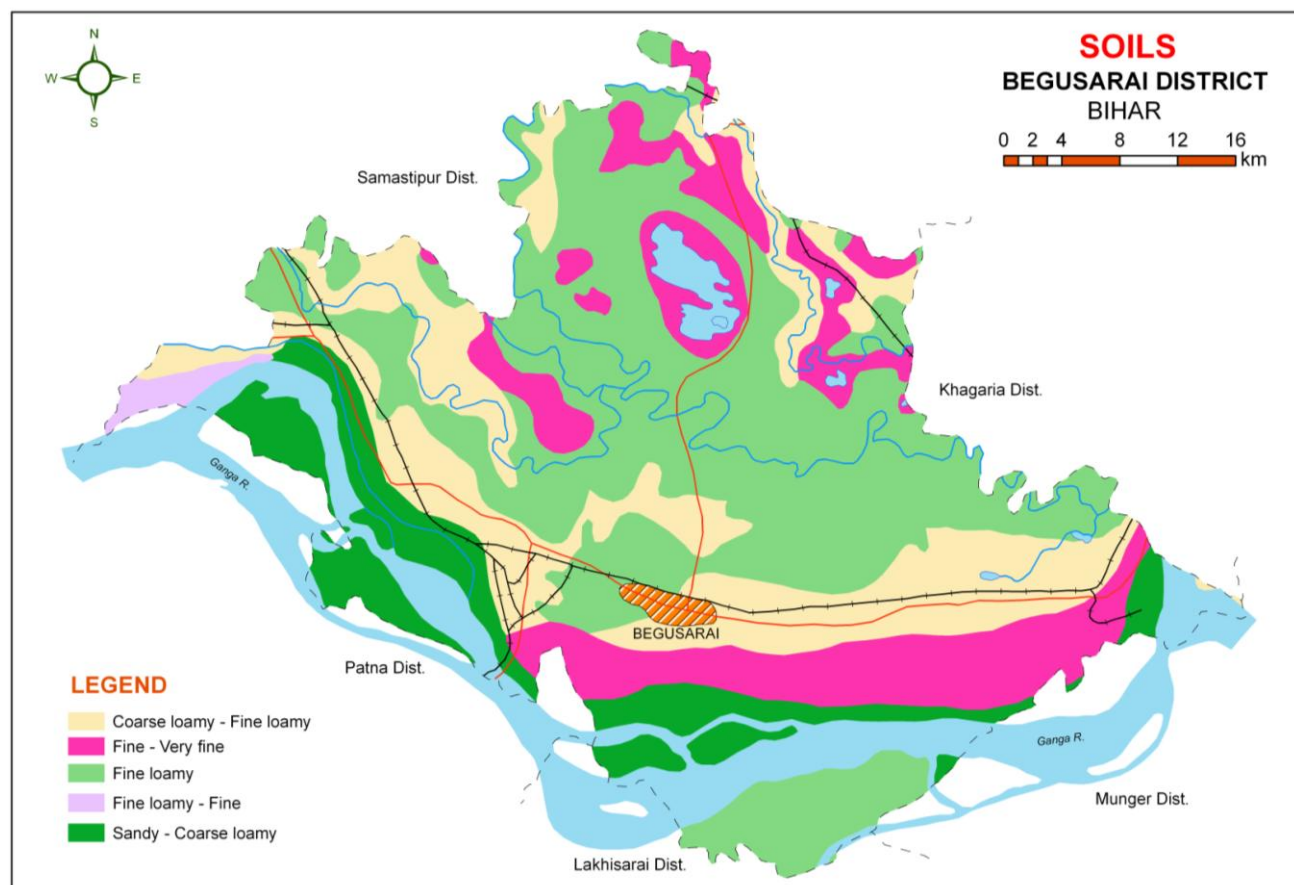
Source: krishi.bih.nic.in

Annexure-II

Mean annual rainfall (mm)



Annexure-III



Source : NBSS& LUP, Regional Centre, Kolkata

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rain fed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 2 weeks 4 th week of June	Very deep, Calcareous fine loamy soils	Rice –Wheat Rice-Rabi maize Maize-Rabi maize Maize-Wheat	Maize -Wheat Rice – wheat Rice- Wheat Maize-Rabi maize Short duration Rice – Wheat Rice -Prabhat, Richharia, Dhanlakxmi, Turanta Maize- Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Maka-3	<ul style="list-style-type: none"> • Normal Package of practices 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Medium land	Rice- Wheat	Rice-Wheat Rice Rajendra Bhagawati, Rajendra Suwasini, Saroj, Rajendra Kasturi, Santosh	<ul style="list-style-type: none"> • Normal package of Practices 	
	Lowland	Rice – Wheat	Rice – Wheat Rice- Rajshree, Santosh , Sita Rajendra Suwasni, Rajendra Sweta	<ul style="list-style-type: none"> • Normal package of Practices • Direct seeding of rice can be done, in case of dry conditions 	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 4 weeks 2 nd week of July	Very deep, Calcareous fine loamy soils Upland	Rice –Wheat Rice-Rabi maize Maize-Rabi maize Maize-Wheat	Soyabean – Wheat/Maize Vegetables-Wheat Maize-Rabi maize Pigeonpea+ Blackgram Sponge gourd- Wheat Blackgram- Wheat Rice- Prefer Medium to short duration varieties like Saroj (100-110d), Birsa Dhan-201 (100-115d) Pigeonpea – Bahar, Pusa-9 Narendra Pigeonpea-I Maize- Shaktiman-1,2,3,4, Suwan, Ganga-11, DeokiPusa early hybridMakka-3 Blackgram- T-9, Navin, Pant U 31 ,19	<ul style="list-style-type: none"> • Direct seeding of rice with medium duration drought tolerant varieties with pre emergence herbicide application under sufficient soil moisture conditions followed up with a post-emergence weedicide application 20-25 days later for effective weed management. • Interculture for timely weed control in direct seeded rice • Application of organic manure and vermicompost initially 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Mid land	Rice-Wheat	Mid duration Rice-Wheat Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Rajendra Bhagwati,	<ul style="list-style-type: none"> • Where field is moist, direct seeding of medium duration varieties (125 days) can be done during second fortnight of July in midlands. Post-emergence herbicide application use is essential 	
	Low land	Rice-Wheat	Rice - Wheat Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Sakuntala, Satyam, Kishori , Swarna sub-1, Masore, Rajshree	<ul style="list-style-type: none"> • Use mat nursery/ dapog nursery , mat nursery (dapog method) can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands • Raise staggered community nursery preferably with short duration 	

				varieties in mid and lowlands <ul style="list-style-type: none"> • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Para grass cultivation for fodder in low land • Timely interculture for weed control in direct seeded rice 	
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 6 weeks 4 th week of July	Very deep, Calcareous fine loamy soils Upland	Rice-Wheat	Rice (Short duration)-Wheat Blackgram / Finger millet-Wheat Rice- Prefer short (early matured) varieties like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi , Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d) Blackgram -, Pant U-31 ,19 Finger millet- RAU-7&8	<ul style="list-style-type: none"> • Direct sowing of rice • Moisture conservation measures through mulching • Transplanting 40-45 days old seedlings of medium duration varieties • Raise staggered community nursery preferably with short duration varieties in mid and lowlands • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Interculturing • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Medium land	Rice – Wheat	Rice (Short duration)-Wheat Maize-Rabi maize Rice (Short duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta Saroj		
	Lowland	Rice-Wheat-Greengram	Rice (short duration)-Wheat Rice- Lentil/Chickpea Rice- Mustard		

			<p>Rice (Short Duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj</p> <p>If dry spell continues, direct seeding of short duration rice varieties (100 days) can be done in midlands by first fortnight of August and extra short duration (70-75 days) up to 25th August</p>	<p>medium duration varieties by first fortnight of August</p> <ul style="list-style-type: none"> • Direct seedling of Rice • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands 	
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Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks 2 nd week of August	Very deep, Calcareous fine loamy soils Upland	Rice- Wheat Rice-Pulses Rice-Oilseeds Rice-Vegetables Rice-Potato	<p>Rice/ Blackgram/Finger millet - Rabi maize / -Sep. Pigeonpea / Late wheat/ Vegetables/ Lentil /Potato / Rai Maize-Rabi maize Rice- Prefer Early matured varieties like Turanta dhan (75d), Prabhat (90d), Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)</p> <p>Blackgram- Pant U-31 , 19</p>	<ul style="list-style-type: none"> • Moisture conservation • Inter cultivation Sowing of <i>rabi</i> crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Medium Land	Rice - Wheat Rice -Pulses Rice-Oilseeds Rice -Vegetables Rice -Potato	<p>Rice(Short duration)-Wheat/Lentil/Chickpea/Vegetables Maize-Rabi maize Rice Direct seeded rice (DSR) with short duration (80-90 days) varieties (Turanta dhan, Prabhat, Anjali, Vandana, CR-Dhan-40 etc.) can be taken up in midlands till the end of August subject to availability of at least one assured irrigation</p>	<ul style="list-style-type: none"> • Double transplanting of rice (karuhan) can be done with 30 + 45 days old seedlings of long duration or photosensitive varieties up to 30th August with close planting (40-45 hills per square meter) 	

			Early Rice-Prabhat, Dhanlaxmi, Richharia, Turanta	<ul style="list-style-type: none"> • Application of organic manure and vermi compost initially for Rice and other crops. • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts 	
	Low land	Rice-Wheat Rice-Oilseeds Rice-Vegetables Rice-Potato Rice-Lentil Rice-Chickpea	Rice(Short duration)-Wheat/Lentil/ Chickpea/Vegetables Blackgram- wheat Blackgram-Vegetables/ Blackgram- Lentil Rice- Prabhat, Dhanlaxmi, Richharia, Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta Blackgram-, Pant Urd-31 , 19		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Early season drought (Normal onset)					
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Very deep, Calcareous fine loamy soils Upland	Rice-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	<ul style="list-style-type: none"> • Life saving irrigation • Gap filling of existing crop • Thinning 	<ul style="list-style-type: none"> • Application of potash • Inter culturing • Mulching for moisture conservation • Conservation tillage 	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium land	Rice-Wheat Rice- Rajendra Bhagawati, Rajendra Suwasni Saroj, Rajendra Kasturi, Santosh	<ul style="list-style-type: none"> • Life saving irrigation • Gap filling through Dapog nursery • Weed management 	<ul style="list-style-type: none"> • Mulching 	

	Lowland	Rice-Wheat Rice- Rajshree, Sakuntala, Satyam, Kishori Rajendra Sweta Rajendra Mashuri			
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Very deep, Calcareous fine loamy soils Upland	Rice –Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Wheat- HD-2733, PBW-343, HP-1731	<ul style="list-style-type: none"> • Gap filling • Life saving Irrigation 	<ul style="list-style-type: none"> • Inter culturing • Mulching through weeds, • Conservation tillage • Life saving irrigation • Foliar spray (1%) MOP on the crops 	
		Maize-Wheat Maize- Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Macca-3			
	Mid land	Vegetables			
	Lowland	Rice-Wheat-Green gram Rice- Rajshree, Santosh, Sita, Rajendra Suwasni Rajendra Sweta			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell)					
At flowering/ fruiting stage	Up land	Vegetables-Wheat Rice-Wheat	-	<ul style="list-style-type: none"> • Interculturing • Mulching through weed • Life saving irrigation • Foliar spray (1%) MOP 	
		Maize – Wheat	<ul style="list-style-type: none"> • Life saving irrigation • Clipping of leaves in maize 		
	Medium land	Rice-Wheat	<ul style="list-style-type: none"> • IPM practices • Life saving irrigation 		
	Lowland	Rice-Wheat			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		Remarks on Implementation
			Crop management	Rabi Crop planning	
Terminal drought (Early withdrawal of monsoon)					
	Very deep, Calcareous fine loamy, coarse loamy soils	Vegetables	<ul style="list-style-type: none"> • Foliar spray (1%) MOP • Mulching • Harvest at physiological maturity 	Open the furrow during evening and leave furrow open overnight and planking in the next morning before sunrise for growing of early rabi crops	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium	Rice-Wheat Rice- Rajendra Bhagawati, Rajendra Suwasni, Saroj, Rajendra Kasturi, Santosh			
	Low	Rice- Wheat Rice- Rajshree, Sakuntala,			

		Satyam, Kishori Rajendra Sweta Rajendra Mashuri			
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2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Not Applicable				
Limited release of water in canals due to low rainfall					
Non release of water in canals under delayed onset of monsoon in catchment					

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Upland	Rice-Wheat	Short duration rice-Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta	<ul style="list-style-type: none"> • Dapog nursery • Mulching for moisture conservation • Foliar spray (1%) with MOP in standing crops 	Seeds from BRBN, RAU, Pusa, NSC, TDC
		Maize –Wheat	Maize- Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Macca-3	-	
	Medium land	Rice-Wheat	Medium duration Rice -Wheat Rice- Rajendra Bhagawati, Rajendra Suwasni Saroj, Rajendra Kasturi, Santosh	<ul style="list-style-type: none"> • Foliar spray (1%) with MOP in standing crops • Application of organic manure and vermicompost initially • Mulching • Life saving irrigation 	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
			Wheat- HD-2733, PBW-343, HP-1731, HD-2824 Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I Blackgram- T-9, Navin, Pant Blackgram-30 , Pant Blackgram-19		

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

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	<ul style="list-style-type: none"> • Drainage management • Gap filling, if required • Resowing through drum seeder • Re transplanting through Dapog nursery if needed 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop like Toria may be taken if present crop is substantially damaged/affected 	<ul style="list-style-type: none"> • Drainage management • Harvest at physiological maturity 	<ul style="list-style-type: none"> • Proper drying • Safer storage and Transportation
Maize	<ul style="list-style-type: none"> • Drainage management • Gap filling, if needed • Resowing, if sequentially affected • Sowing of R&F should be adopted 	<ul style="list-style-type: none"> • Drainage management • Alternative Rabi maize or other rabi crop if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Harvest at physiological maturity 	<ul style="list-style-type: none"> • Proper drying • Safer storage and Transportation
Pigeonpea	<ul style="list-style-type: none"> • Drainage management • Gap filling if needed • September sowing of pigeonpea if Kharif pigeonpea is completely affected • Sowing of R&F should be 	<ul style="list-style-type: none"> • Drainage management • 		<ul style="list-style-type: none"> • Proper drying • Safer storage and Transportation

	adopted			
Vegetables	<ul style="list-style-type: none"> • Resowing , if required • Replanting 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Drainage management • Gap filling • Replanting if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Spray of pesticides 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management 	
Litchi	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting ❖ Gap filling 	<ul style="list-style-type: none"> ❖ Drainage management 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	
Banana	<ul style="list-style-type: none"> • Drainage management • Gap filling • Replanting if completely damaged 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	
Papaya	<ul style="list-style-type: none"> ❖ Drainage management ❖ Gap filling ❖ Replanting 	<ul style="list-style-type: none"> ❖ Pesticides spray ❖ Drainage management 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	
Heavy rainfall with high speed winds in a short span²				
Rice	<ul style="list-style-type: none"> ❖ Drainage management ❖ Gap filling ❖ Replanting with Dapog seedling ❖ Kharuhan (double transplanting) 	<ul style="list-style-type: none"> ❖ Pesticides spray ❖ Drainage management ❖ Alternative crop if completely failed 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	<ul style="list-style-type: none"> ❖ Proper drying ❖ Safer storage and Transportation
Maize	<ul style="list-style-type: none"> ❖ Drainage management ❖ Gap filling ❖ Replanting ❖ Earthing up 	<ul style="list-style-type: none"> ❖ Pesticides spray ❖ Drainage management ❖ Alternative crop if completely failed 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	<ul style="list-style-type: none"> ❖ Proper drying ❖ Safer storage and Transportation
Pigeonpea	<ul style="list-style-type: none"> ❖ Drainage management ❖ Gap filling ❖ Resowing 	<ul style="list-style-type: none"> ❖ Pesticides spray ❖ Drainage management ❖ Alternative crop if completely failed 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	<ul style="list-style-type: none"> ❖ Proper drying ❖ Safer storage and Transportation

Horticulture				
Mango	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting or Gap filling as the case may be 	<ul style="list-style-type: none"> ❖ Pesticides spray ❖ Drainage management 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	
Litchi	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting or Gap filling as the case may be 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Pesticides spray 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	
Banana	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting or Gap filling as the case may be 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Pesticides spray 	<ul style="list-style-type: none"> Drainage management Harvest at proper time 	
Papaya	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting or gap filling as the case may be 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Pesticides spray 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Harvest at proper time 	
Outbreak of pests and diseases due to unseasonal rains				
Rice	<ul style="list-style-type: none"> ❖ Seedling treatment with granular insecticide – Cartap hydrochloride or phorate 10G or carbofuran 3G. <ul style="list-style-type: none"> ❖ Maintain shallow water in nursery beds ❖ Providing good drainage. 	<ul style="list-style-type: none"> ❖ Use copper fungicides against Bacterial leaf blight. ❖ Split application of N fertilizer (3-4 times) 	<ul style="list-style-type: none"> ❖ Harvest at physiological maturity 	Proper drying and safe storage
Maize	<ul style="list-style-type: none"> ❖ Drainage, and yellowing mainly due to nitrogen deficiency apply N split doses ❖ Application of granular insecticides viz. Thimet 10g, or Carbofuran 3g. in whorl of maize 	<ul style="list-style-type: none"> ❖ Foliar blight control through Mancozeb @ 2.5g/l or Zineb/ Maneb @ 2.5-4 g/lit of water (2-4 applications at 8-10 days interval) 	<ul style="list-style-type: none"> ❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity 	<ul style="list-style-type: none"> ❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper drying

Pigeonpea	<ul style="list-style-type: none"> ❖ Provide drainage ❖ Seed treatment with 1 g carbendizim +2g thiram/kg seed. 	Provide drainage	Provide drainage	<ul style="list-style-type: none"> ❖ Proper drying • Storage at safe place and transportation
Black gram & Greengram	<ul style="list-style-type: none"> ❖ Drain off water to avoid diseases 	<ul style="list-style-type: none"> ❖ Field drainage to avoid diseases ❖ Application of Mancozeb @ 2 kg with 1000 lit water per ha or carbendizim @ 0.05% at first notice of the disease and subsequent sprays may be applied at 10-15 days interval to control the leaf spots. 	<ul style="list-style-type: none"> ❖ Drain off water and harvest the crop 	<ul style="list-style-type: none"> ❖ Storage in safer places like warehouse/tent houses
Horticulture				
Vegetables	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	

Mango	<p>Anthracnose:- The foliar infection can be controlled by spraying of copper oxychloride (0.3%)</p> <p>Use bio control agent viz <i>Streptosporangium pseudovulgare</i></p> <p>Bacterial canker: Regular inspection of orchards, sanitation and seedling certification are recommended as preventive measures. Mango stones for raising seedlings (root stock) should always be taken from healthy fruits. Use of wind-breaks helps in reducing brushing/ wounding and thus reduces the chance of infection.</p>	<p>Anthracnose:- Apply Carbendazim/ Thiophanate methyl (1g/lit) to control of Anthracnose. Blossom infection can be controlled effectively by spraying of Bavistin (0.1%) at 15 days interval.</p> <p>Mango powdery mildew: Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December</p>	<p>Mango powdery mildew: Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculum load.</p> <p>Spray wettable sulphur (0.2%) when panicles are 3-4" in size</p> <p>Spray dinocap (0.1%) 15-20 days after first spray. Spray tridemorph (0.1%) 15-20 days after second spray.</p> <p>Spraying at full bloom needs to be avoided.</p> <p>Mango bacterial canker: Three sprays of Streptocycline (200 ppm) at 10 days intervals reduce fruit infection.</p> <p>In severe infection, spraying of Streptocycline (300 ppm) or copper oxychloride (0.3%) is more effective.</p>	
Litchi	<p>Fruit Fly: Monitor adult fruit flies emergence by using methyl eugenol or sex pheromone traps.</p>	<p>Fruit Fly: First Spray delta menthrin 0.0025% plus molasses 0.1% . after 10-12 days spray fenthion 0.05% + molasses 0.1% followed by dimethoate 0.045% + molasses 0.1% if required</p>	Harvest at proper time	<p>Fruit Fly: Collect all fallen infested fruits and put in a drum covered with fine wire mesh. Harvest fully matured fruits one week earlier to escape egg laying</p>
Banana			Harvest at proper time	
Papaya			Harvest at proper time	

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Rice	<ul style="list-style-type: none"> • Drainage management • Resowing, if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Gap filling • Transplanting using 40-45 days old seedling • Double transplanting through Kharuan 	Lentil as paira crop	<ul style="list-style-type: none"> • Proper drying • Safer storage • Transportation
Maize	<ul style="list-style-type: none"> • Drainage management • Replanting , if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Resowing if completely damaged • Toria if standing crop damaged 	Lentil if standing crop damaged	<ul style="list-style-type: none"> • Proper drying • Safer storage • Transportation
Pigeon pea	<ul style="list-style-type: none"> • Drainage management Resowing, if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Rabi Maize if standing crop damaged 	Spring maize Var. Suwan if crop is substantially damaged	<ul style="list-style-type: none"> • Proper drying • Safer storage • Transportation
Horticulture				
Vegetable	<ul style="list-style-type: none"> • Resowing • Drainage management • Replanting, if substantially damaged 	<ul style="list-style-type: none"> • Drainage management 	-	<ul style="list-style-type: none"> • Safer storage and Transportation
Mango	<ul style="list-style-type: none"> • Drainage management • Gap filling • Replanting, if substantially damaged 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Drenching with copper fungicide 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Drenching with copper fungicide ❖ Harvest at proper time 	
Litchi	<ul style="list-style-type: none"> • Drainage management • Gap filling • Replanting, if substantially 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicide 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicide 	

	damaged		<ul style="list-style-type: none"> Harvest at proper time 	
Guava	<ul style="list-style-type: none"> Drainage management Gap filling Replanting, if substantially damaged 	<ul style="list-style-type: none"> Drainage management Drenching with copper fungicide 	<ul style="list-style-type: none"> Drainage management Drenching with copper fungicide Harvest at proper time 	
Continuous submergence for more than 2 days²				
Rice	Re-sowing, if damaged after receding of floods	Re-sowing, gap filling	Toria/late wheat, if substantial damaged	Storage at safe place
Maize	Re-sowing, if damaged after receding of floods	Re-sowing, gap filling	Toria/late wheat, if substantial damaged	Storage at safe place
Pigeonpea	Re-sowing, if damaged after receding of floods	Re-sowing, gap filling	Rabi maize/Summer maize, if substantial damaged	Storage at safe place
Horticulture				
Mango	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting if damaged 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Replanting 	<ul style="list-style-type: none"> ❖ Drainage management ❖ 	
Litchi	<ul style="list-style-type: none"> ❖ Drainage management ❖ Use of fungicide with the use of nitrogenous fertilizer and manure ❖ Replanting if damaged 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Use of fungicide with the use of nitrogenous fertilizer and manure ❖ Replanting 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Use of fungicide with the use of nitrogenous fertilizer and manure 	
Guava	<ul style="list-style-type: none"> ❖ Drainage management ❖ Use of fungicide with the use of nitrogenous fertilizer and manure ❖ Replanting 	<ul style="list-style-type: none"> ❖ Drainage management ❖ Use of fungicide with the use of nitrogenous fertilizer and manure ❖ Replanting 	<ul style="list-style-type: none"> ❖ Drainage management • Use of fungicide with the use of nitrogenous fertilizer and manure 	
Sea water intrusion	Not applicable			

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

Extreme event type	Suggested contingency measure ^r			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Maize, Pigeonpea, Wheat	Life saving irrigation	Life saving irrigation	Life saving irrigation	-
Horticulture				
Mango, Litchi, Papaya	Life saving irrigation	Life saving irrigation	Life saving irrigation	-
Cold wave				
Wheat, Chickpea, Pigeonpea, Lentil	-	Provide light irrigation, Mulching Smoke generation to generate heat	Mulching Smoke generation to generate heat	-
Horticulture				
Okra, Brinjal, Chili, Tomato, Bottle gourd		Light irrigation, Mulching		
Frost				
Wheat, Chickpea, Pigeonpea, Lentil		Light irrigation, Mulching		
Horticulture				
Okra		Light irrigation, Mulching		
Brinjal		Light irrigation, Mulching		
Chilli		Light irrigation, Mulching		
Tomato & Potato		Earth up to 15cm ht. Light irrigation, Mulching		Harvest in dry weather
Cyclone	Not applicable			

2.5.1 Livestock

	Suggested contingency measures		
	Before the event ^s	During the event	After the event
Drought			
Floods			
Feed and fodder availability	<ol style="list-style-type: none"> 1. Advance planning for cultivation of fodder tree 2. Storage of Improved Quality Fodder 3. Conservation & Storage of Feed & Fodder <ul style="list-style-type: none"> • Hay & Silage: — Preserve the fodder in the form of hay from Berseem & other grasses as well as silage from <ol style="list-style-type: none"> (a) Maize- harvesting at well developed cob. (b) Jowar - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hycianth mixing with Rice straw in ratio of 4:1 with 70 kg molasses /ton of clean water hycianth. (f) Potato leaves mixing with wheat straw in ratio of 7:1 and should be supplemented with 3% molasses. Hay: – <ul style="list-style-type: none"> • Berseem/Lucerne and other grasses. • Bales of hay and other dry fodder should be stored in dry places at a height of last flood level and covered with asbestos sheet or polythene sheet. 4. Development & storage of: – <ol style="list-style-type: none"> (a) Complete Feed Block (CFB) (b) Urea-Molasses-Mineral-Block (U.M.M.B) 5. Development of Fodder Bank 	<ol style="list-style-type: none"> 1. Feeding of Complete Feed Block 2. Feeding of Urea-Molasses-Mineral-Block & Fodder 3. Feeding of stored Hay/Silage/Improved Quality Fodder 4. Feeding of Tree leaves some of which are as follows: <ol style="list-style-type: none"> 1. Bamboo leaves 2. Neem 3. Bargad 4. Peepal 5. Seesam 6. Subabul <p>Use of unconventional feed stuff:</p> <ol style="list-style-type: none"> (i) Aquatic Plants – water hycianth (i) Lotus (ii) Aquatic weeds 	<p>Production of forage crops</p> <ol style="list-style-type: none"> 1. Balanced feeding of Animal supported with little higher concentrate mixture 2. Cultivation of fodder Rabi maize if water stagnated upto Nov/ December 3. Jowar/Cowpea 4. Maize in September
Drinking water			
Health and disease management	Veterinary Preparedness with Medicines,	Animal safety, Health camp and Treatment	treatment, health camps Culling of

	<p>Vaccines and provision for mobile ambulatory van.</p> <ul style="list-style-type: none"> • Vaccination <p>During flood stress becomes an incriminating factor for the precipitation of diseases in livestock and poultry.</p> <p>So, necessary vaccination of livestock and poultry should be done against economically important contagious disease. This will be helpful not only to check epidemic in animals, but also to reduce the probability of zoonoses in human beings.</p> <p>Care should be taken for mass vaccination of livestock and poultry with a view to covering 80% of livestock population in order to achieve herd immunity.</p> <p>Mass vaccination should be conducted by a team of Department staff with proper maintenance of detailed Inoculation Register.</p> <p>Pro-active steps should be taken to receive and stock the required doses of vaccines against different diseases for their use in face of Flood.</p>	<p>Important Suggestions for animal and Poultry safety</p> <p>During flood, all efforts should be made to rescue most of the livestock and poultry as carefully as possible.</p> <p>The people should be made conscious through announcement with the help of mikes or other means of communication, so that they may escape with their livestock and poultry to safe area.</p> <p>The fisherman or the people who knows swimming should be deputed for the rescue of drowning and floating animals and birds.</p> <p>During flood do not leave halter or headstalls on animals.</p> <p>Do not tie animals together when releasing.</p> <p>Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.</p> <p>Health camp and treatment</p> <p>Water borne diseases are one of the most common phenomena during the flood Diarrhoeal diseases outbreaks can Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.</p> <p>Health camp and treatment</p> <p>Water borne diseases are one of the most</p>	<p>Sick animals and disposal of carcass</p> <p>Maintenance of Sanitation: Adequate attention is to be paid to disinfect the premises of temporary sheds with the help of bleaching powder, phenol, carbolic acid etc. In no case the carcass/ cadaver should come in contact with healthy animals rehabilitated in sheds. Arrangements should be made accordingly.</p> <p>De-worming after the flood: Immediately after flood, the animals like cattle, buffalo. Sheep, goat, pig, dog and poultry need to be de-wormed with suitable broad spectrum anthelmintics. This will enable the animals to regain proper health.</p> <p>In water logged area, snails can be introduced as biological control measures against snails to protect livestock from parasite disease.</p> <p>Treatment of sick animals: The Disposal of Carcass: the disposal of dead animals and birds are to be done</p>
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		<p>common phenomena during the flood</p> <p>Diarrhoeal diseases outbreaks can occur after drinking contaminated water.</p> <p>Diseases that can occur during flood should be given special attention and accordingly medicines should be available in the health camp for the following mentioned diseases.</p> <p>Salmonella spp. Escherichia coli Giardiasis Amoebiasis Rotavirus Leptospirosis Scabies Black leg Malignant Edema Foot rot Anthrax Botulism Tetanus Red water Black disease Entertoxemia Liver fluke Amphistomiasis Brooders pneumonia</p> <p>Treatment of Non infectious Arrangement should be made for the treatment of drowning and traumatic injuries, aspiration pneumonia, lameness and other surgical cases in the health camp.</p> <p>Disinfection of livestock premises and Poultry shed</p>	<p>by Animal Husbandry Department. Accordingly, necessary arrangement should be made for prompt and easy disposal of carcasses during the Flood and Post-Flood period.</p> <p>Carcasses of animals affected by the disease are the chief source of soil infection. They harbour the germs in large numbers and liberate them from both artificial and natural body openings into the surrounding soil.</p> <p>Methods of Carcass disposal to be adopted</p> <p>Burial</p> <p>Burning</p> <p>Composting</p> <p>Vulturing</p> <p>s. Health Camp after the flood:</p> <p>Protection of livestock from out breaking and communicable diseases be made. Health camps are to be organised in Flood affected areas to</p>
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		Disinfection of livestock premises and the temporary sheds should be done with the help of bleaching powder, phenol, carbolic acid etc	restore the normal breeding capability of breedable population as well as to restore the normal health of livestock and poultry.
Cyclone			
Heat wave and cold wave	Adequate and suitable measures for safety of animal lifes		

^s based on forewarning wherever available

2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event ^a	During the event	After the event	
Drought				
Floods				
Shortage of feed ingredients				
Drinking water				
Health and disease management	Vaccines to be used for different animals and Poultry Cattle and Buffalo Hemorrhagic Septicemia Vaccine Black Quarter Vaccine FMD Vaccine Anthrax Vaccine as per endemicity. Sheep and Goat Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine			

	<p>Enterotoxemia Vaccine Anthrax Vaccine as per endemicity Pigs Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity.</p> <p style="text-align: center;">Dogs</p> <p>Rabies Vaccine</p> <p style="text-align: center;">Poultry</p> <p>Mareks disease vaccine RDV (F₁ & R₂B), FPV, IBRV & IBDV (Annexure-1)</p> <ul style="list-style-type: none"> • Medicines <p>All Districts should be earmarked for flood.</p> <p>An inventory of required medicines to treat the affected livestock in case of eventualities should be made.</p> <p>The Govt. should take steps to procure sufficient quantity of essential life saving medicines. List of life saving Medicines Corticosteroids Nikethamide Antibloat Adrenaline Antihistaminic Antidotes for common poisoning Antisnake venom</p>			
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	<p>Broad spectrum antibiotics Anti-inflammatory Antipyretic and Analgesics Fluids and Electrolytes</p> <ul style="list-style-type: none"> • Mobile Veterinary Clinics <p>Mobile Veterinary Clinics should be kept ready at Veterinary Hospital or Veterinary Camps so that immediate treatment of injured and affected animals may be done.</p> <p>For this MVC must have adequate drugs like antibiotic, analgesic, dewormer, ointment, antsnake venom and emergency health care facilities along with trained personnel.</p> <p>A good no. of mobile clinic teams should be planned consisting dedicated and experienced technical workers with allotment of area of operation.</p> <p>The teams should be kept in readiness having required stock of medicines and equipment to work in any adverse situation.</p> <p>A telephone directory should be maintained at the District level by collecting the telephone nos. of Vets, Para-Vets, NGOs / youth clubs / societies, volunteers etc. to collect feedback and plan the activities during the emergency.</p> <p>An emergency kit for poultry should be made ready well in advance. The Poultry kit should have Cage, mask, mash, pellet feed trough, waterers, detergents, poultry</p>			
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	vaccines, Veterinary drugs, workers protection uniform etc.			
Cyclone				
Heat wave and cold wave				

^a based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
1) Drought			
A. Capture			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	(i) Thinning of population (ii) Arrangement of water supply from external resource	(i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes	(i) Maintenances of remaining stock till favorable condition achieved (ii) If not feasible, total harvesting or transfer of fishes may be done. (iii) Preparation of the pond for next crop.
(ii) Impact of salt load build up in ponds / change in water quality	(i) Regular monitoring of water quality parameter. (ii) Arrangement of aeration (iii) Addition of water from external resource	(i) Arrangement of aeration. (ii) Addition of water (iii) Monitoring of water quality (iv) Reduction of manuring according to water level.	
2) Floods			
A. Capture			
B. Aquaculture			
(i) Inundation with flood water	(i) Elevation/ Renovation of pond dyke.	Collection of naturally bred seeds	-Retain the water in pond immediately

	(ii) Sale of Table/marketable size fishes (iii) construction of earthen nursery ponds in upland areas	(Spawn /fry /fingerling) from flooded water Stocking in nursery ponds for rearing	after flood through repairing of damaged dyke etc. -Netting of pond -Removal of unwanted, predatory/weed fishes -Sell of large size fishes
(ii) Water contamination and changes in water quality	Arrangement of regular water quality monitoring		
(iii) Health and diseases	(a) Use lime/ potassium permanganate (b) Arrangement of CIFAX and medicines & chemical stock		-Sampling of fishes and water for disease analysis - Liming, use of drugs/ medicine if required in consultancy of fisheries experts
(iv) Loss of stock and inputs (feed, chemicals etc)	Raising the height of dyke by fencing with net and bamboo poles to prevent loss of stock	Arrangement of advance size fingerling/ yearlings for stocking	Stocking of large size fingerlings carp Fertilization of pond and regular feeding of fish Harvesting and sale of fish
(v) Infrastructure damage (pumps, aerators, huts etc)	Repairing/ arrangement of alternate safe place to keep pumps aerators etc.	A regular water on the flood and infrastructure facilities.	Re establishment of the infra structural facility.
3. Cyclone / Tsunami			
4. Heat wave and cold wave			

^a based on forewarning wherever available