

State: Bihar

Agriculture Contingency Plan for District: Sheohar

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Eastern Plain, Hot Subhumid (moist) Eco-Region (13.1)		
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climatic Zone (NARP)	North West Alluvial Plain Zone (BI-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Zone – 1 (Saran, Siwan, Goplaganj, Muzaffarpur, E. Champaran, W. Champaran, Sitamarhi, Sheohar, Vaishali, Darbhanga , Madhubani, Samastipur)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		26°33'N	85°17'E	56 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTS	RAU, Pusa , Bihar		
	Mention the KVK located in the district	KVK, Sheohar		
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Rajendra Agricultural University, Pusa, Samastipur			

1.2	Rainfall (Zone-I)	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep)	1028	45	2 nd week of June	2 nd week of October
	NE Monsoon(Oct-Dec)	94	03		
	Winter (Jan- Feb)	30	03		
	Summer (Mar -May)	124	04		
	Annual	1276	55		

Source: RAU, Pusa, Meteorology Dept.

1.3	Land use pattern of the district (latest statistics)	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)	45.5	30.6	-	10.2	0.012	1.2	0.01	0.008	1.5	1.9

Source: Dept. of Agriculture

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Sandy Soils	2.280	6.14
	Coarse Sandy Loam Soils	5.00	13.47
	Fine Sandy Loam Soils	20.033	53.99
	Clayey Soils	0.438	1.18
	Saline/ Calcareous Soils	9.354	25.21

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	30.6	145.2
	Area sown more than once	13.8	
	Gross cropped area	44.4	

Source : Deptt. of Agril., Govt. of Bihar (SREP, Sheohar)

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	13.9		
	Gross irrigated area			
	Rainfed area	16.7		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area

Canals	-		
Tanks	215	0.2	1.7
Open wells	11897	9.9	78.5
Bore wells	9933	0.9	7.6
Lift irrigation schemes			
Micro-irrigation			
Other sources (River)		1.5	12.2
Total Irrigated Area		8.8	
Pump sets			
No. of Tractors	421		
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	5	100%	
Wastewater availability and use			
Ground water quality			

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

Source: NABARD. Potential linked credit plan, Sheohar

1.7 Area under major field crops & horticulture (as per latest figures of 2010-11)

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	20	-	20	-	-	-	-	20	
Pulses	3.3	-	3.3	-	-	-	-	3.3	

	Wheat	-	-		17	-	17	-	17
	Oilseeds	-	-		1.8	-	1.8	-	1.8
	Sugarcane	-	-		3	-	3	-	3
	Maize	-	-		1	-	1	-	1

Source: District Agricultural Officer, Sheohar

Horticulture crops - Fruits	Area ('000 ha)		
	Total	Irrigated	Rainfed
Mango	2.5		
Guava	0.3		
Banana	0.2		
Litchi	0.9		
Lemon	0.14		
Horticulture crops - Vegetables	Total	Irrigated	Rainfed
Potato	2.1		
Cauliflower	0.7		
Tomato	0.4		
Brinjal	0.3		
Onion	0.3		

	Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	Plantation crops	Total	Irrigated	Rainfed
	Fodder crops	Total	Irrigated	Rainfed
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

Source: NABARD. Potential linked credit plan, Sheohar

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)	
	Non descriptive Cattle (local low yielding)	20.7	8.9	29.6	
	Improved cattle				
	Crossbred cattle	0.1	0.5	0.6	
	Non descriptive Buffaloes (local low yielding)	3.8	22.1	25.8	
	Graded Buffaloes				
	Goat	23.5	49.1	72.5	
	Sheep	0.002			
	Others (Camel, Pig, Yak etc.)				
	Commercial dairy farms (Number)				
1.9	Poultry	No. of farms	Total No. of birds ('000)		
	Commercial		4.8		
	Backyard		40.4		
1.10	Fisheries (Data source: Chief Planning Officer)				
	A. Capture				
	i) Marine (Data Source: Fisheries)	No. of fishermen	Boats	Nets	Storage

Department)		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	facilities (Ice plants etc.)
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds	No. of Reservoirs		No. of village tanks		
	105	337		232		
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)	289.3		3.2		232	

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	29	1450			-	-	29	1450	
	Sugarcane	--	-	1.3	45000	-	-	1.3	45000	
	Maize	-	-	3	3000	-	-	3	3000	
	Wheat	-	-	47.6	2800	-	-	47.6	2800	
	Pulses	-	-	1.6	500	-	-	1.6	500	

Source : DAO office, Sheohar

Major Horticultural crops (Crops identified based on total acreage)

Mango							22.6		
Banana							8.2		
Litchi							6.3		
Guava							2.1		
Lemon							1.0		

Source: NABARD. Potential linked credit plan 2010-11

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Wheat	Maize	Potato
	Khariif- Rainfed	2 nd week of June - 3 rd week of June	-	-	-
	Khariif-Irrigated	2 nd week of May - 3 rd week of June	-	-	-
	Rabi- Rainfed	-	-	-	-
	Rabi-Irrigated	-	2 nd week of November - 1 st week of December	2 nd week of October - 2 nd week of November	2 nd 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 II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

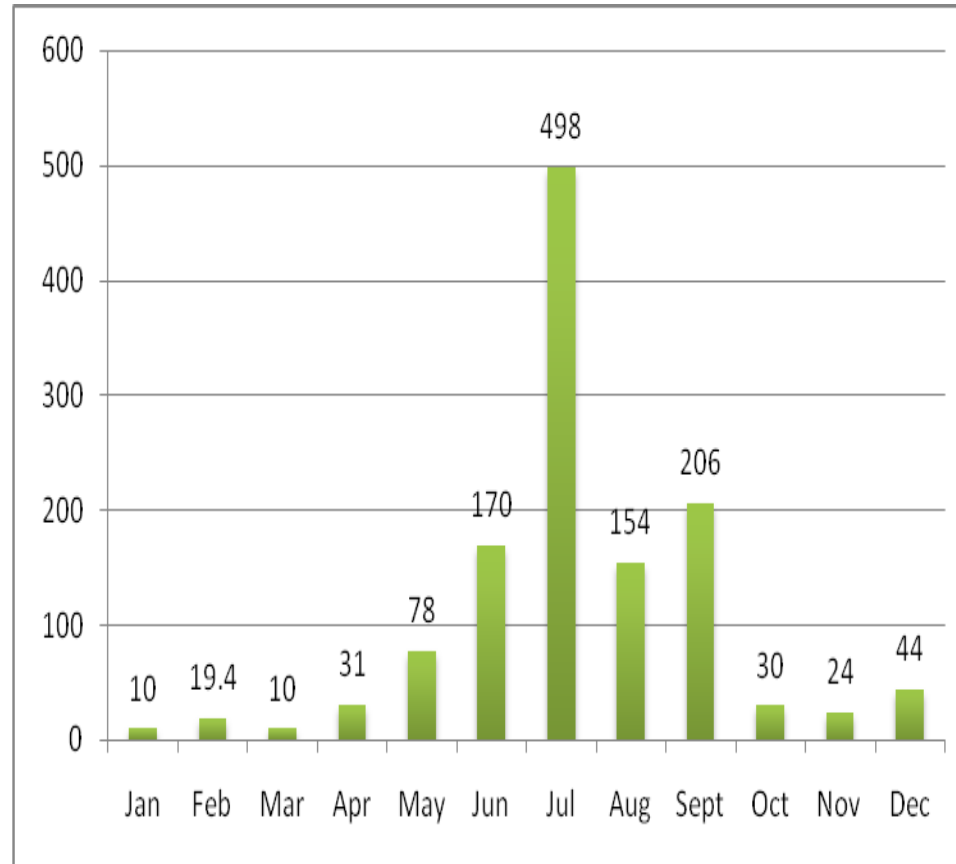
Annexure I

Agro climatic Zones of Bihar

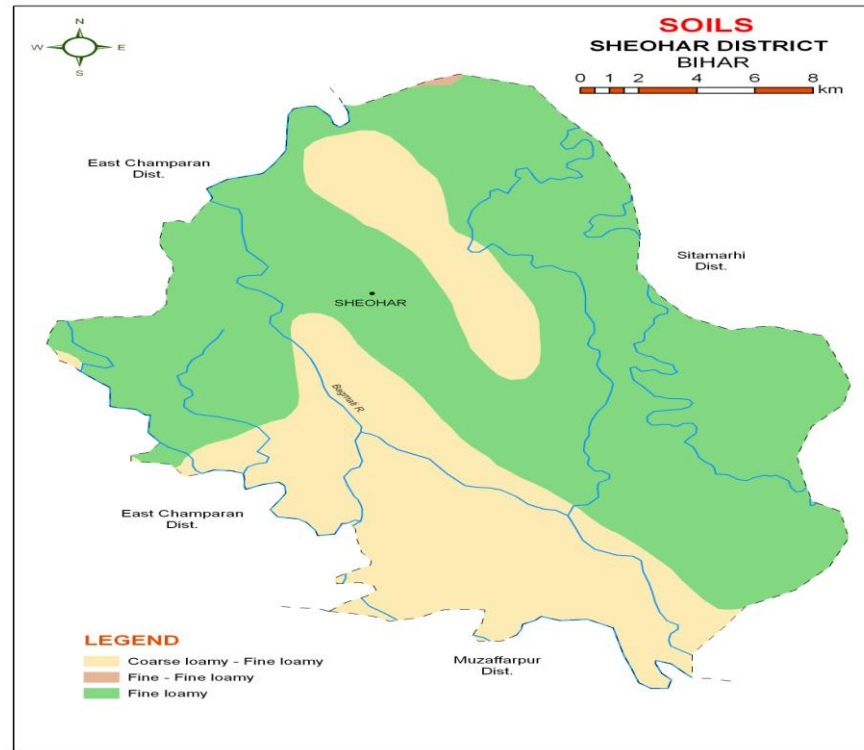


Source: krishi.bih.nic.in

Annexure II



Annexure III



Source : NBSS& LUP, Regional Centre, Kolkata

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested contingency measures.		
Early season drought (delayed onset)	Major Farming situation	Crop/ cropping system	Change in crop/cropping system	Agronomic management	Remarks on Implementation
Delay by 2 weeks 4 th week of June	Upland coarse loamy soils	Rice -Wheat Rice - Lentil Rice - Chickpea Rice - Rabi Maize Rice - Linseed	Rice -Wheat Rice - Lentil Rice - Chickpea Rice - Rabi Maize Rice - Linseed Prefer long to medium duration rice varieties	Normal Package of practices, Life saving irrigation, Direct seeding of rice	-
	Medium land	Rice - Wheat Rice - Lentil Rice - Chickpea	Medium duration Rice - Chickpea Rice- Prefer Long to medium duration varieties Rice - Rajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130140d), Rajendra Bhagawati, Rajendra Suwasni, Rajshree (140d),		
	Low land	Rice-Wheat	Medium/long duration Rice-Late wheat Rice - Chickpea Rice- Lentil	Normal Package of practices , Life saving irrigation,	

			Rice- Prefer Long to medium duration varieties Rice - Rajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130140d), Rajendra Bhagawati, Rajendra Suwasni, Rajshree (140d),		
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Condition			Suggested contingency measures.		
Early season drought (delayed onset)	Major Farming situation	Crop/ cropping system	Change in crop/cropping system	Agronomic management	Remarks on Implementation
Delay by 4 weeks 2 nd week of July	Upland Coarse loamy soils	Rice –Wheat Rice-Lentil Rice-Chickpea Rice-Oilseeds Rice-Rabi Maize	Short duration Rice – Wheat Rice-Lentil Rice-Oilseeds Rice-Chickpea Rice--Prabhat, Dhanlaxmi, Richharia, Turanta, Pusa-372, SG-2	<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	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Medium land	Rice –Wheat Rice-Lentil Rice-Chickpea Rice-Oilseed Rice-Pulses Rice -Maize	Rice– wheat/ Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant Blackgram-30 , Pant Blackgram-19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1 Rice- Prefer short (early matured) varieties like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland),	<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 	

			Dhanlaxmi , Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)	<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 	
	Low land	Rice – Wheat Makhana (in ponds) Var. local	Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Swarna sub-1		

Condition			Suggested contingency measures.		
Early season drought (delayed onset)	Major Farming situation *	Crop/ cropping system*	Change in crop/cropping system*	Agronomic measurement	Remarks on Implementation*
Delay by 6 weeks 4 th week of July	Upland	Rice – Wheat	Short duration Rice– Wheat Rice-Rabi Maize	<ul style="list-style-type: none"> • Direct seeding of Rice 	Seeds from BRBN, RAU,

	Coarse loamy soils		Rice-Vegetables Rice-Pulses Rice-Mustard Rice-Rai Rice--Prabhat, Dhanlaxmi, Richharia,	<ul style="list-style-type: none"> Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts Life saving irrigation	Pusa, NSC, TDC
	Medium land	Rice - Wheat	Short duration Rice– Wheat Rice-Vegetables Rice-Pulses Rice-Mustard/Toria/Rai Rice--Prabhat, Dhanlaxmi, Richharia,		
	Low land	Rice - Wheat	Short duration Rice– Wheat Rice-Vegetables Rice-Pulses Rice-Oil seeds Rice--Prabhat, Dhanlaxmi, Richharia,	12-14 days old seedling (Dapog Nursery) should be used for Rice transplanting Transplanting with 40-45 days old seedlings with 3-4 seedlings per hill with closer spacing	

Condition			Suggested contingency measures.		
Early season drought (delayed onset)	Major Farming situation *	Crop/ cropping system*	Change in crop/cropping system*	Agronomic management	Remarks on Implementation*
Delay by 8 weeks 2 nd week of August	Upland Coarse loamy soils	Rice - Wheat	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) Blackgram/Finger millet - Rabi Maize Blackgram/Finger millet -Sep. Pigeonpea	<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

			<p>Blackgram/Finger millet -Late Wheat Blackgram/Finger millet -Vegetables Blackgram/Finger millet -Lentil Blackgram/Finger millet -Potato Blackgram/Finger millet Rai Blackgram-Vegetables</p> <p>Blackgram- T-9, Navin, Pant Urd-30 , 19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1</p>		
	Medium land	Rice - Wheat	<p>Rice(Short duration)-Wheat /Vegetables/ Lentil/Mustard</p> <p>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> <p>Early Rice-Prabhat, Dhanlaxmi, Richharia, Turanta</p>	<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	
	Low land	Rice - Wheat	Rice(Short duration)-Wheat/Lentil/ Chickpea/Vegetables Rice-Potato/Wheat Rice- Rajshree, Santosh , Sita Rajendra Suwasni, Rajendra Sweta	<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 	

Condition			Suggested contingency management.		
Early season drought (Normal onset)	Major Farming situation	Crop/ cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/ crop stand etc.	Upland	Rice – Wheat /Rabi maize Rice-Lentil/Chickpea Rice – Oilseeds Rice--Prabhat, Dhanlaxmi, Richharia, Turanta,	Gap filling Spray 1% urea Weed management Life saving irrigation	Interculture Mulching Foliar application with 2% MOP Conservation tillage	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Medium land	Rice – Wheat Rice-Lentil/Chickpea/ Khesari Rice – Oilseeds			
	Low land	Rice – Wheat Rice-Lentil/Chickpea/ Khesari Rice – Oilseeds Rice- Rajshree, Sakuntala, Satyam, Kishori, Rajendra Sweta, Rajendra Mashuri			

Condition			Suggested contingency measures.		
Mid season drought (long dry spell consecutive 2 weeks rainless (>25 mm))	Major Farming situation	Crop/ cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	Upland, Medium land, Lowland	Rice – Wheat/Rabi maize Rice – Lentil/Chickpea/ Khesari Rice – Mustard	Gap filling Spray 1% urea Postponement of top dressing Weed management	Interculture Mulching Foliar application with 2% MOP Conservation tillage	

			Life saving irrigation		
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Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	Upland, Medium land, Lowland	Rice – Wheat/Rabi maize Rice – Lentil/Chickpea/ Khesari Rice – Mustard	IPM practices Life saving irrigation	Interculture Mulching Foliar application with 2% MOP Conservation tillage	

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
	Upland, Medium land, Lowland	Rice – Wheat/Rabi Maize Rice – Lentil/Chickpea/ Khesari Rice – Mustard	IPM practices 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 	Seeds from BRBN, RAU, Pusa, NSC, TDC

				/Oilseeds/ Vegetables <ul style="list-style-type: none"> 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>. 	
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2.1.2 Drought - Irrigated situation

Condition	Major Farming situation ^f	Normal Crop/cropping system ^g	Suggested Contingency measures		
			Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Delayed release of water in canals due to low rainfall	Upland Medium land Lowland	Not Applicable			

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Limited release of water in canals due to low rainfall	Upland Medium land Lowland	Not Applicable			

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Non release of water in canals under delayed onset of monsoon in catchment	Upland Medium land Lowland	Not Applicable			

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Upland	Rice-Wheat/Rabi maize Rice – Oilseeds Rice – Pulses Rice – Maize	Rice-Wheat/Rabi maize Pigeonpea – Greengram Blackgram/Finger millet-Wheat Sesame-Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta, Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I Blackgram- T-9, Navin, Pant urd-30 , 19 Sesame – Krishna, Pragati	Life saving irrigation, , Mulching	Seeds from BRBN, RAU, Pusa, NSC, TDC
	Medium Land	Rice-Wheat	Medium duration of Rice-Wheat	Life saving irrigation,	

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
		Rice – Oilseeds Rice – Pulses Rice – Maize	Pigeonpea-Greengram Rice- Rajendra Bhagawati, Rajendra Suwasni, Saroj, Rajendra Kasturi, Santosh Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	Mulching,	
	Lowland	Rice-Wheat/Oilseeds /Pulses	Medium/long duration Rice-Wheat Rice- Lentil/Chickpea Rice – Mustard Rice - Rajshree, Sakuntala, Satyam, Kishori Rajendra Sweta , Rajendra Mashuri	Life saving irrigation, Mulching	

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Insufficient groundwater recharge due to low rainfall	Upland	Rice-Wheat Rice – Pulses Rice – Oilseeds	Pigeonpea-Greengram Blackgram-Wheat/Rabi maize Sesame - Wheat /Rabi Maize/ Lentil/Chickpea/Mustard Sesame – Krishna, Pragati Blackgram- T-9, Navin, Pant urd-30 ,19	Life saving irrigation, Mulching	Seeds from BRBN, RAU, Pusa, NSC, TDC

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Normal Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
	Medium land	Rice-Wheat Rice – Pulses Rice – Oilseeds	Rice – Wheat Vegetables – Wheat/Toria/ Mustard Rice- Rajendra Bhagawati, Rajendra Suwasini, Saroj, Rajendra Kasturi, Santosh		
	Lowland	Rice-Wheat Rice – Pulses Rice – Oilseeds	Rice – Wheat Vegetables- Wheat/Toria/ Mustard Rice- Rajendra Bhagawati, Rajendra Suwasini, Saroj, Rajendra Kasturi,Santosh		

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	Provide drainage	Provide drainage		
Maize	Provide drainage	Provide drainage		
Pigeonpea	Provide drainage	Provide drainage		
vegetables	Provide drainage	Provide drainage		
Horticulture	Provide drainage	Provide drainage		
Mango	Provide drainage	Provide drainage	Provide drainage	Safe storage and transportation

Litchi	Provide drainage	Provide drainage	Provide drainage	
Banana	Provide drainage	Provide drainage	Provide drainage	
Guava	Provide drainage	Provide drainage	Provide drainage	
Heavy rainfall with high speed winds in a short span²				
Rice	Replanting with Dapog seedling , Gap filling, Kharuhan (double transplanting) method			
Maize	Earthing up			
Pigeonpea	Earthing up			
Vegetables	Grow nursery on raised bed and poly tunnel			
Horticulture				
Mango Litchi Banana Guava	Re planting	Provide wind break to reduce wind speed	Provide wind break	
Outbreak of pests and diseases due to unseasonal rains	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Rice	❖ Seedling treatment with granular insecticide – Cartap hydrochloride or phorate 10G or carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good drainage.	❖ Use copper fungicides against Bacterial leaf blight. ❖ Split application of N fertilizer (3-4 times)	❖ Harvest at physiological maturity	❖ Proper drying ❖ Storage at safe place and transportation
Maize	❖ 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	❖ Foliar blight control through Mancozeb @ 2.5g/l or Zineb/ Maneb @ 2.5-4 g/lit of water (2-4 applications at	❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity	❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12%

	maize	8-10 days interval)		moisture in grains before storage ❖ Proper drying
Pigeonpea	❖ Provide drainage ❖ Seed treatment with 1 g carbendazim +2g thiram/kg seed.	Provide drainage	Provide drainage	❖ Proper drying • Storage at safe place and transportation
Horticulture				
Vegetables	• Drainage management	• Drainage management	• Drainage management	
Mango	Anthracnose:- The foliar infection can be controlled by spraying of copper oxychloride (0.3%) Use bio control agent viz <i>Streptosporangium pseudovulgare</i> 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.	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. Mango powdery mildew: Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December	Mango powdery mildew: Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculum load. Spray wettable sulphur (0.2%) when panicles are 3-4" in size Spray dinocap (0.1%) 15-20 days after first spray. Spray tridemorph (0.1%) 15-20 days after second spray. Spraying at full bloom needs to be avoided. Mango bacterial canker: Three sprays of Streptocycline (200 ppm) at 10 days intervals reduce fruit infection. In severe infection, spraying	Harvest at proper time 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. Diseased leaves, twigs, and fruits, should be collected and burnt to avoid the spread for next season

			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
Banana	Provide drainage	Provide drainage	Harvest at Physiological maturity	
Guava	Provide drainage	Provide drainage	Harvest at Physiological maturity	

2.3 Floods

Condition	Suggested contingency measure ^o			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation ¹				
Rice	<ul style="list-style-type: none"> • Provide drainage • Re transplanting through Dapog nursery seedlings • Gap filling 	<ul style="list-style-type: none"> • Provide drainage • Gap filling • 40-45 days old seedlings may be used • Kharuhan (double transplanting) method 	<ul style="list-style-type: none"> • Provide drainage • Harvest at physiological maturity • Lentil as paira crop can be taken 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Provide drainage • Re sowing • Gap filling 	<ul style="list-style-type: none"> • Provide drainage 	<ul style="list-style-type: none"> • Provide drainage • Harvest at physiological maturity 	Storage at safer place
Pigeonpea	<ul style="list-style-type: none"> • Provide drainage 	<ul style="list-style-type: none"> • Provide drainage 	<ul style="list-style-type: none"> • Provide drainage 	Storage at safer place

	<ul style="list-style-type: none"> • Re sowing • Gap filling 		<ul style="list-style-type: none"> • Harvest at physiological maturity 	
Horticulture				
Mango	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	
Litchi	<ul style="list-style-type: none"> • Gap filling • Replanting • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	
Banana	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	
Guava	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	
Continuous submergence for more than 2 days²				
Rice	<ul style="list-style-type: none"> • Gap filling • Re-sowing 	<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 	<ul style="list-style-type: none"> • Re sowing or gap filling 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Provide drainage 			
Guava	<ul style="list-style-type: none"> • Provide drainage 			
Banana	<ul style="list-style-type: none"> • Provide drainage 			
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^p				
Maize	Provide irrigation	Provide irrigation	Provide irrigation	

Pigeonpea	Provide irrigation	Provide irrigation	Provide irrigation	
Wheat			Provide irrigation (Terminal heat)	
Horticulture				
Mango	Provide irrigation	Provide irrigation	Provide irrigation	
Litchi	Provide irrigation	Provide irrigation	Provide irrigation	
Papaya	Provide irrigation	Provide irrigation	Provide irrigation	
Cold wave⁴				
Wheat		Provide irrigation , Mulching		
Maize		Provide irrigation , Mulching		
Mustard		Provide irrigation , Mulching		
Potato		Provide irrigation , Mulching		
Pulses		Provide irrigation , Mulching		
Horticulture				
Bhendi		Provide irrigation, Mulching		
Brinjal		Provide irrigation, Mulching		
Chili		Provide irrigation , Mulching		
Tomato		Provide irrigation, Mulching		
Lauki		Provide irrigation , Mulching		
Frost		Provide irrigation, Mulching		
Wheat		Provide irrigation, Mulching		
Chickpea		Provide irrigation , Mulching		
Pigeonpea		Provide irrigation , Mulching		
Lentil		Provide irrigation , Mulching		

Horticulture				
Bhendi		Provide irrigation , Mulching		
Brinjal		Provide irrigation , Mulching		
Chilli		Provide irrigation , Mulching		
Tomato & Potato		Earthing up Provide irrigation , Mulching		Harvest in dry weather
Hailstorm		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			
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 <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 	<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 	Production of forage crops <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. Sorghum/Cowpea 4. Maize in September

	<p>wheat straw in ratio of 7:1 and should be supplemented with 3% molasses.</p> <p>Hay: – Berseem/Lucerne and other grasses.</p> <ul style="list-style-type: none"> • 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. <p>4. Development & storage of: – (a) Complete Feed Block (CFB) (b) Urea-Molasses-Mineral-Block (U.M.M.B)</p> <p>5. Development of Fodder Bank</p>		
Drinking water			
Health and disease management	<p>Veterinary Preparedness with Medicines, 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.</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</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</p>	<p>Sanitation, deworming, treatment, health camps Culling of 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>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>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 occur after drinking contaminated water.</p> <p>Diseases that can occur during flood should be given special attention and accordingly medicines should be</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 parasitic disease.</p> <p>Treatment of sick animals: The Disposal of Carcass: the disposal of dead animals and birds are to be done 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>
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		<p>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 Disinfection of livestock premises and the temporary sheds should be done with the help of bleaching powder, phenol, carbolic acid etc</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 restore the normal breeding capability of breedable population as well as to restore the normal health of livestock and poultry.</p>
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Floods	Not Applicable
Cyclone	
Heat wave and cold wave	

^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	<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>Sheep and Goat Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity</p>			

	<p style="text-align: center;">Pigs</p> <p>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</p> <p style="text-align: center;">(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.</p> <p>List of life saving Medicines</p> <p>Corticosteroids Nikethamide Antibloat Adrenaline Antihistaminic Antidotes for common poisoning Antisnake venom Broad spectrum antibiotics Anti-inflammatory</p>			
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	<p>Antipyretic and Analgesics Fluids and Electrolytes</p> <ul style="list-style-type: none"> • Mobile Veterinary Clinics 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>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 vaccines, Veterinary drugs, workers protection uniform etc.</p>			
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Cyclone	Not Applicable
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 a. Monitoring of water quality b. Reduction of manuring according to water level.	
2) Floods			
A. Capture			
B. Aquaculture			

(i) Inundation with flood water	(i) Elevation/ Renovation of pond dyke. (ii) Sale of Table/marketable size fishes (iii) construction of earthen nursery ponds in upland areas	Collection of naturally bred seeds (Spawn /fry /fingerling) from flooded water Stocking in nursery ponds for rearing	-Retain the water in pond immediately 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	Not Applicable		
4. Heat wave and cold wave			

^a based on forewarning wherever available