

State: BIHAR

Agriculture Contingency Plan for District: BHOJPUR

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Northern Plain, Hot Subhumid (Dry) Eco-sub region (9.2)		
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climatic Zone (NARP)	South Bihar Alluvial Plain Zone (BI-3)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Aurangabad, Gaya, Jahanabad, Patna, Arwal, Rohtas, Nalanda, Bhojpur, Buxar, Bhabhua, Nawada		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		25° 15'N – 25° 46'N	85° 45'E – 85° 15' E	195.98 m MLS
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agriculture Research Institute-Mithapur Patna		
	Mention the KVK located in the district with address	PC,Krishi Vigyan Kendra, Sone Command Area, Japanese Farm, Katira Arrah-802301 Bhojpur		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	ICAR-RCER (Research Center for Eastern Region) Patna, Bihar.		

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	906	51	2 nd week of June	2 nd week of October
	NE Monsoon(Oct-Dec)	58	4		
	Winter (Jan- March)	28	6	-	-
	Summer (Apr-May)	36	4	-	-

	Annual	1028	65		
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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)	233.7	185.1	0	31.9	0.2	5.01	0.7	0.7	14.1	4.1

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Sandy Soils	2.112	1.05
	Coarse Sandy Loam Soils	6.886	3.45
	Fine Sandy Loam Soils	43.444	21.75
	Clayey Soils	135.022	67.62
	Saline/ Calcareous Soils	12.210	6.11

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	175.1	141.83 %
	Area sown more than once	73.2	
	Gross cropped area	248.3	

1.6	Irrigation	Area ('000 ha)
	Net irrigated area	100.4
	Gross irrigated area	169.1
	Rainfed area	74.7

Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
Canals		72.952, 29.7/ Rabi	60.6
Tanks			
Open wells / State Tube well	63	0.454 , 0.526 Rabi	0.5
Bore wells/ Private Tube well	18901	24.478, 36.717 Rabi	36.1
Lift irrigation schemes	29	0.838 , 0.153 Rabi	0.5
Micro-irrigation			
Other sources (please specify)		1.685 , 1.685 Rabi	1.9
Total Irrigated Area		100.407 , 68.781 Rabi	
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			
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	-	-	82.3	-	-	-	-	82.3
	Maize	-	-	4	-	-	2.295	0.03	6.3

	Redgram	-	-	3.5	-	-	-	-	3.5
	Blackgram	-	-	1.0	-	-	-	-	1.0
	Greengram	-	-	1.08	-	-	-	0.02	1.1
	Wheat	-	-	-	-	-	80.5	-	
	Chickpea						20.5		20.5
	Lentil						12.0		12.0
	Pea						14.7		14.7
	Other Pulses						4.5		4.5
	Sesame			0.21					0.2
	Castor			0.28					0.2
	Sunflower			0.02					0.02
	Mustard						10.1		10.1
	Horticulture crops - Fruits	Area ('000 ha)							
		Total			Irrigated			Rainfed	
	Horticulture crops - Vegetables	Total			Irrigated			Rainfed	
	Potato	5.2							
	Onion	0.1							
	Vegetables	3.1							

	Total	6.8		
	Medicinal and Aromatic crops			
	Fenungreek	0.2		
	Others (Safed Musali, Kaal Megh, Aspragas, Ocimum)	0.05		
	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)	44	85	129
	Improved cattle			
	Crossbred cattle	5.2	33.2	38.5
	Non descriptive Buffaloes (local low yielding)	10	156	167
	Descript Buffaloes			
	Goat			134.1
	Sheep			43.6

	Others (Camel, Pig, Yak etc.)			17.1
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial		215.4	
	Backyard			

1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		875		174		701	
	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)		1242.4	3.2	2854.6		

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue
		Production	Productivity	Production	Productivity	Production	Productivity	Production	Productivity	

		('000 t)	(kg/ha)	('000 t)	(kg/ha)	('000 t)	(kg/ha)	('000 t)	(kg/ha)	as fodder (‘000 tons)
Major Field crops (Crops identified based on total acreage)										
Rice		155.3	1885					155.3	1885	
Maize								11.3	2088	
Pigeonpea		2.04	1114					2.04	1114	
Wheat				281.6	3499			281.6	3499	
Chickpea				22.2	1265			22.2	1265	
Lentil				15.1	1026			15.1	1026	
Mustard				12.9	1272			12.9	1272	
Major Horticultural crops (Crops identified based on total acreage)										
Potato				85.8	16500			85.8	16500	
Onion						1.9	15850	1.9	15850	

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Wheat	Maize	Lentil	Potato
	Khariif- Rainfed	-	-	1 st week of June to 3 rd week of June	-	-
	Khariif-Irrigated	3 rd week of June – 4 th week of July	-	-	-	-
	Rabi- Rainfed	-	-	-	2 nd week of October - 2 nd week of	-

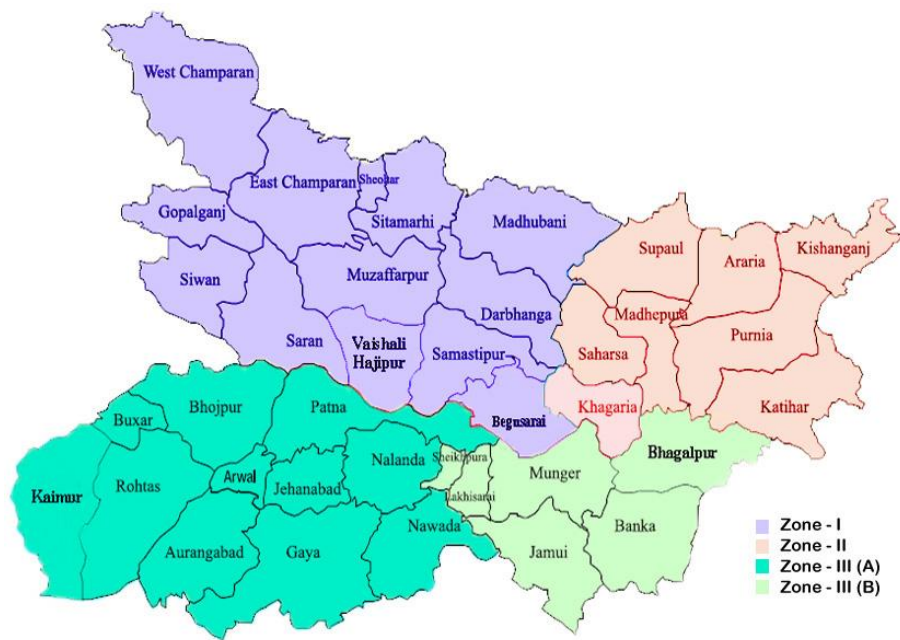
					November	
	Rabi-Irrigated	-	2 nd week of November- 4 th week of December	3 rd week of October - 2 nd week of November	2 nd week of October – 2 nd week of Nov.	3 rd week of October - 2 nd week of November

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	√		

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

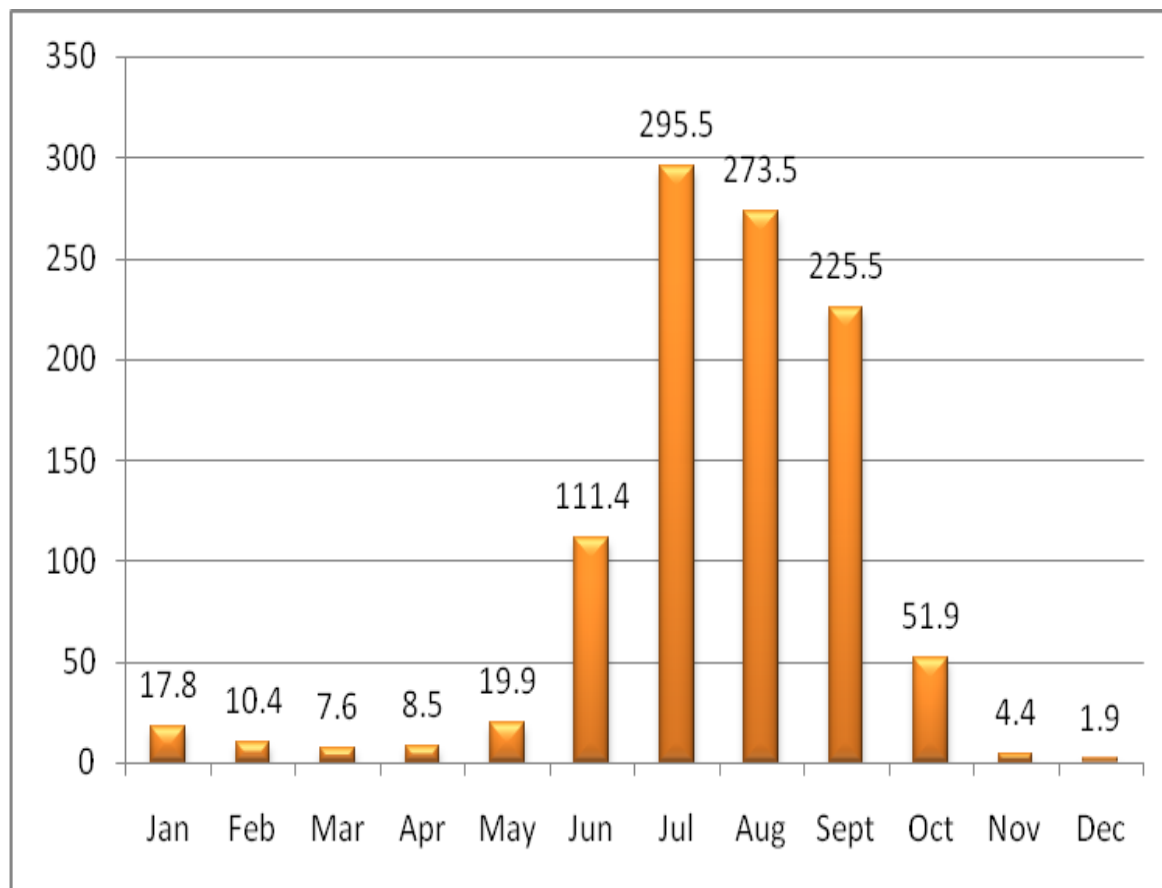
Agro climatic Zones of Bihar



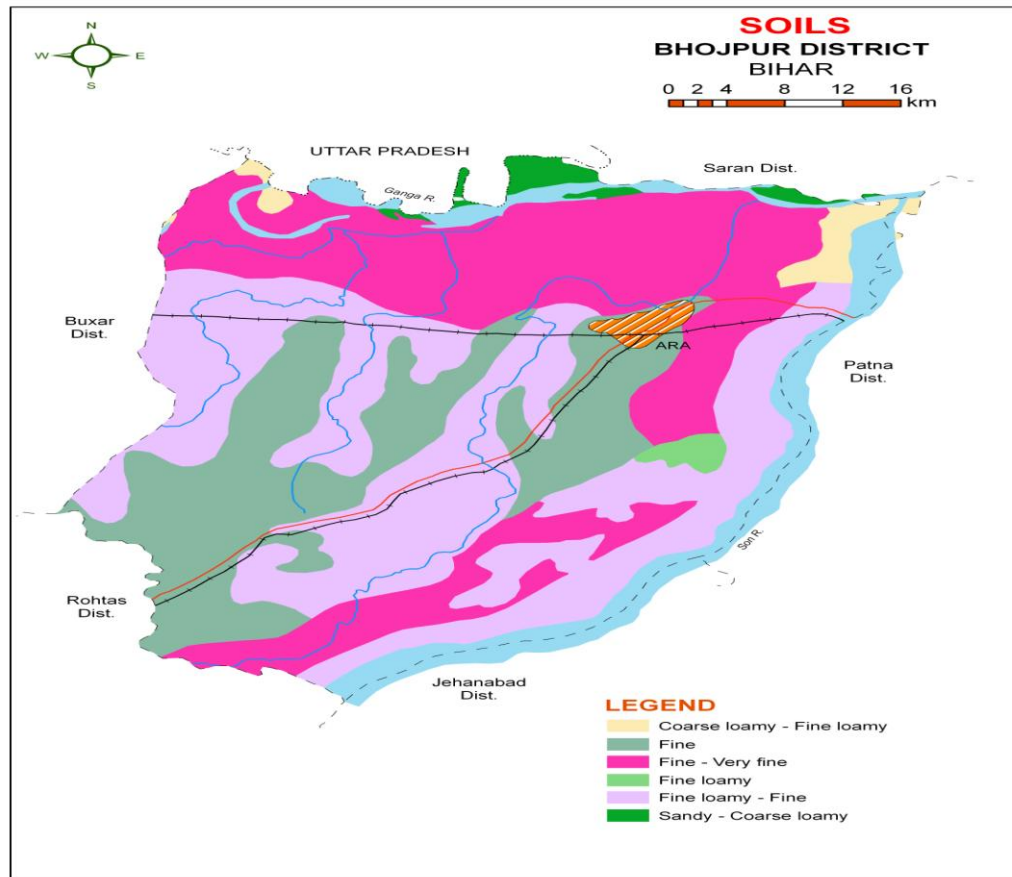
Source: krishi.bih.nic.in

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 Rainfed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks 4 th week of June	Upland (Light textured soil) Shallow red soils	Rice/ Pigeonpea- Greengram	Pigeonpea – Greengram Pigeonpea – Pusa-9, Narendra Arhar-I	<ul style="list-style-type: none"> • Normal package of Practices 	Seeds from BAU, Sabour, NSC, TDC , BRBN , KVK etc.
	Upland (Med. textured soil) Very deep, calcareous fine loamy, loamy surface texture	Rice-Wheat	Early Rice – Wheat Rice- PNR-381, PD-10, MTU-1001 Rice- Prefer Medium to short duration varieties like Saroj (100-110d), Birsa Dhan-201 (100-115d)	<ul style="list-style-type: none"> • Adopt normal package of practices • Direct seeding of drought tolerant varieties in dry soil in June/ July with pre emergence herbicide application under sufficient soil moisture conditions. • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands 	
	Medium land	Rice- Wheat	Medium duration Rice -Wheat Rice - Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Rajendra Bhagwati, Rajendra Sweta, Rajendra Kasturi, BPT-5204	<ul style="list-style-type: none"> • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts. • Interculture for timely weed control in direct seeded rice 	
	Low land	Rice – Wheat	Medium to long duration Rice– Wheat Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra	<ul style="list-style-type: none"> • Groundwater to be used for life saving irrigation to upland crops and transplanted rice 	

			Suwasni, Rajendra Sweta, Swarna sub-1, Rajendra Mahsuri		
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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 4 weeks 2 nd week of July	Upland (Light textured soil) Shallow red soils	Rice/ Pigeonpea – Greengram Pigeonpea–Pusa-9 Narendra Arhar-I	Short duration Rice-Wheat Rice- PNR-381, PD-10, MTU-1001	<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. 	Seeds from BAU, Sabour, NSC, TDC , BRBN , KVK etc.
	(Medium Textured) Very deep, calcareous fine loamy to loamy soils	Rice- Wheat Rice- PNR-381, Pusa-834	Short duration Rice-Wheat Rice- PNR-381, PD-10, MTU-1001		
	Medium land	Rice – Wheat Rice - Rajendra Sweta, Rajendra Kasturi	Rice-Wheat Rice - Direct sowing / 20d old dapog seedlings with medium to short duration varieties – Rajendra Sweta, Rajendra Kasturi, BR34, Rajendra Dhan-201(130-135d), Rajendra Bhagwati, Saroj, Rajendra Suwasni, Santosh, Sita	<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 • Use mat nursery/ dapog nursery , mat nursery (dapog method) can be 	

	Low land	Rice – Wheat Rice- BPT-5204, R. Sweta	No change in crop	<p>raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands</p> <ul style="list-style-type: none"> • 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. • Enhanced dose of nitrogen with full basal dose of NPK at the time of transplanting to boost the early vegetative growth in late plantings under sufficient moisture • Timely interculture for weed control in direct seeded rice • Life saving irrigation 	
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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 6 weeks 4 th week of July	Upland (Light tex. soil) Scarce rainfall shallow red soils scarce rainfall shallow red soils	Rice/ Pigeonpea-Greengram Pigeonpea-Pusa-9 Narendra Arhar-I Greengram - SML668, Samarat	Blackgram- Wheat Blackgram- T-9, Navin, Pant Urd-30 ,19	-	
	(Medium Textured) Very deep, calcareous fine loamy, loamy surface texture	Rice-Wheat Rice - PNR-381, Pusa- 834	Early Rice – Wheat Rice- PNR-381, Pusa -834, MTU- 1001	<ul style="list-style-type: none"> • Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts • Life saving irrigation 	
	Medium land	Rice – Wheat Rice - Rajendra Sweta Rajendra Kasturi	Rice (Short duration)-Wheat Rice- PNR-381, Pusa -834, MTU- 1001	<ul style="list-style-type: none"> • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Direct seedling of Rice • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands • Enhanced basal dose of NPK to boost the early vegetative growth • Application of fertilizers especially phosphorous and potash to be ensured under late 	
			Blackgram / Finger millet-Wheat Blackgram - T-9, Navin, Pant Urd-30 , Pant Urd-19		
	Low land	Rice-wheat-green gram (Greengram)	Rice (Short Duration)-Wheat Rice- Santosh , Rajendra Sweta		

			Rice- Pulses Rice- Santosh , Rajendra Sweta Greengram - SML 668, PDM-44, T-44 Blackgram- T-9, Navin, Pant Urd-30 , Pant Urd-19	transplanted conditions in severely affected districts • Life saving irrigation	
			Rice Oilseeds Rice- Santosh , Rajendra Sweta Oilseeds- 66-197-3, Rajendra Sarson-I, JD -6		

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 8 weeks 2 nd week of August	Upland (Light tex. soil)	Rice-Wheat	Blackgram -Sep. Pigeonpea Blackgram : T-9, Navin, Pant Urd-30 , Pant Urd-19 Pigeonpea – Pusa-9	• 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 BAU, Sabour, NSC, TDC , BRBN , KVK etc.
	Shallow red soils		Blackgram -Lentil/ Blackgram -Rai / Blackgram - T-9, Navin, Pant Urd-30 , Pant Urd-19		
	(Medium Textured) Very deep, calcareous fine loamy, loamy	Rice-Wheat	Blackgram -Rabi Maize/ Blackgram -Late wheat/ Blackgram -Potato Blackgram : T-9, Navin, Pant Urd-30 , Pant urd-19		

	surface texture				
	Medium land	Rice-Wheat	Toria- Late Wheat Toria -RAUTS-17- PT-303	<ul style="list-style-type: none"> • Direct seeding of rice • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Use of 20 days old dapog seedling in rice. • Enhanced basal dose of NPK in rice to boost early vegetative growth • Supply of contingency crop seeds of Toria, Maize (QPM varieties, Swann composite-65-70 days; HM-4 hybrid baby corn), Arhar (Bahar, NDA1, Pusa 9), Urd (Navin and T9), Cowpea and Horsegram need to be ensured for taking up of sowing in September in midlands • 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 	
		Pigeonpea –Greengram	September Pigeonpea-Greengram Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I Greengram – Samrat, Pusa Vishal, SML 668, PDM-44		

	Low land	Rice- Potato	<p>Rice-Potato</p> <p>Rice- Santosh, Rajendra Sweta Potato – PJ376, Rajendra Aloo-1,2,3, Kufri Jyoti , Kufri Pokhara</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) • Application of organic manure and vermi compost initially for Rice and other crops. • Sowing of <i>rabi</i> crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables can be taken up on time for maximizing productivity from lowlands with support from the government for timely supply of inputs and in a way <i>rabi</i> production would compensate the production loss during <i>kharif</i>. • 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
			<p>Rice-wheat</p> <p>Rice- Santosh, Rajendra Sweta</p>	
		Rice-wheat	<p>Sept. Pigeonpea</p> <p>Pigeonpea – Pusa-9 Narendra Arhar-I</p>	<ul style="list-style-type: none"> • Normal practices for Pigeonpea

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.	Upland	Rice-Wheat	<ul style="list-style-type: none"> • Gap filling of existing crop • Thinning • Life saving irrigation 	<ul style="list-style-type: none"> • Inter culture • Mulching • Conservation tillage 	
	Light to medium textured soil	Rice- PNR-381, Pusa-834, MTU – 1001			
	Medium land	Rice-wheat	<ul style="list-style-type: none"> • Gap filling • Life saving irrigation 		
		Rice – R. Sweta, Santosh, R. Kasturi, BPT-5204,			
	Pigeonpea	<ul style="list-style-type: none"> • Pre sowing irrigation • Adopt higher seed rate • Gap filling 			
	Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I				
Low land	Rice-wheat-green gram	<ul style="list-style-type: none"> • Life saving irrigation • Gap filling through Dapog nursery 			
	Rice- Santosh , Rajendra Kasturi 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, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Upland	Rice-Potato	<ul style="list-style-type: none"> • Gap filling of existing crop • Postpone top dressing 	<ul style="list-style-type: none"> • Inter culturing • Mulching • Foliar application of 	
	Light to medium textured soil	Rice –Wheat Rice- PNR -381, Pusa-834, MTU			

		– 1001, Potato – PJ376, Rajendra Aloo-1,2,3, Kufri Jyoti Wheat- HD-2733, PBW-443, HD-2824		pray (1%) MOP on the crops • Conservation tillage • Life saving irrigation	
		Pigeonpea (Arhar) Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	-		
	Medium land	Rice-Wheat-Cowpea Rice- - Rajendra Bhagawati, Rajendra Suwasni, R. Sweta	• Gap filling of existing crop • Postponement of top dressing		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		Remarks on Implementation
			Crop management	Soil nutrient & moisture conservation measures	
Mid season drought (long dry spell)	Up land	Rice-Wheat Vegetables – Wheat Rice- PNR -381, Pusa-834, MTU – 1001	• Postponement of top dressing of nutrients • Life saving irrigation	• Interculture • Foliar application of 2% MOP • Mulching • Conservation tillage • Life saving irrigation	
	Medium land	Rice-wheat Rice- R. Sweta, Santosh, R. Kasturi, BPT-5204, Wheat- HD-2733, PBW-343, HP-1731, HD-282			
		Pigeonpea(Arhar) Var Narendra Arhar-1	• If rice crop withers & gets damaged plan for Blackgram/ Sesame-Wheat should be followed • Postponement of top dressing of nutrients • Life saving irrigation •		
	Low land	Rice-wheat-Cucurbits	• Postponement of top		

		Rice- MTU-7029 , Santosh , Rajendra Kasturi Rajendra Sweta	dressing of nutrients • Life saving irrigation		
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Upland Light to medium textured soil	Rice-Wheat Rice- PNR -381, Pusa-834, MTU – 1001	<ul style="list-style-type: none"> • Foliar application of 2% MOP • Mulching • Life saving irrigation 	<ul style="list-style-type: none"> • Open the furrow during evening and left furrow open overnight and plank in the next morning before sunrise for growing of early rabi crops like wheat, Rabi Maize/Pulses /Oilseeds/ Vegetables 	Seeds from BAU, Sabour, NSC, TDC , BRBN , KVK etc.
	Medium land	Maize-wheat Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Maka-3			
		Pigeonpea Var. Narendra Arhar-1, P-9			
	Low land	Rice-wheat-greengram Rice- Rajendra Mahsuri Rajendra Sweta			

2.1.2 Drought - Irrigated situation

Note: Bhojpur district is having 60% of its area under canal irrigation, so please write some measures for 2.1.2

Condition			Suggested Contingency measures		
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	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Rice – Wheat Rice – Maize	Not applicable	Direct seeding of short duration rice varieties like Sahabhagi, Richarya, Turanta, Prabhat, NDR-97, and Pusa 834 can be done upto 15 Aug. under low land re-transplanting (Kharuhan) of medium and long duration rice varieties like Swarna Sub-1, Rajendra Mansuri, Sambha Sub-1, (BPT 5204), Kasturi, Sudha, Vaidehi and Swarna could be done upto 30 Aug.	Bunding should be done to store the water in field use 3-4 seedlings/ hill.	Seeds from BAU, Sabour, NSC, TDC , BRBN , KVK etc.
Limited release of water in canals due to low rainfall			Direct seeding of short duration rice varieties in medium land. In upland grow urd-bean var. T ₉ , Pant U-61 and Pant U-19, Sesamum var. Krishna and Maize var. Suwan, Deoki, Shaktiman 1 and 2.	Seedling should be done in rows 90 cm apart.	
Non release of water in canals under delayed onset of monsoon in catchment			Direct seeding of short duration rice varieties like Sahabhagi, Richarya, Turanta, Prabhat, NDR-97 and Pusa-834 can be done upto 15 Aug. in medium land. In upland-grow maize, sesamum and urdbean crops.	Seedling should be done 30 cm apart.	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Upland & Medium land	Rice-Wheat/Oilseeds / Pulses/Rabi maize	Short duration of Rice- Wheat Rice- PNR -381, Pusa-834, MTU – 1001,	<ul style="list-style-type: none"> • Dapog nursery for rice • Direct seedling of rice • Life saving irrigation 	Seeds from BAU, Sabour, NSC, TDC , BRBN , KVK etc.

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures
Low land	Rice-Wheat/Oilseeds Pulses	Short duration Rice- Wheat/Lentil/Mustard/Linseed Rice- Santosh ,Rajendra Suwasni, Rajendra Sweta	<ul style="list-style-type: none"> Mulching Application of organic manure and vermicompost 	

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 Retransplanting through dapog nursery if needed Gap filling Resowing through drum seeder 	<ul style="list-style-type: none"> Drainage management Subsequently crop if totally damaged i.e. Toria 	<ul style="list-style-type: none"> Drainage management Subsequent crop if totally damaged Harvest at physiological maturity 	Storage at safer place
Maize	<ul style="list-style-type: none"> Drainage management Gap filling Resowing, if completely damaged 	<ul style="list-style-type: none"> Drainage management Alternative maize or other rabi crop if totally damaged 	<ul style="list-style-type: none"> Drainage management Subsequent if totally damaged Harvest at physiological maturity 	Storage at safer place
Pigeonpea	<ul style="list-style-type: none"> Drainage management September sowing if Khrif pigeonpea is completely damaged Gap filling if needed 	<ul style="list-style-type: none"> Drainage management Alternative maize or other rabi crop if totally damaged 	<ul style="list-style-type: none"> Drainage management Subsequent if totally damaged Harvest at physiological maturity 	Storage at safer place
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/ Guava	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management • Harvesting at proper maturity 	
Heavy rainfall with high speed winds in a short span²				
Rice	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling if needed 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged i.e. Toria 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Re sowing If completely damaged • Gap filling if needed • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safer place
Pigeonpea	<ul style="list-style-type: none"> • Re sowing If completely damaged • Gap filling if needed • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Alternative crop if totally damaged 	Storage at safer place
vegetable	<ul style="list-style-type: none"> ▪ Drainage management ▪ Gap filling 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicide 	
Horticulture				
Mango	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicides 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	
Guava	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicides 	<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. ❖ 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. 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 <ul style="list-style-type: none"> ❖ 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 <ul style="list-style-type: none"> ❖ Storage at safe place and transportation
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</p>	<p>Harvest at proper time</p> <p>Anthracnose:- Pre-harvest sprays of hexaconazole (0.01%) or Carbendazim (0.1%) at 15 days interval should be done in such a way that the last spray falls 15 days prior to harvest.</p> <p>Diseased leaves, twigs, and fruits, should be collected and burnt to avoid the spread for next season</p>

			Streptocycline (200 ppm) at 10 days intervals reduce fruit infection. In severe infection, spraying of Streptocycline (300 ppm) or copper oxychloride (0.3%) is more effective.	
Litchi	Fruit Fly: Monitor adult fruit flies emergence by using methyl eugenol or sex pheromone traps.	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	Harvest at proper time	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
Guava			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 ¹	Seedling/ Nursery stage	Vegetative stage	Reproductive stage	At harvest
Water logging/Partial inundation	Seedling/ Nursery stage	Vegetative stage	Reproductive stage	At harvest
Rice	<ul style="list-style-type: none"> • Drainage management • Re transplanting through Dapog nursery if completely damaged • Gap filling 	<ul style="list-style-type: none"> • Drainage management • Alternative crops if totally damaged • Gap filling • 40-45 days old seedlings may be used • Kharuhan (double transplanting) 	<ul style="list-style-type: none"> • Drainage management • Harvest at physiological maturity • Lentil as paira crop can be taken 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Drainage management • Re sowing if 	<ul style="list-style-type: none"> • Drainage management • Alternative crops if totally 	<ul style="list-style-type: none"> • Drainage management • Harvest at physiological 	Storage at safer place

	<ul style="list-style-type: none"> substantially damaged • Gap filling, if needed 	<ul style="list-style-type: none"> damaged like maize or subsequent crop i.e. Toria 	<ul style="list-style-type: none"> maturity 	
Pigeonpea	<ul style="list-style-type: none"> • Drainage management • Re sowing if substantially damaged • Gap filling if needed 	<ul style="list-style-type: none"> • Drainage management • Any rabi crop can e taken, if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Harvest at physiological maturity 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Replanting if substantially damaged • Gap filling • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management 	Judicious harvesting
Guava	<ul style="list-style-type: none"> • Replanting if substantially damaged • Gap filling • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management 	Judicious harvesting
Continuous submergence for more than 2 days²				
Rice	<ul style="list-style-type: none"> • Gap filling, if needed • Re-sowing if damaged after receding of flood 	<ul style="list-style-type: none"> • Replanting through Kharuhan (double transplanting) by 3-4 seedlings per hill • Short duration rice variety 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Re-sowing if damaged after receding of flood 	<ul style="list-style-type: none"> • Resowing or gap filling as the case may be 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Drainage management 			
Guava	<ul style="list-style-type: none"> • Drainage management 			
Sea water intrusion³	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	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Cold wave	-		-	-
Wheat, Maize, Mustard, Potato, Pulses	-	Light irrigation, Mulching	-	-
Horticulture				
Vegetables	-	Light irrigation, Mulching	-	-
Frost				
Wheat Chickpea Red gram Lentil		Light irrigation, Mulching		
Horticulture				
Vegetables		Light irrigation, Mulching		
Tomato & Potato		Earth up to 15cm ht. Light irrigation, Mulching		Harvest in dry weather
Hailstorm	Not applicable			
Cyclone	Not applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event ^s	During the event	After the event
Drought			
Floods			

<p>Feed and fodder availability</p>	<ol style="list-style-type: none"> 1. Cultivation of fodder tree 2. Storage of Improved Quality Fodder 3. Conservation & Storage of <ul style="list-style-type: none"> • Feed & Fodder • 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. <p>Hay: –</p> <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. <ol style="list-style-type: none"> 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><u>Use of unconventional feed stuff:</u></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
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<p>Health and disease management</p>	<p>Veterinary Preparedness with Medicines, Vaccines and provision for mobile ambulatory van.</p> <ul style="list-style-type: none"> <p>Vaccination</p> <p>During flood stress becomes an incriminating factor for the precipitation of diseases in livestock and poultry. So, necessary vaccination of livestock and poultry should be done against economically important contagious disease.</p> <p>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>Animal safety, Health camp and Treatment</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</p> <p>Diarrhoeal diseases outbreaks can</p> <p>Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.</p>	<p>Sanitation, deworming, treatment, health camps Culling of Sick animals and disposal of carcass</p> <p>Maintenance of Sanitation:</p> <p>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:</p> <p>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</p>
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		<p>Health camp and treatment</p> <p>Water borne diseases are one of the most common phenomena during the flood</p> <p>Diarrheal 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 Enterotoxaemia Liver fluke Amphistomiasis Brooders pneumonia</p> <p>Treatment of Non infectious</p> <p>Arrangement should be made for the treatment of drowning and traumatic injuries, aspiration pneumonia, lameness</p>	<p>to regain proper health.</p> <p>In water logged area, snails can be introduced as biological control measures against snails to protect livestock from parasitic disease.</p> <p>Treatment of sick animals: The</p> <p>Disposal of Carcass: the disposal of dead animals and birds are to be done by Animal Husbandry Department.</p> <p>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>
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		and other surgical cases in the health camp. Disinfection of livestock premises and Poultry shed Disinfection of livestock premises and the temporary sheds should be done with the help of bleaching powder, phenol, carbolic acid etc	Composting Vulturing s. Health Camp after the flood: Protection of livestock from out breaking and communicable diseases be made. Health camps are to be organised in Flood affected areas to 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			

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	<p>Vaccines to be used for different animals and Poultry</p> <p>Cattle and Buffalo Hemorrhagic Septicemia Vaccine Black Quarter Vaccine FMD Vaccine Anthrax Vaccine as per endemicity.</p> <p style="text-align: center;">Sheep and Goat</p> Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxaemia Vaccine Anthrax Vaccine as per endemicity <p style="text-align: center;">Pigs</p> Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity. <p style="text-align: center;">Dogs</p> Rabies Vaccine <p style="text-align: center;">Poultry</p> Mareks disease vaccine RDV (F ₁ & R ₂ B), FPV, IBRV & IBDV (Annexure-1) • 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.</p> <p>List of life saving Medicines Corticosteroids Nikethamide Antibloat Adrenaline Antihistaminic Antidotes for common poisoning Antisnake venom 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, antisnake 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,</p>			
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	<p>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 vaccines, Veterinary drugs, workers protection uniform etc.</p>			
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			