State: Bihar

Agriculture Contingency Plan for District: Saran

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
		25°36' to 26°13' N	84°24' to 85°15' E	36m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RRS, Madhopur		
	Mention the KVK located in the district with address	KVK Manjhi, Saran		
	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**	**Normal RF(mm)**	**Normal Rainy days (number)**	**Normal Onset (specify week and month)**	**Normal Cessation (specify week and month)**
	SW monsoon (June-Sep)	762		3rd week of June	2nd week of October
	NE Monsoon(Oct-Dec)	99			
	Winter (Jan- Feb)	50			

	Summer (Mar-May)	67			
	Annual	978			

1.3	**Land use pattern of the district** (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and Uncultivable land	Land under permanent water	Current fallows	Other fallows
	Area ('000 ha)	270.2	199.3		25.9	0.5	1.8	8.2	17.6	4.1	5.1	7.7

1. 4	**Major Soils**	**Area ('000 ha)**	**Percent (%) of total**
	Alluvial Saline soils	67.5	33.8
	Alluvial soils	36.6	18.4
	Heavy clay soils with sodicity	65.6	32.9
	Light sandy soils	29.6	14.8
	Total	199.3	100

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	199.3	174.7 %
	Area sown more than once	74.5	
	Gross cropped area	348.3	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	101.6		
	Gross irrigated area	145.1		
	Rainfed area	97.7		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		22.3	22
	Tanks			
	Open wells			
	Bore wells		72.1	71
	Lift irrigation schemes			
	Micro-irrigation		7.1	7.05
	Other sources		101.611	100
	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			
	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 (as per latest figures)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***			**Summer**	**Grand total**
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**		
	Rice	1.8	70	71.8					71.8
	Maize		31.5	31.5	35.1		35.2		66.7
	Pulses		11.6	11.6		7.2	7.2		18.8
	Oilseeds		0.4	0.4	5.0	2.2	7.2		7.6
	Wheat				50.6	57.4	108		108
	Potato				8.0	4.5	12.5		12.5
	Sugarcane				12		12		12

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
		4.1		4.1
	Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
		19.6	12.6	7.0
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**

		1	1	
	Plantation crops			
	Fodder crops			
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

1.8	**Livestock**	**Male**	**Female**	**Total**
	Non descriptive Cattle (local low yielding)			208806
	Improved cattle			
	Crossbred cattle			23994
	Non descriptive Buffaloes (local low yielding)			401625
	Descript Buffaloes			
	Goat			196187
	Sheep			104849
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds**	
	Commercial		218686	
	Backyard		38823	
1.10	**Fisheries** (Data source: Chief Planning Officer)			
	A. Capture			

i) Marine (Data Source:	**No. of fishermen**	**Boats**	**Nets**	**Storage facilities**

Fisheries 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**
	1300	2208	908

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)	1530	3.2	2.166

1.11 Production and Productivity of major crops (Average of last 5 years: 2004 - 08)

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	0.1	1730					0.1	1730	
	Maize	0.05	1830					0.05	1830	
	Pulses	0.01	980	0.007	980			0.017	1960	
	Oilseeds	0.003	716	5	716			5	1432	

	Wheat			0.2	2010			0.2	2010	
Major Horticultural crops (Crops identified based on total acreage)										
	Vegetables							0.3	14500	
	Orchards							7.0	934	
	Potato							3.4	28700	

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Rice	Maize	Pigeonpea	Wheat	Rapeseed and Mustard
	Kharif- Rainfed		3rd week of June to 4th week of June	3rd week of June to 4th week of June		
	Kharif-Irrigated	1st week of June to 1st week of July				
	Rabi- Rainfed		3rd week of October to 1st week of November		3rd week of October to 1st week of November	
	Rabi-Irrigated		1st week of November to 1st week of December		1st week of November to 1st week of December	3rd week of September to 1st week of October

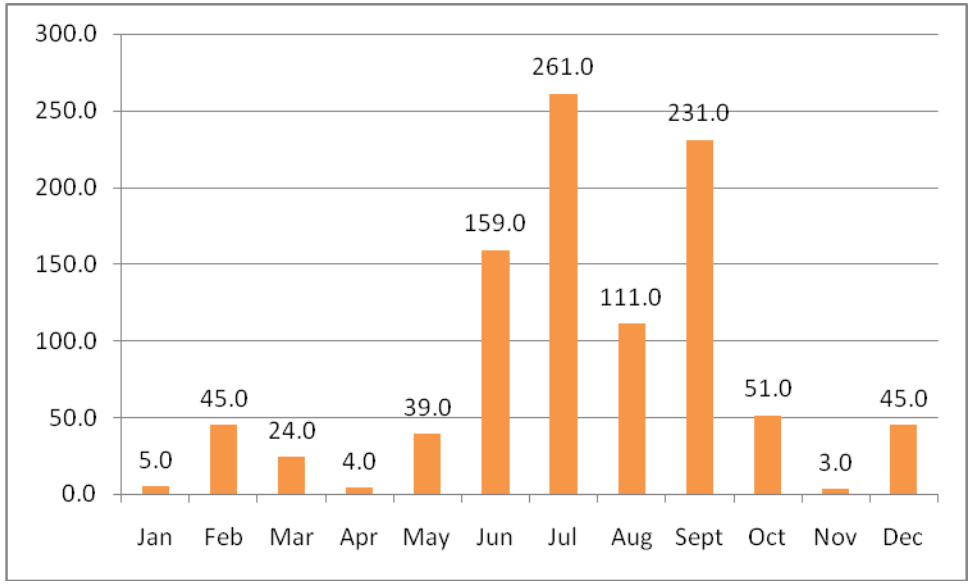
1.13	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought	√		
	Flood	√		
	Cyclone			√
	Hail storm			√
	Heat wave	√		
	Cold wave		√	
	Frost		√	
	Sea water intrusion			√
	Pests and disease outbreak		√	

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


Bihar
Sikkim
Nepal
Pashchim Champaran
Purba Champaran
Sitamarhi
Sheohar
Gopalganj
Madhubani
Supaul
Araria
Kishanganj
Uttar Pradesh
Siwan
Muzaffarpur
Darbhanga
Bangladesh
Saran
Vaishali
Samastipur
Saharsa
Madhepura
Purnia
Buxar
Bhojpur
Patna
Begusarai
Khagaria
Katihar
West Bengal
Munger
Bhagalpur
Nalanda
Lakhisarai
Jehanabad
Sheikhpura
Bhabua
Rohtas
Aurangabad
Nawada
Jamui
Banka
Gaya
Bangladesh
Jharkhand
not to scale
© 2011, emapsworld

Annexure-II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200.0
150.0
100.0
50.0
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5.0
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24.0
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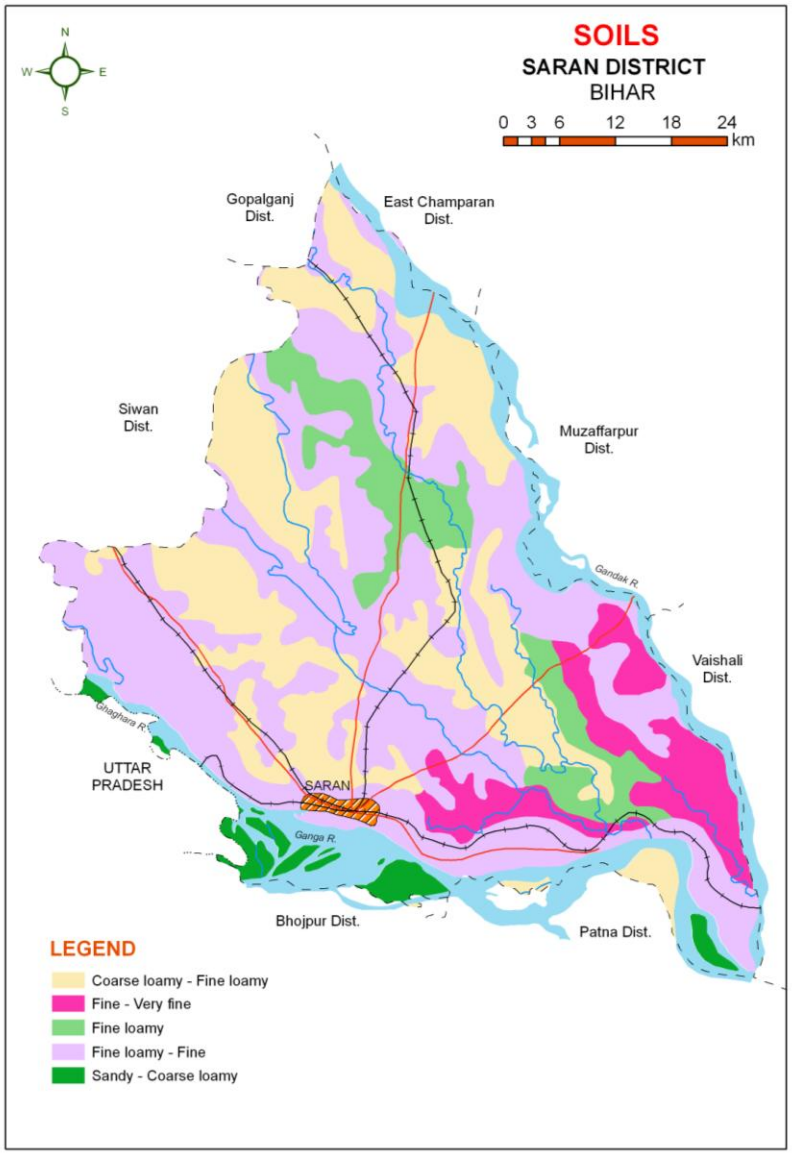
261.0
111.0
231.0
51.0
3.0
45.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec

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[a]**	**Normal Crop / Cropping system**	**Change in crop / cropping system[s] including variety**	**Agronomic measures**	**Remarks on Im plementation**
Delay by 2 weeks 1st week of July	Upland Alluvial soils	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram 5.Maize-Wheat-Greengram/ Pigeonpea	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat- Greengram 5.Pigeonpea	Direct seeding of rice can be done, Life saving irrigation,, Use of potash as initial dose, Use of organic and bio-fertilizer to increase WHC of the soil,	
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	Direct seeding of rice can be done, Life saving irrigation , Use of potash as initial dose, Use of organic and bio-fertilizer to increase WHC of the soil, Sowing by zero tillage to save moisture,	
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	1.Rice – Wheat 2.Rice-Wheat-Greengram	Life saving irrigation,	
Delay by	Upland	1.Rice-Wheat	Short duration Rice-Wheat		Seeds from RAU,

4 weeks 3rd week of July	Alluvial soils	2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram 5.Maize-Wheat-Greengram/ Pigeonpea	Rice:Prabhat, Dhanlaxmi, Richharia, Rajendra Bhagwati, Saroj		Pusa, NSC, TDC , BRBN etc.
	Medium Land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	1.Rice-Wheat 2. Rice-Wheat-Greengram 3. Rice-Rai-Potato Rice - Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat,	Life saving irrigation, Application of organic manure and vermi compost initially for Rice, Mid duration Rice varieties (125-130 days)	
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	1.Rice – Wheat 2.Rice-Wheat-Greengram Rice : Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta	Use 40-45 days old seedlings may be used with three seedling per hill with close spacing Mulching, Application of Organic manure and vermi compost initially for rice, Use long duration variety(130-140 days)	
Delay by 6 weeks 1st week of August	Upland Alluvial soils	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram 5.Maize-Wheat-	1.Early Rice-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat 4.Blackgram-Wheat 5.Blackgram/ Horsegram-Wheat 6.Sesamum-Potato-Wheat	Direct seeding of Rice, Application of Potassic fertilizer along with adjuvant at vegetative stage , Protective spray of pesticides with adjuvant against BLB & BLAST& Helminthosporium leaf spot, Machine transplanting,	Seeds from RAU, Pusa, NSC, TDC , BRBN etc.

		Greengram/ Pigeonpea	Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj Blackgram: T-9, Navin, Pant Urd-19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	Practice zero tillage for Rice	
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Green gram 3.Rice-Rai-Potato	1.Rice (Short duration)-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat 4.Blackgram-Wheat Blackgram: T-9, Navin, Pant Blackgram-19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	Application of Potassic fertilizer with adjuvant at vegetative stage,	
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	1.Rice (Short Duration)-Wheat 2.Rice-Rai- Greengram 3.Rice –Vegetables 4.Rice- Potato-Greengram 5.Sesamum-Potato-Greengram 6.Blackgram-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta Sesamum : 66-197-3, Rajendra Sarson-I (For early sowing), Rajendra Anukul, Rajendra Picheti, Rajendra Suphalam for late sowing	20 days old seedlings (Dapog nursery) should be used for rice, Application of Potassic fertilizer at vegetative stage, Application of organic manure and vermi compost initially for rice and other crops	

Delay by 8 weeks 3rd week of August	Upland	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea	1.Late sown Rice-Late sown Wheat 2.Pigeonpea (September) - Greengram/ Blackgram -Late Wheat 3.Sesamum-Rai-Greengram 4.Toria-Wheat- Greengram Rice: Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj Pigeonpea: Pusa-9,Sharad, Arhar-I	Direct seeding of rice Enhanced basal dose of NPK in rice to boost early vegetative growth , Application of organic manure and vermi compost initially for rice and other crops	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	1.Sesamum –Rabi Maize 2.Sesamum-Late Wheat 3.Pigeonpea (September) - Greengram Sesamum : Krishna, Pragati Pigeonpea: Pusa-9, Sharad, Narendra Arhar-I		
	Lowland	Rice- Potato	1.Sesamum –Rabi Maize 2.Sesamum-Late Wheat 3.Pigeonpea (September) - Greengram Sesamum : Krishna, Pragati Pigeonpea: Pusa-9, Sharad, Narendra Arhar-I		
		Rice-Wheat-Greengram	1.Pigeonpea (September) – Greengram 2.Sesamum-Rabi Maize Pigeonpea: Bahar, Pusa-9, Narendra Arhar-I Sesamum: Krishna, Pragati		

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measures[d]**	**Remarks on Implementation[e]**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Upland	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea	Life saving irrigation, Gap filling of existing crop, Thinning	Application of potash, Mulching , Inter culturing	Seeds from RAU, Pusa, NSC, TDC, BRBN etc
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato			
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	Pre sowing irrigation, Higher seed rate, Life saving irrigation Gap filling through Dapog nursery seedlings		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measures[d]**	**Remarks on Implementation[e]**

At vegetative stage	Upland	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea	Gap filling of existing crop Postponement of top dressing	Inter culturing, Mulching Conservation tillage, Life saving irrigation, Spray of potassic fertilizer with adjuvant , Spray (1%) Urea	
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato			
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram			

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measures[d]**	**Remarks on Implementation[e]**
At flowering/ fruiting stage	Upland	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea		Inter culturing, Mulching Conservation tillage, Life saving irrigation, Spray of potassic fertilizer with adjuvant , Spray Urea (1%) on the crops	
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato			

	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram			

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
	Upland	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea	Life saving irrigation , Thinning, Clipping of leaves in maize	Wheat/ Rabi Maize/Pulses /Oilseeds/ Vegetables	
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	Life saving irrigation		
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram			

2.1.2 Drought - Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in	Upland	1.Rice-Wheat 2.Rice-Wheat-Greengram	1.Early Rice-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat	Direct seeding of rice, Application of Potassic fertilizer with adjuvant at	Seeds from RAU, Pusa, NSC, TDC,

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
canals due to low rainfall		3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea	4.Blackgram-Wheat 5.Pigeonpea/ Sesamum-Potato-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj Blackgram- T-9, Navin, Pant Urd -19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	vegetative stage,	BRBN etc.
	Medium Land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	1.Rice (Short duration)-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat 4.Blackgram-Wheat Blackgram: T-9, Navin, Pant Urd -19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	Direct seeding of Rice , Application of organic manure and vermicompost initially for Rice and other crops	
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	1.Rice (Short Duration)-Wheat 2.Rice-Rai-Greengram 3.Rice –Vegetables 4.Rice- Potato-Greengram 5.Sesamum-Potato-Greengram 6.Blackgram-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta	20days old Dapog seedling should be used for rice, Application of Potassic fertilizer at vegetative stage ,	

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	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram/ Pigeonpea	1.Early Rice-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat 4.Blackgram-Wheat 5.Pigeonpea/ Sesamum-Potato-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj Blackgram- T-9, Navin, Pant Urd -19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	Direct seeding of rice, Application of Potassic fertilizer with adjuvant at vegetative stage,	Seeds from RAU, Pusa, NSC, TDC , BRBN etc.
	Medium Land	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato	Rice (Short duration)-Wheat/ 1.Sesamum-Wheat 2.Horsegram-Wheat 3.Blackgram-Wheat Blackgram: T-9, Navin, Pant Urd-19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	Direct seedling of Rice , Application of organic manure and vermi compost initially for rice and other crops	
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	1.Rice (Short Duration)-Wheat 2.Rice-Rai-Greengram 3.Rice –Vegetables 4.Rice- Potato- Greengram 5.Sesamum-Potato- Greengram 6.Blackgram-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra	Use 20 days old dapog seedling for rice, Application of Potassic fertilizer at vegetative stage , Application of organic manure and vermi compost initially for rice	

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]**
			Sweta		

Condition			Suggested Contingency measures		
Non release of water in canals under delayed onset of monsoon in catchment	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
	Upland	1.Rice-Wheat 2.Rice-Wheat-Green gram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram 5.Maize-Wheat-Greengram/ Pigeonpea	1.Early Rice-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat 4.Blackgram-Wheat 5.Pigeonpea/ Sesamum-Potato-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj Blackgram: T-9, Navin, Pant Urd-19, 30 Horsegram: DB-7, BR-5, BR-10, Coimbatore-1	Direct seeding rice	Seeds from RAU, Pusa, NSC, TDC, BRBN etc.
	Medium land	1.Rice-Wheat 2.Rice-Wheat-Green gram 3.Rice-Rai-Potato	1.Early Rice-Wheat 2.Sesamum-Wheat 3.Horsegram-Wheat 4.Blackgram-Wheat 5.Pigeonpea/ Sesamum-Potato-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj Blackgram: T-9, Navin, Pant Urd-19, 30	Direct seeding rice,	

			Horsegram: DB-7, BR-5, BR-10, Coimbatore-1		
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	1.Rice (Short Duration)-Wheat 2.Rice-Rai-Greengram 3.Rice –Vegetables 4.Rice- Potato- Greengram 5.Sesamum-Potato-Greengram 6.Blackgram-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta	Use 20 days old dapog seedling for rice, Application of Potassic fertilizer at vegetative stage , Application of organic manure and vermi compost initially for rice and other crops	

Condition			**Suggested Contingency measures**		
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
	Upland	1.Rice-Wheat 2.Rice-Wheat-Green gram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram 5.Maize-Wheat-Greengram/ Pigeonpea	1.Late sown Rice-Late sown Wheat 2.Sept. Pigeonpea-Greengram 3.Greengram/Blackgram-Late Wheat 4.Sesamum-Rai-Greengram Rice: Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj Greengram: Samrat, Pusa Vishal, SML 668, PDM-44, T-44 Pigeonpea: Pusa-9,Sharad, Arhar-I Blackgram :T-9, Navin, Pant Urd-19, 30	Direct seeding Rice, Application of Potassic fertilizer at vegetative stage, Application of organic manure and vermi compost initially for rice and other crops	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium land	1.Rice-Wheat	1.Sesamum –Rabi Maize 2.Sesamum-Late Wheat		

		2.Rice-Wheat-Green gram 3.Rice-Rai-Potato	3.Pigeonpea (September) – Greengram Sesamum: Krishna, Pragati Pigeonpea: Pusa-9, Sharad, Narendra Arhar-I		
	Lowland	Rice- Potato	1.Sesamum –Rabi Maize 2.Sesamum-Late Wheat 3.Pigeonpea (September) – Greengram Sesamum: Krishna, Pragati Pigeonpea: Pusa-9, Sharad, Narendra Arhar-I		
		Rice-Wheat-Greengram	1.Pigeonpea (September) – Greengram 2.Sesamum-Rabi Maize Pigeonpea: Bahar, Pusa-9, Narendra Arhar-I Sesamum: Krishna, Pragati		

Insufficient groundwater recharge due to low rainfall	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
	Upland	1.Rice-Wheat 2.Rice-Wheat-Green gram 3.Rice-Rai-Potato 4.Maize-Wheat-Greengram	Short duration Rice-Wheat Rice:Prabhat, Dhanlaxmi, Richharia, Rajendra Bhagwati, Saroj	Direct seeding of rice	Seeds from RAU, Pusa, NSC, TDC, BRBN etc.

		5.Maize-Wheat-Greengram/ Pigeonpea			
	Medium Land	1.Rice-Wheat 2.Rice-Wheat-Green gram 3.Rice-Rai-Potato	1.Rice-Wheat 2.Rice-Wheat-Greengram 3.Rice-Rai-Potato Rice: Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat	Life saving irrigation, Application of organic manure and vermi compost	
	Lowland	1.Rice – Wheat 2.Rice-Wheat-Greengram	Rice (130-140 days): Rajshree, Santosh , Sita Rajendra Suwasni, Rajendra Sweta		

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

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Rice	• Provide drainage • Re transplanting through Dapog nursery seedlings • Gap filling	• Provide drainage	• Provide drainage • Harvest at physiological maturity	Storage at safer place
Maize	• Provide drainage • Gap filling • Re sowing	• Provide drainage	• Provide drainage • Harvest at physiological maturity	Storage at safer place
Pigeonpea	• Provide drainage • Gap filling	• Provide drainage	• Provide drainage • Harvest at physiological maturity	Storage at safer place

Vegetables	• Re sowing • Re planting	• Provide drainage	• Provide drainage	Storage at safer place
Horticulture				
Mango	• Provide drainage • Replanting , • Gap filling	• Provide drainage	• Provide drainage • Harvesting at proper maturity	
Litchi	• Provide drainage • Replanting	• Provide drainage	• Provide drainage	
Banana	• Provide drainage • Replanting	• Provide drainage	• Provide drainage	
Papaya	• Provide drainage • Replanting	• Provide drainage	• Provide drainage	• Safe storage and transportation
Heavy rainfall with high speed winds in a short span[2]				
Rice	• Provide drainage • Replanting, • Gap filling	• Provide drainage	• Provide drainage	Storage at safer place
Maize	• Re sowing • Gap filling • Provide drainage	• Provide drainage	• Provide drainage	Storage at safer place
Pigeonpea	• Re sowing • Gap filling Provide drainage	• Provide drainage	• Provide drainage	Storage at safer place
Vegetables	▪ Provide drainage ▪ Gap filling	• Provide drainage	• Provide drainage	
Horticulture				
Mango	• Provide drainage	• Provide drainage	• Provide drainage	

	• Replanting		• Harvest at physiological maturity	
Litchi	▪ Provide drainage ▪ Gap filling	Provide drainage	• Provide drainage • Drenching with copper fungicide	
Banana	• Provide drainage • Replanting	• Provide drainage • Staking	• Provide drainage • Harvest at proper time	
Guava	• Provide drainage • Replanting	• Provide drainage	• Provide drainage • Harvest at proper time	
Outbreak of pests and diseases due to unseasonal rains				
Rice	• Seedling treatment with Carbendazim + Imidacloroprid	• Provide drainage	• Provide drainage	Storage at safer place
Maize	• Application of granular insecticides viz. Thimet 10 g/Carbofuran 3g in whorl of maize	• Provide drainage	• Provide drainage	Storage at safer place
Pigeonpea	• Use of pesticides	• Provide drainage	• Provide drainage	Storage at safer place
Vegetables	• Provide drainage	• Provide drainage	• Provide drainage	Safe storage & transportation
Horticulture				
Mango	• Provide drainage	• Provide drainage	• Provide drainage	
Litchi	• Provide drainage	• Provide drainage	• Provide drainage	
Banana	Provide drainage	Provide drainage	• Provide drainage	
Guava	• Provide drainage	Provide drainage	• Provide drainage	

2.3 Floods

Condition	Suggested contingency measure[o]			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	• Provide drainage • Re transplanting through Dapog nursery seedlings • Gap filling	• Provide drainage • Gap filling with 40-45 days old seedlings • Kharuhan (double transplanting)	• Provide drainage • Harvest at physiological maturity • Lentil as paira crop can be taken	Storage at safer place
Maize	• Provide drainage • Re sowing • Gap filling	• Provide drainage	• Provide drainage • Harvest at physiological maturity	Storage at safer place
Pigeonpea	• Provide drainage • Re sowing • Gap filling	• Provide drainage	• Provide drainage • Harvest at physiological maturity	Storage at safer place
Horticulture				
Mango	• Replanting • Gap filling • Provide drainage	• Provide drainage	• Provide drainage	Judicious harvesting
Litchi	• Gap filling • Replanting • Provide drainage	• Provide drainage	• Provide drainage	Judicious harvest
Banana	• Replanting • Gap filling • Provide drainage	• Provide drainage	• Provide drainage	Judicious harvesting
Guava	• Replanting • Gap filling • Provide drainage	• Provide drainage	• Provide drainage	Judicious harvesting
Continuous submergence for more than 2 days[2]				
Rice	• Gap filling • Re sowing	• Replanting through Kharuhan method	• Toria/Late wheat if completely damaged	Storage at safer place

		(double transplanting) by 3-4 seedlings per hill • Short duration rice variety		
Maize	• Re-sowing		• Toria/Late wheat if completely damaged	Storage at safer place
Horticulture				
Mango	• Provide drainage			
Guava	• Provide drainage			
Banana	• Provide drainage			
Sea water intrusion[3]	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				
Rice	Provide irrigation	Provide irrigation Spray of potassic fertilizer with adjuvant	Provide irrigation Spray of potassic fertilizer with adjuvant	
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 wave				
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	Treat the seeds with 0.2% Mancozeb	Provide irrigation , Mulching		
Brinjal		Provide irrigation , Mulching		
Chilli		Provide irrigation , Mulching		
Tomato & Potato	Treat the seeds with 0.2% Mancozeb	Earthing up Provide irrigation , Mulching	Spray Mancozeb @ 2.5 gm/lt of water in 3rd week of December at 10 days interval 3 times	Harvest in dry weather
Hailstorm	Not Applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the events	**During the event**	**After the event**
Drought			
Floods			
Feed and fodder availability	**1.** Cultivation of fodder tree **2.** Storage of Improved Quality Fodder **3.** Conservation & Storage of • Feed & Fodder • Hay & Silage: — Preserve the fodder in the form of hay from Berseem & other grasses as well as silage from (a) Maize- harvesting at well developed cob. (b) Sorghum - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hyacianth mixing with Rice	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: 1. Bamboo leaves 2. Neem 3. Bargad	Production of forage crops **1.** Balanced feeding of Animal supported with little higher concentrate mixture **2.** Cultivation of fodder Rabi maize if water stagnated upto November/ December **3.** Sorghum/Cowpea **4.** Maize in September **5.** Poly bag silage

	straw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacianth. (f) Potato leaves mixing with wheat straw in ratio of 7:1 and should be supplemented with 3% molasses. Hay: – • 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: – (a) Complete Feed Block (CFB) (b) Urea-Molasses-Mineral-Block (U.M.M.B) **5.** Development of Fodder Bank	4. Peepal 5. Seesam 6. Subabul Use of unconventional feed stuff: (i) Aquatic Plants – water hycianth (i) Lotus (ii) Aquatic weeds	should be prepared **6.** Establishment of atleast one centre for production of concentrate feed should be done.

Health and disease management	Veterinary Preparedness with Medicines, Vaccines and provision for mobile ambulatory van. • Vaccination 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. This will be helpful not only to check epidemic in animals, but also to reduce the probability of zoonoses in human beings. 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. Mass vaccination should be conducted by a team of Department staff with proper maintenance of detailed Inoculation Register. 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.	Animal safety, Health camp and Treatment Important Suggestions for animal and Poultry safety During flood, all efforts should be made to rescue most of the livestock and poultry as carefully as possible. 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. The fisherman or the people who knows swimming should be deputed for the rescue of drowning and floating animals and birds. During flood do not leave halter or headstalls on animals. Do not tie animals together when releasing. Report the location, identification and disposition of livestock and poultry to authorities handling the	Sanitation, deworming, treatment, health camps Culling of Sick animals and disposal of carcass 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. 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 anthelmentics. This will enable the animals to regain proper health.

		disaster. Health camp and treatment 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 poulrty to authorities handling the disaster. Health camp and treatment Water borne diseases are one of the most common phenomena during the flood Diarrhoeal diseases outbreaks can occur after drinking contaminated water. 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. Salmonella spp. Escherichia coli Giardiasis	In water logged area, sucks can be introduced as biological control measures against snails to protect livestock from parasitec disease. 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. 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. Methods of Carcass disposal to be adopted Burial Burning Composting

		Amoebiasis Rotavirus Leptospirosis Scabies Black leg Malignant Edema Foot rot Anthrax Botulism Tetanus Red water Black disease Entertoxemia Liver fluke Amphistomiasis Brooders pnemonia Treatment of Non infectious rangement should be made for the treatment of drowning and traumatic injuries, aspiration pneumonia, lameness and other surgical cases in the health camp. Disinfection of livestock premises and Poultry shed sinfection of livestock emises and the temporary sheds should be done with the help of bleaching powder, phenol, carbolic acid etc	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	Vaccines to be used for different animals and Poultry **Cattle and Buffalo** Hemorrhagic SepticemiaVaccine Black Quarter Vaccine FMD Vaccine Anthrax Vaccine as per endemicity. **Sheep and Goat** Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine 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. **Dogs** Rabies Vaccine **Poultry** Mareks disease vaccine RDV (F_1 & R_2B), FPV, IBRV & IBDV **(Annexure-1)** • **Medicines** All Districts should be earmarked for flood. An inventory of required medicines to treat the affected livestock in case of eventualities should be made. 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 Broad spectrum antibiotics Anti-inflammatory Antipyretic and Analgesics Fluids and Electrolytes • **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. For this MVC must have adequate drugs like antibiotic, analgesic, dewormer, ointment, antisnake venom and emergency health care facilities along with trained personnel. A good no. of mobile clinic teams should be planned consisting dedicated and experienced technical workers with allotment of area of operation. The teams should be kept in readiness **having required**			

	stock of medicines and equipment to work in any adverse situation. 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. 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.			
Cyclone				
Heat wave and cold wave				

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought			
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			
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.		Re establishment of the infra structural facility.
3. Cyclone			
4. Heat wave and cold wave			