

**State: WEST BENGAL**  
**Agriculture Contingency Plan for District: HOWRAH**

<b>1.0 District Agriculture profile</b>				
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>			
	Agro Ecological Sub Region (ICAR)	Assam And Bengal Plain, Hot Subhumid To Humid (Inclusion Of Perhumid) Eco-Region. (15.1)		
	Agro-Climatic Zone (Planning Commission)	Lower Gangetic Plain Region (III)		
	Agro Climatic Zone (NARP)	Costal – Saline zone (WB-6)		
	List all the districts or part thereof falling under the NARP Zone	24 Paraganas(North), Calcutta and South 24 Paraganas, Haora, Hooghly, Midnapur(west)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		22 ° 35'44.77" N	88° 15'49.10" E	12 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RRS, Costal & Saline Zone, Kakduip-743 347		
Mention the KVK located in the district	Howrah KVK; Jagatvallabpur, Howrah-711 408			

<b>1.2</b>	<b>Rainfall</b> (Ten year' average 1998-2007)	Normal RF(mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	1095.4	1 <sup>st</sup> week of June	4 <sup>th</sup> week of September
	NE Monsoon (Oct-Dec):	202.7		
	Winter (Jan- March)	71.2	-	-
	Summer (Apr-May)	162.1	-	-
	Annual	1531.4	-	-

<b>1.3</b>	<b>Land use pattern of the district</b> (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
	<b>Area ('000 ha)</b>	138.67	85.57	-	51.24	-	0.21	1.20	1.00	4.6	0.24

<b>1.4</b>	<b>Major Soils (common names like red sandy loam deep soils (etc.))</b>	<b>Area ('000 ha)</b>	<b>Percent (%) of total</b>
	1. Clayey	13.82	16
	2. Clayey loamy	42.35	49
	3. Loamy	30.25	35

<b>1.5</b>	<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>
	Net sown area	80.73	202
	Area sown more than once	82.13	
	Gross cropped area	162.86	

<b>1.6</b>	<b>Irrigation</b>	<b>Area ('000 ha)</b>		
	Net irrigated area	44.03		
	Gross irrigated area	126.17		
	Rainfed area	36.69		
	<b>Sources of Irrigation</b>	<b>Number</b>	<b>Area ('000 ha)</b>	<b>Percentage of total irrigated area</b>
	Canals	-	29.34	66.63%
	Tanks	23589	8.39	19.05%
	Open wells	-	-	-
	Bore wells	-	-	-
	Lift irrigation schemes	1250	6.30	14.30%
	Micro-irrigation	-	-	-
	Other sources (please specify)	-	-	-
	Total Irrigated Area	-	44.03	99.98%
	Pump sets	-	-	-
	No. of Tractors	-	-	-
	<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	<b>No. of blocks/ Tehsils</b>	<b>(%) area</b>	<b>Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)</b>
	Over exploited	-	-	Arsenic level 0.05-0.10 mg/lit
	Critical	Data yet to the collected	-	Salinity CI-111 & above
	Semi- critical	-	-	Arsenic depth range 9-220 mbgl

Safe	14	-	Salinity
Wastewater availability and use	-	-	-
Ground water quality	Arsenic contamination in 4 blocks		
*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) (year 2007 – 08)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Khariif</i>			<i>Rabi</i>				
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	Rice	-	1.10	1.10	-	67.8	67.8	48.9	117.8
	Wheat	-	-	-	0.50	-	0.50	-	0.50
	Pulses (Lathyrus, Blackgram, Greengram)	-	-	-	-	0.60	0.60	-	0.60
	Oilseeds (Sunflower, Safflower, Mustard, Linseed)	-	-	-	6.90	-	6.90	-	6.90
	Jute	-	3.60	3.60	-	-	-	-	3.6
	Potato	-	-	-	8.0	-	8.0	-	8.0
	<b>Horticulture crops - Fruits</b>	<b>Area ('000 ha)</b>							
		<b>Total</b>			<b>Irrigated</b>			<b>Rainfed</b>	
	Mango	0.57			-			0.57	
	Banana	0.70			0.70			-	
	Papaya	0.12			-			0.12	
	Guava	0.18			-			0.18	
	Jackfruit	0.14			-			0.14	
	<b>Horticulture crops - Vegetables</b>	<b>Total</b>			<b>Irrigated</b>			<b>Rainfed</b>	
	Brinjal	1.98			1.98			-	
	Cucurbits	1.78			1.78			-	
	Ladies finger	1.57			1.57			-	
	Cauliflower	0.88			0.88			-	
	Cabbage	0.78			0.78			-	
	Tomato	0.60			0.60			-	

<b>1.8</b>	<b>Livestock (2007-08)</b>	<b>Male ('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>		
	Non descriptive Cattle (local low yielding)	47.3	245.4	264049		
	Crossbred cattle	7.1	39.5	46645		
	Non descriptive Buffaloes (local low yielding)	0.2	10.3	1120		
	Graded Buffaloes	-	-	9494		
	Commercial dairy farms	-	-	-		
	Goat	-	-	187852		
	Sheep	-	-	593		
	Others (Camel, Pig, Yak etc.)	-	-	Horse-8, Pig-978, Rabbit-2859		
Commercial dairy farms (Number)	-	-	-			
<b>1.9</b>	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds ('000)</b>			
	Commercial	Broiler-1182, Improved Layer-25	In Farm: Broiler-560392, Layer-6779, Duck-60 [District Total of Improved strains Fowl-672006, Duck-1814452633, Turkey-214, Quail-264, Other-4232]			
	Backyard	Fowl-3, Duck (commercial + backyard) -1	In Farm: Deshi Total Fowl-145, Duck-60 [District Total of Deshi Fowl-474613, Duck-222642]			
<b>1.10</b>	<b>Fisheries (Data source: Chief Planning Officer)</b>					
	<b>A. Capture</b>					
	<b>i) Marine</b> (Data Source: Fisheries Department)	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>	<b>Storage facilities (Ice plants etc.)</b>
			Mechanized	Non-mechanized		
		-	-	-	-	-
<b>ii) Inland</b> (Data Source: Fisheries Department)	<b>No. Farmer owned ponds (Under FFDA Scheme up to 08-09)</b>		<b>No. of Reservoirs</b>	<b>No. of village tanks</b>		
	No. of Farmer: 14300 Area of Pond (ha.) : 4803.75		Nil	Record not available		

**1.11 Production and Productivity of major crops** (Average of last 4 years: 2004-05, 05-06, 06-07, and 07-08)

1.11	Name of crop	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
<b>Major Field crops</b>									
	Rice	2.509	1749	124.05	1700	136.79	1767	263.349	2187
	Wheat	-	-	0.69	1823	-	-	0.69	1823
	Jute	64.98	4006	-	-	-	-	64.98	4006
	Pulses	-	-	1.28	758	-	-	1.28	758
	Oilseeds	-	-	40.87	1127	-	-	40.87	1127
	Potato	-	-	1960.32	20839	-	-	1960.32	20839
<b>Major Horticultural crops</b>									
	Brinjal	-	-	-	-	-	-	25.77	13015
	Cucurbits	-	-	-	-	-	-	19.31	10848
	Okra	-	-	-	-	-	-	12.45	79290
	Cauliflower	-	-	-	-	-	-	17.50	19886
	Cabbage	-	-	-	-	-	-	19.50	25000

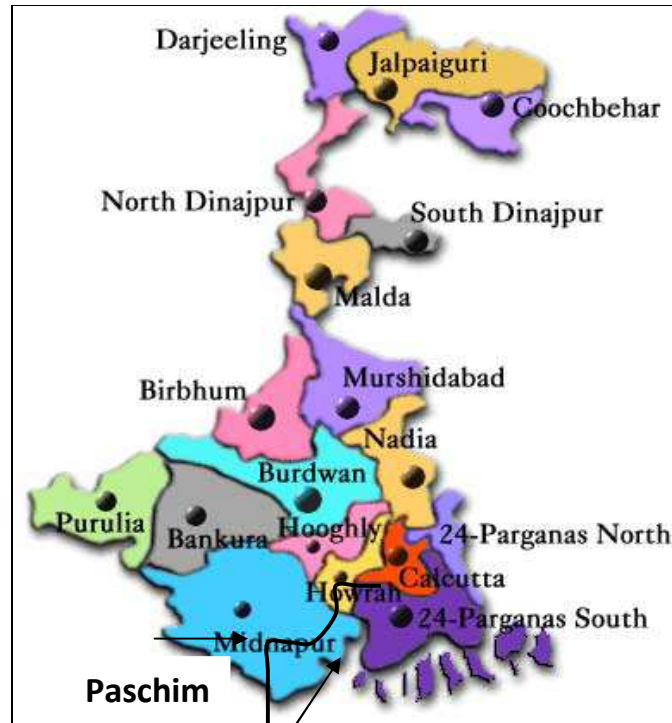
1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Jute	Potato	Oilseeds	Pulses
	Kharif- Rainfed	July 1 <sup>st</sup> to 4 <sup>th</sup> week	-	-	-	-
	Kharif-Irrigated	July 1 <sup>st</sup> to 4 <sup>th</sup> week		-	-	-
	Rabi- Rainfed	-	March 4 <sup>th</sup> week to April 3 <sup>rd</sup> week	-	-	
	Rabi-Irrigated	Jan 3 <sup>rd</sup> to 4 <sup>th</sup> week		Nov.2 <sup>nd</sup> to 4 <sup>th</sup> week	Nov 1 <sup>st</sup> week. to 3 <sup>rd</sup> week	Nov.2 <sup>nd</sup> week to 4 <sup>th</sup> week

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

<b>1.14</b>	<b>Include Digital maps of the district for</b>		
		Location map of district within State, Annexure I	Enclosed: Yes
		Agro-climatic Zones of West Bengal, Annexure 2	Enclosed: Yes
		Mean annual rainfall, Annexure 3	Enclosed: Yes
		Soil map of West Bengal, Annexure 4	Enclosed: Yes

Annexure –I

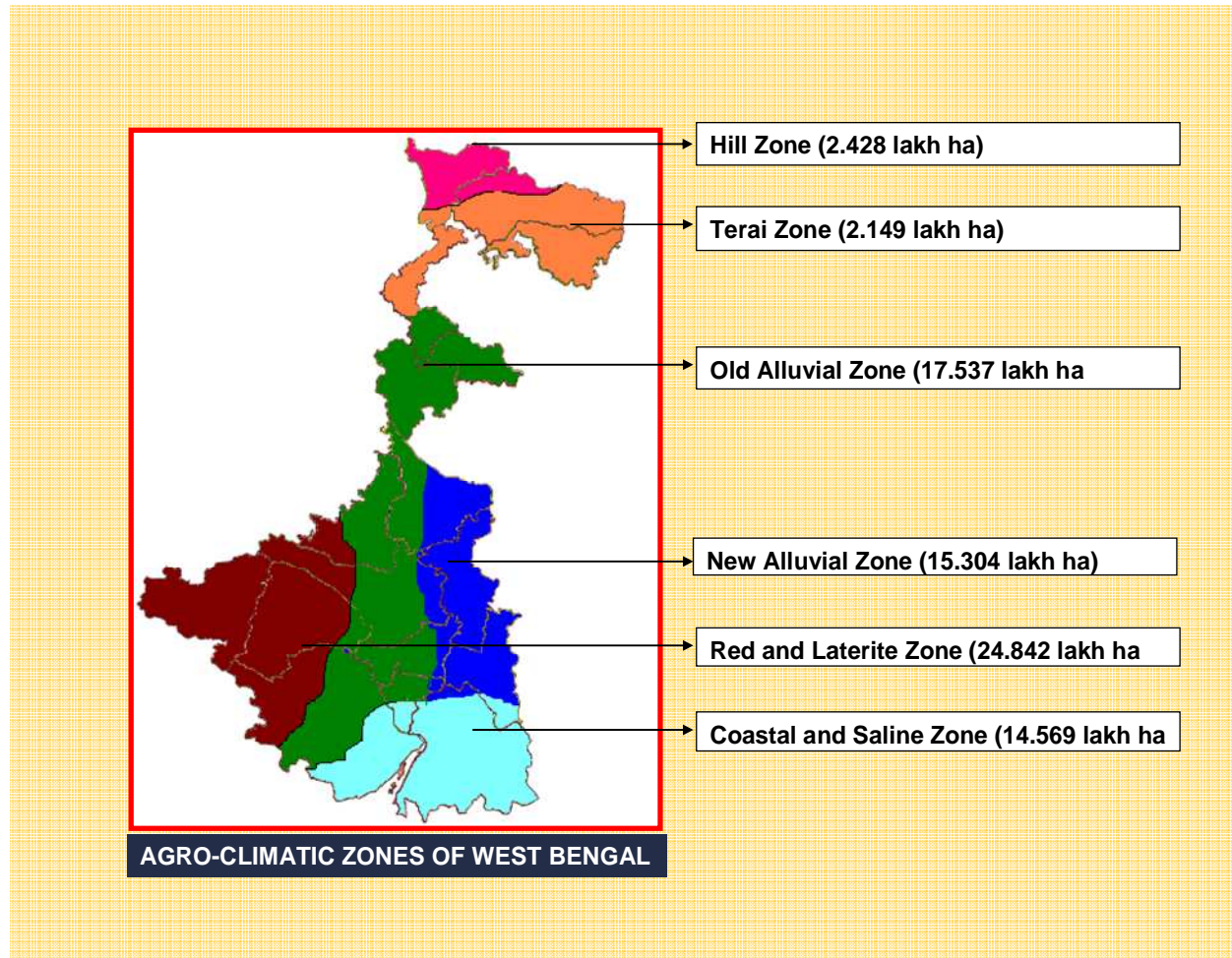
Location map of Howrah district



Purba

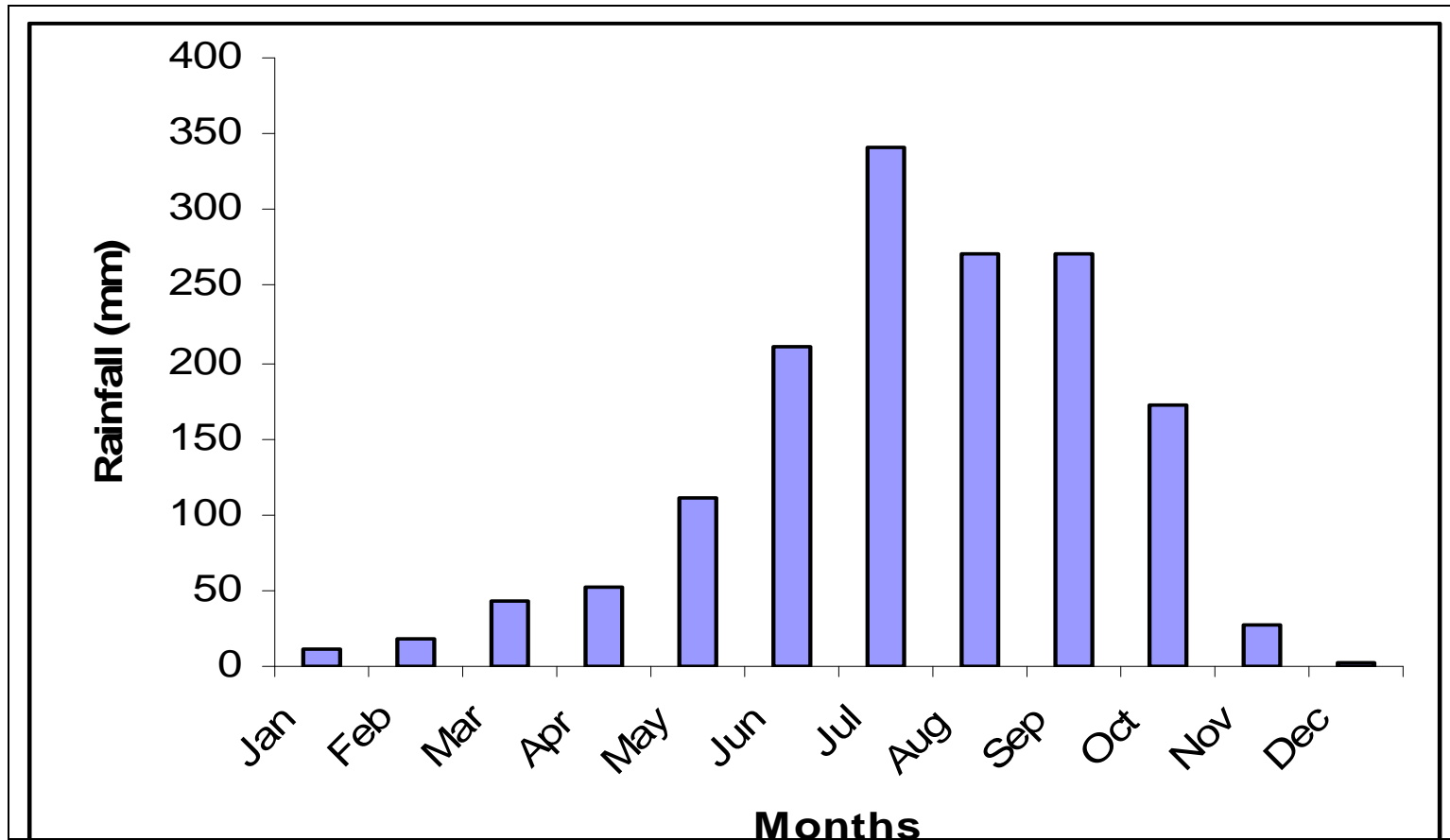
## Annexure-II

### Agro-climatic Zones of West Bengal





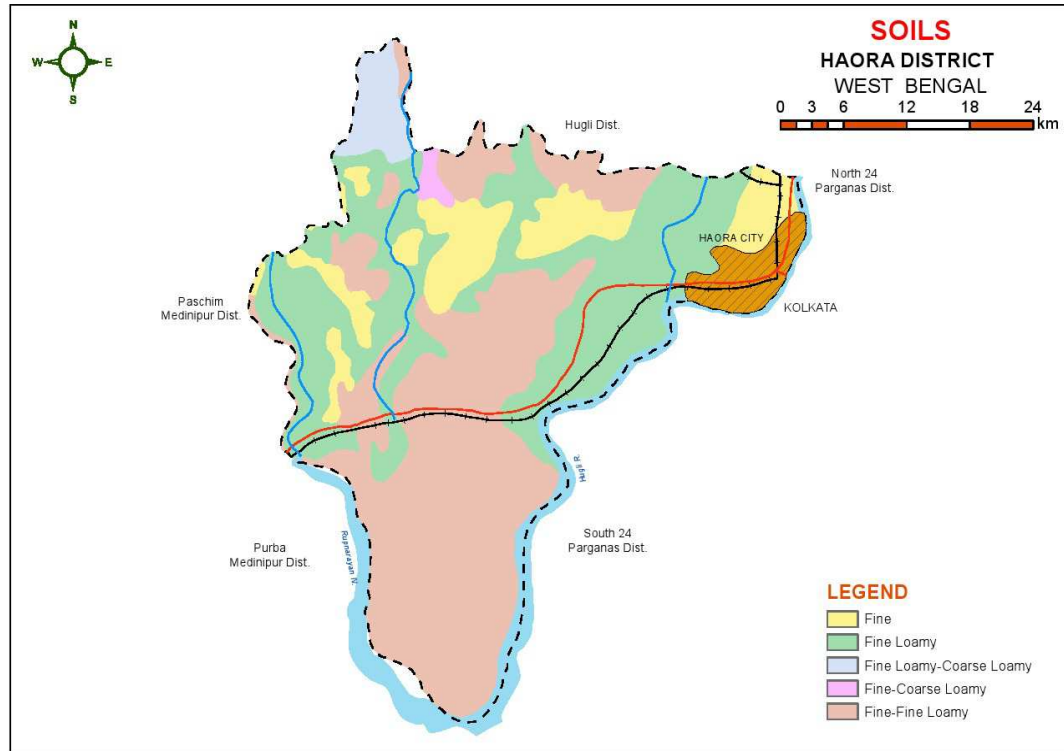
Annexure – III



Mean monthly rainfall of Howrah district

## Annexure-IV

### Soil map of Howrah district



Source: NBSS & LUP Regional centre, Calcutta

## 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	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks  3 <sup>rd</sup> week of June	Deep loamy soils Gangetic New Alluvial Plains High Rainfall (>1500 mm)	Rice-Pulse(Lentil/Lathyrus)	No change. Prefer short duration varieties (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna)	Transplant 2-3 seedlings/hill	Link seed farms, Department of Agriculture, NSC,WBSC, and BCKVV, Kalyani for supply of seed
		Rice-Jute	No change. Adopt short duration HYV of Rice – Shatabdi, Khitish	-do-	
		Rice-Mustard	No change. Prefer short duration varieties (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna)	-do-	
		Rice-Vegetables-Sesame	No change. Prefer short duration varieties (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna)	-do-	

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks  1 <sup>st</sup> week of Aug	Deep loamy soils Gangetic New Alluvial Plains	Rice-Pulse (Lentil/Lathyrus)	No change. Prefer short duration varieties (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna)	Transplant 2-3 seedlings/hill	Link seed farms, Department of Agriculture, NSC,WBSC, and BCKVV, Kalyani for supply of seed
		Rice-Jute	No change. Adopt short duration HYV of Rice – Shatabdi, Khitish	-do-	
		Rice-Mustard	No change. Prefer short duration varieties (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna)	-do-	

		Rice-Vegetables-Sesame	No change. Prefer short duration varieties (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna)	-do-	
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Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 6 weeks 3 <sup>rd</sup> week of Aug	Deep loamy soils Gangetic New Alluvial Plains	Rice-Pulse(Lentil/Lathyrus)	No change (Shatabdi, Khitish, Swarna Mahsuri, Sada Swarna) Alternatively prefer vegetables like brinjal (Muktakeshi, Makra) / Chillies (Surya mukhi, Jwala, BCCH SL-4)	Transplant 4-5 seedlings/hill	Link seed farms, Department of Agriculture, NSC,WBSC, and BCKVV, Kalyani for supply of seed
		Rice-Jute	No change. Adopt short duration HYV of Rice – Shatabdi, Khitish	-do-	
		Rice-Mustard	No change	-do-	
		Rice-Vegetables-Sesame	No change	-do-	

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 8 weeks 1 <sup>st</sup> week of Sept	Deep loamy soils Gangetic New Alluvial Plains	Rice-Pulse(Lentil/Lathyrus)	Replace kharif rice, prefer brinjal (Muktakeshi, Makra) / Chillies (Surya mukhi, Jwala, BCCH SL-4), Greengram (Samrat - PDM 84-139; IPM-02-03, Bireswar, Sukumar) /Blackgram (Pant U-31, 19, WBU-108 - Sharada, WBU-109 Sulota), kharif Maize	Transplant 4-5 seedlings/hill	Link seed farms, Department of Agriculture, NSC,WBSC, and BCKVV, Kalyani for supply of seed
		Rice-Jute	-do-	-do-	
		Rice-Mustard	-do-	-do-	

		Rice-Vegetables- Sesame	-do-	-do-	
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Condition			Suggested contingency measures	
Early season drought (Normal onset)	Major Farming situation	Normal Crop/ cropping system	Crop management	Soil nutrient & moisture conservation measures
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Deep loamy soils Gangetic New Alluvial Plains	Rice - Pulse (Lentil/Lathyrus) /Jute / Mustard / Vegetables	<ul style="list-style-type: none"> <li>Take up gap filling with available nursery or by splitting the tillers from the surviving hills</li> <li>Weeding</li> </ul>	<ul style="list-style-type: none"> <li>Apply foliar spray with 2% Urea</li> <li>Postpone top dressing with N</li> <li>Life saving irrigation (fertigation)</li> </ul>
		Rice-Jute	-do-	-do-
		Rice-Mustard	-do-	-do-
		Rice-Vegetables- Sesame	-do-	-do-

Condition			Suggested contingency measures	
	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid season dry spell at Vegetative stage	Deep loamy soils Gangetic New Alluvial Plains	Rice - Pulse (Lentil/Lathyrus) /Jute / Mustard / Vegetables	<ul style="list-style-type: none"> <li>Gap filling with the seedlings from available community nursery</li> <li>Weeding</li> </ul>	<ul style="list-style-type: none"> <li>Apply foliar spray with 2% Urea</li> <li>Postpone top dressing with N</li> <li>Life saving irrigation (fertigation)</li> </ul>
		Rice-Jute	-do-	-do-
		Rice-Mustard	-do-	-do-
		Rice-Vegetables- Sesame	-do-	-do-

Condition	Major Farming situation	Normal Crop/cropping system	Suggested contingency measures	
			Crop management	Soil nutrient & moisture conservation measures
Mid season dry spell at Flowering stage	Deep loamy soils Gangetic New Alluvial Plains	Rice - Pulse (Lentil/Lathyrus) /Jute / Mustard / Vegetables	<ul style="list-style-type: none"> <li>Weeding</li> <li>Life saving irrigation (fertigation)</li> <li>In case of failure of rice, broadcast pulses (blackgram) or plan for rabi mustard after harvesting fodder if damage is severe</li> </ul>	<ul style="list-style-type: none"> <li>Apply foliar spray with 2% Urea</li> <li>Life saving irrigation (fertigation)</li> </ul>
		Rice-Jute	-do-	-do-
		Rice-Mustard	-do-	-do-
		Rice-Vegetables-Sesame	-do-	-do-

Condition	Major Farming situation	Normal Crop/cropping system	Suggested contingency measures	
			Crop management	Rabi crop planning
Terminal drought (Early withdrawl of monsoon)	Deep loamy soils Gangetic New Alluvial Plains	Rice - Pulse (Lentil/Lathyrus) /Jute / Mustard / Vegetables	Life saving irrigation	Plan for early rabi crops like oilseeds, pulses, vegetables
		Rice-Jute	-do-	-do-
		Rice-Mustard	-do-	-do-
		Rice-Vegetables-Sesame	-do-	-do-

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 canals due to low rainfall	<b>Not applicable</b>				
Limited release of water in canals due to low rainfall	<b>Not applicable</b>				
Non release of water in canals under delayed onset of monsoon in catchment	<b>Not applicable</b>				
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Tube-well irrigated lowland alluvial soil	Rice-rice-rice	No change Alternatively: Rice + Lathyrus as paira cropping	<ul style="list-style-type: none"> <li>• Starter dose of 2% DAP to Lathyrus</li> <li>• Dapog method of nursery for rice and adopt SRI method of cultivation</li> </ul>	<ul style="list-style-type: none"> <li>• Linkage with Agricultural Farms under Department of Agriculture, Govt. of WB, Regional Research Station, UBKV, Majhian and KVK at Chopra for supply of seed</li> <li>• Machine for Zero tillage under NFSM</li> </ul>
	Tube-well irrigated medium land alluvial soil	Rice-potato-sesame	Rice-lentil (Asha, Ranjan) groundnut (TAG-51, Tag-24)/sesame (Kanke white, Rama) /Greengram (Samrat)	<ul style="list-style-type: none"> <li>• Dapog method of nursery for rice</li> <li>• Adopt SRI method of cultivation</li> <li>• Prefer ridge and furrow system for groundnut</li> </ul>	
		Rice-rapeseed-rice	Rice-rapeseed (B-9)sesame (Rama)	Dapog method of nursery for rice Adopt SRI method of cultivation	
		Rice-Wheat	No change	Zero till for wheat	
Insufficient groundwater recharge due to low rainfall	<b>Not applicable</b>				

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

<b>Condition - Continuous high rainfall in a short span leading to water logging</b>				
<b>Crop</b>	<b>Suggested contingency measure</b>			
	<b>Vegetative stage</b>	<b>Flowering stage</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Rice	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Postpone topdressing N fertilizers till water recedes</li> <li>• Take up gap filling either with available nursery or by splitting the tillers from the surviving hills</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Apply the recommended nutrients after draining excess water</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Spray 2% brine solution to prevent premature germination in field</li> <li>• Allow the crop to dry completely before harvesting</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water and spread sheaves loosely in the fields or field bunds where there is no stagnation or</li> <li>• Dry the grain to proper moisture content before bagging and storage</li> </ul>
Potato	Drain excess water	Drain excess water	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Harvest the produce on a clear sunny day after the water recedes</li> </ul>	Keep the harvested produce in shed for aeration
Mustard	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Intercultivation at optimum moisture condition to loosen and aerate the soil and to control weeds</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Intercultivation at optimum moisture condition to loosen and aerate the soil and to control weeds</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Allow the crop to dry completely before harvesting</li> </ul>	Dry the produce to proper moisture content before bagging and storage
Sesame	-do-	- do -	-do-	-do-
Jute	-do-	-do-	-do-	Immediately after harvesting, go for retting
Wheat	-do-	-do-	-do-	-do-
Pulses	-do-	-do-	-do-	-do-
<b>Horticulture</b>				
Cauliflower	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Three sprays of 0.1% Ammonium molybdate 15, 30 and 45 days after transplanting</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Blanching i.e. covering the curd through tying the outer leaves up over the curd improves curd colour and quality.</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Harvest on clear sunny day</li> </ul>	Large leaves are trimmed away leaving only sufficient jacket leaves to protect the curd from bruising and other mechanical injury in transport
Cabbage	-do-	-do-	-do-	-do-



Brinjal	-do-	-do-	-do-	-do-
<b>Condition-Heavy rainfall with high speed winds in a short span</b>				
Boro rice	Drain excess water	Drain excess water	Spray brine (2%) solution to prevent field germination	Dry the grain to proper moisture content before bagging and storing
Cauliflower	Drain excess water	Spraying the crop with Copper-oxychloride (0.4%) or Mancozeb (0.25 %)/ Chlorothalonil (0.2% ) or Difenconazole (0.5g/l) with sticker at 10 days interval to prevent curd blight.	-	-
Cabbage	-do-	Spraying the crop with Cypermethrin @ 0.1% with sticker to control Cabbage borer	-	-
Okra	-do-	Spraying the crop with Cypermethrin @ 0.1% to control fruit borer	-	-
<b>Condition-Outbreak of pests and diseases due to unseasonal rains</b>				
Rice	Protection against blast and sheath blight with hexaconazole or propiconazole @ 1ml/l	Protect against bacterial leaf blight with hexaconazole @ 1ml/l	Protect against bacterial leaf blight with hexaconazole @ 1ml/l	Prevent grain discolouration by spraying carbendazim 0.1%
Potato	Spray metalaxyl+mancozeb mixture @2.5g/l twice at 7days interval to protect against late blight disease	Spray metalaxyl+mancozeb mixture @1.5g/l twice at 10days interval to protect against late blight disease	Protection against late blight with carbendazim spray 0.1% immediately after cessation of rain	<ul style="list-style-type: none"> <li>Dehauling of affected parts and destroy</li> <li>Severely infected produce is unfit for seed purpose</li> </ul>
Mustard	<ul style="list-style-type: none"> <li>Spray application of carbaryl 0.1 % or endosulfan 0.07 % or phosalone 0.05% or profenofos 0.05% for the control of mustard saw fly</li> <li>Early sowing of mustard before 15<sup>th</sup> October will help to escape the attack of the mustard aphid and economic damage and Spray application of metasystox 0.05% or imidacloprid 0.01% or acetamiprid @ 0.01% also controls the pest</li> </ul>	<ul style="list-style-type: none"> <li>Spray application of carbaryl 0.1 % or endosulfan 0.07 % or phosalone 0.05% or profenofos 0.05% for the control of mustard saw fly</li> <li>Early sowing of mustard before 15<sup>th</sup> October will help to escape the attack of the mustard aphid and economic damage and Spray application of metasystox 0.05% or imidacloprid 0.01% or acetamiprid @ 0.01% also controls the pest</li> </ul>		

<b>Horticulture</b>				
Cauliflower	Spraying of Prophenophos @ 0.1% or Cypermethrin @ 0.1% to Control cabbage borer or diamond back moth with sticker	Spraying the crop with Copper-oxychloride (0.4%) or Mancozeb (0.25 %)/ Chlorothalonil (0.2% ) or Difenconazole (0.5g/lit) with sticker at 10 days interval to prevent curd blight.	-	-
Okra	Four sprayings of systemic insecticides starting from 20 days after sowing at 10 days interval	Spraying the crop with Cypermethrin @ 0.1% to control fruit borer	-	-
Cucurbits	Two sprays of 0.25% Fosetyl Al or Cyamoxanil- Mancozeb or Metalaxyl- Mancozeb at 10 days interval effectively control downy mildew disease.	-	-	-
Chilli	Spraying of Prophenophos @ 1ml/litre/ Diafenthuron @ 1 g/litre for the control of thrips and mites at 15-20 days interval	-	-	-

### 2.3 Floods

<b>Condition - Transient water logging/ partial inundation</b>				
<b>Crop</b>	<b>Suggested contingency measure</b>			
	<b>Seedling / nursery stage</b>	<b>Vegetative stage</b>	<b>Reproductive stage</b>	<b>At harvest</b>
Rice (Aman)	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Delayed sowing of seed</li> <li>• Growing variety like IET5656 and Nc490(withstans submergence and late transplanting)</li> <li>• Maintain weed free condition</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Take up gap filling with available seedlings from community nursery</li> <li>• Spray zinc sulphate 0.2% if the crop is affected by floods within 45 days after transplanting</li> </ul>	Early rabi crop planning with vegetables, oilseeds etc	<ul style="list-style-type: none"> <li>• Drain excess water and spread sheaves loosely in the fields or field bunds where there is no stagnation or</li> <li>• Spray 2% brine solution to prevent premature germination in field.</li> </ul>

				<ul style="list-style-type: none"> <li>• Dry the grain to proper moisture content before bagging and storage</li> </ul>
Jute (Olitorius)	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Intercultivation at optimum soil moisture condition to loosen and aerate the soil and to control weeds</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Intercultivation at optimum soil moisture condition to loosen and aerate the soil and to control weeds</li> </ul>	<ul style="list-style-type: none"> <li>• Drain excess water</li> <li>• Allow the crop to dry completely before harvesting</li> </ul>	Immediately after harvesting, go for retting
<b>Horticulture</b>				
Cabbage	Raised and poly covered seed bed	Quick drainage and need based plant protection measure to be adopted	-	-
Cauliflower	-do-	-do-	-	-
Brinjal	Protect against damping off with Dithane M 45 @ 2g/l spray	Quick drainage and need based plant protection measure to be adopted	-	
<b>Continuous submergence for more than 2 days</b>				
Rice	Re-transplanting / double transplanting		Early rabi crop planning	
<b>Horticulture</b>	More than 2 to 3 days submergence will damage all the horticultural crops			
<b>Sea water intrusion</b>	NA			

**2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone – Not applicable**

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	<b>Suggested contingency measures</b>		
	<b>Before the event<sup>s</sup></b>	<b>During the event</b>	<b>After the event</b>
<b>Drought</b>			
Feed and fodder availability	<p>Establishment of village level fodder banks with surplus material (paddy straw/wheat straw)</p> <p>Cultivation of perennial fodder (Pusagaint, NB-21, IGFRI-3, IGFRI-6, 7, 10, BN-1, 2, 4, 6 and Co-1, paragrass ) on the bank of the rivers</p> <p>Sowing of cereals (Sorghum/ Maize/Bajra) and leguminous crops Lucerne (Anand-2, T-9, Chetak)/Berseem (Mescavi, warden etc)/ Rice bean (DagoreRani, S-8, S-9, K-1)/ Cowpea (Russian Giant, UPC-287, UPC 5286, C-30) during North-East monsoon for fodder production.</p> <p>Cultivation of JOB'S TEAR OR COIX (Bidhan Coixno. 1, PC-9, PC-23) with summer rains</p> <p>Promote Azola cultivation at backyard</p> <p>Formation of village Disaster Management Committee</p> <p>Capacity building and preparedness of the stakeholders and official staff for the drought/floods</p>	<p>Harvest and use biomass of dried up crops material as fodder</p> <p>Harvest all the top fodder available (Subabul, Glyricidia, Pipol, Prosopis etc) and feed the LS during drought</p> <p>Judicious use of available fodder from fodder banks</p> <p>Concentrate ingredients such as Grains, brans, chunnies &amp; oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding as supplement for high productive animals during drought</p> <p>Promotion of cultivation of Horse gram as contingent crop and harvesting it at vegetative stage as fodder</p>	<p>Encourage progressive farmers to grow multi cut fodder crops of sorghum (Meethi Sudan, Raj Chari, PC-6, PC-9, PC-23)/maize (African Tall, J 1006, Vijay, Moti, Jawahar)/ Oats (OS-6, Kent, UPO 212, UPO 94, PO 3)</p> <p>Flushing the stock to recoup</p> <p>Replenish the feed and fodder banks</p>
Drinking water	<p>Establish water reservoir from the ground water or river on community basis</p> <p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p> <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water bodies/resources</p> <p>Add alum in stagnated water bodies</p>	<p>Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>

	<p>use only as drinking water for animals)  Construction of drinking water tanks in herding places/village junctions/relief camp locations  Community drinking water trough can be arranged in shandies /community grazing areas</p>		
Health and disease management	<p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area  All the stock must be immunized for endemic diseases of the area  Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district  Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health &amp; management measures  Procure and stock multivitamins &amp; area specific mineral mixture</p>	<p>Carryout deworming to all animals entering into relief camps  Identification and quarantine of sick animals  Constitution of Rapid Action Veterinary Force  Performing ring vaccination (8 km radius) in case of any outbreak  Restricting movement of livestock in case of any epidemic  Tick control measures be undertaken to prevent tick borne diseases in animals  Rescue of sick and injured animals and their treatment  Organize with community, daily lifting of dung from relief camps</p>	<p>Keep close surveillance on disease outbreak.  Undertake the vaccination depending on need  Keep the animal houses and milking sheds clean and spray disinfectants  Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer</p>
<b>Floods</b>			
Feed and fodder availability	<p>Preparation of hay &amp; silage of excess left over fodder for use in natural disadvantageous situation,  Insurance of livestock  In case of early forewarning (EFW), harvest all the crops that can be useful as feed/fodder in future (store properly)  Store sufficient dry fodder for the transportation to the flood affected villages  Don't allow the animals for grazing if severe floods are forewarned  Keep stock of bleaching powder and lime  Carry out Butax spray for control of external</p>	<p>Supply fodder from nearby Govt. fodder farms, private parties, prepared hay or silage, community fodder bank etc.  Establish Control Room at the Block, Sub-division &amp; District level for prompt management action  Transportation of animals to elevated areas  Proper hygiene and sanitation of the animal shed  In severe storms, un-tether or let loose the animals  Use of unconventional and locally</p>	<p>Repair of animal shed  Bring back the animals to the shed  Cleaning and disinfection of the shed  Bleach (0.1%) drinking water / water sources  Encouraging farmers to cultivate short-term fodder crops like sunhemp.  Deworming with broad spectrum dewormers</p>

	<p>parasites</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations</p>	<p>available cheap feed ingredients for feeding of livestock.</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p> <p>Drying the harvested crop material and proper storage for use as fodder.</p> <p>Claim insurance</p>
<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		

### 2.5.2 Poultry

	<b>Suggested contingency measures</b>		
	<b>Before the event<sup>a</sup></b>	<b>During the event</b>	<b>After the event</b>
<b>Drought</b>			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water	Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.	Use water sanitizers or offer cool hygienic drinking water	Sanitation of drinking water
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and IBD	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in one litre water)	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit
<b>Floods</b>			
Shortage of feed ingredients	In case of early forewarning of	Use stored feed as supplement	Routine practices are followed

	floods, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc,	Don't allow for scavenging Culling of weak birds	Deworming and vaccination against RD
Drinking water	Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.	Use water sanitizers or offer cool hygienic drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder (Terramycin/Ampicilline/ Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	Prevent water logging surrounding the sheds through proper drainage facility Assure supply of electricity by generator or solar energy or biogas Sprinkle lime powder to prevent ammonia accumulation due to dampness	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
<b>Cyclone</b>	NA		
<b>Heat wave &amp; cold wave</b>	NA		

### 2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event <sup>a</sup>	During the event	After the event
<b>1) Drought</b>			
<b>A. Capture</b>			
<b>Marine</b>	Not applicable	Not applicable	Not applicable
<b>Inland</b>			
(i) Shallow water depth due to insufficient rains/inflow	Proposed for excavation of earth from periphery areas so that water can retain in the deep pockets and building of high embankment	Supply of water into the water body from tube well, nearby river etc. and observe mortality of fish and proper management of the said water body.	Proper post-event management, retention of water, disinfecting water (if possible) to prevent disease out-breaks.
(ii) Changes in water quality	Water and soil quality tests suggested from time to time.	Proper management in ponds for soil and water as per the test report.	Proper disinfection of water and maintenance of water temperature and

			plankton quantity.
(iii) Any other	Nil	Nil	Nil
<b>B. Aquaculture</b>			
(i) Shallow water in ponds due to insufficient rains/inflow	Proposed for excavation of earth from the pond so that water can retain during drought and supply of water in to the pond from tube well / river etc.	Control of pond water quality parameters and maintenance of optimum level of planktons (fish food) in the pond through proper fertilization (if required)	Suggested for disinfection of pond water through liming and periodic netting to assess the biomass.
(ii) Impact of salt load build up in ponds / change in water quality	Not applicable (No saline water nearby)	Not applicable (No saline water nearby)	Not applicable (No saline water nearby)
(iii) Any other	Nil	Nil	Nil
<b>2) Floods</b>			
<b>A. Capture</b>			
Marine	Not applicable (No marine fishery resource)	Not applicable (No marine fishery resource)	Not applicable (No marine fishery resource)
Inland			
(i) Average compensation paid due to loss of human life	Creating awareness among the fishermen on emergency strategies to be adopted in the case of flood.	Advise to shift to high land / flood shelter camps to save life.	Monetary compensation to the affected family for loss of life.
(ii) No. of boats / nets/damaged	Training fishermen on protection of boats, nets etc. in case of occurrence of flood.	Keeping the boat / net in dry / high places during flood situation.	Damage reports are to be sent to higher authority for compensation.
(iii) No. of houses damaged	Nil	Nil	Damage reports are to be sent to higher authority for compensation.
(iv) Loss of stock	Advise to strengthen protection dyke so that during flood dyke remains safe and fish stock are not affected. Placing fish aggregation devices in the deeper zones so that fish are accumulated there.	Advise to protect fish stock from escaping by putting nets in the areas where dyke is damaged.	Assessing the residual fish stock after the flood and taking proper management strategies as per the advice of Fishery Department.
(v) Changes in water quality	Nil	Nil	Application of lime / other disinfectants in the water body
(vi) Health and diseases	Nil	Nil	Monitoring and taking preventive measures against out-break of disease
<b>B. Aquaculture</b>			



(i) Inundation with flood water	Raising the height of the pond dyke in the flood prone areas, Harvesting the stock before onset of monsoon.	Placing nets to prevent escape of fish from the culture ponds.	Repair of pond dyke.
(ii) Water contamination and changes in water quality	Nil	Nil	Suggested for water testing and advice for corrective measures.
(iii) Health and diseases	Nil	Nil	Suggested for water treatment through liming and other disinfectants and monitoring of health of fish stock..
(iv) Loss of stock and inputs (feed, chemicals etc)	Arrangement for keeping feeds / chemicals in dry & safe place.	Immediately shift the inputs to high / safe place. Sundry (if possible) the wet inputs.	Recommending to higher authority for supplying mini kit (fingerlings, lime & other critical inputs)
(v) Infrastructure damage (pumps, aerators, huts etc)	Keeping them in safe place after use.	Immediately shift the pump / aerator from the pond to safe place. Remove the other valuable items from the hut in case possibilities of flood water entering to the hut	Recommending to higher authority for compensation against the loss.
(vi) Any other	Insurance for aquaculture activities. Constitute Departmental Disaster Management Committee at the Block, Sub-division & District level for planning management action.	Establish Control Room at the Block, Sub-division & District level for prompt management action. Cancel leaves for the employees	Claim insurance
<b>3. Cyclone / Tsunami</b>			
<b>4. Heat wave and cold wave</b>	NA		

<sup>a</sup> based on forewarning wherever available