

## State: MEGHALAYA

### District Contingency Plan: East Khasi Hills District

<b>1.0 District Agriculture profile*</b>				
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>			
	Agro Ecological Sub Region (ICAR)	North-Eastern Hills (Purvachal), Warm Perhumid Eco-sub region (17.1)		
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Region (II)		
	Agro Climatic Zone (NARP)	Sub Topical Hill Zone (NEH-5)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	East Khasi hills, West Khasi Hills, Jaintia hills ,East Garo Hills, West Garo Hills, South Garo Hills, Ri Bhoi		
	Geographic coordinates of district headquarters	<b>Latitude</b>	<b>Longitude</b>	<b>Altitude</b>
		25°07" & 25°41" N	91°21" & 92°09" E	1496m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ICAR Research Complex for NEH region ,Umiam Road,Umiam-793103 (Meghalaya)		
	Mention the KVK located in the district with full address	State Biological Control Laboratory,5 <sup>th</sup> Mile, Upper Shillong- 793009		
	Name and address of the nearest Agro met Field Unit (AMFU, IMD) for agro-advisories in the Zone	Indian Meteorological Department, 3 <sup>rd</sup> Mile, Upper Shillong-793005		

<b>1.2</b>	<b>Rainfall</b>	<b>Normal RF (mm) Avg. of 2009-2013</b>	<b>Normal Rainy days (number)</b>	<b>Normal Onset</b>	<b>Normal Cessation</b>
	SW monsoon (June-Sep):	5713.5	-	1 <sup>st</sup> week of May	Last week of September
	NE Monsoon(Oct-Dec):	516.5	-	Last week of September	Last week of October
	Winter (Jan- February)	60.5	-	-	-
	Summer (March-May)	2375.1	-	Last week of February-	1 <sup>st</sup> week of May-
	Annual	2637.5	-	Last week of February	Last week of October

**Source: Indian Metrological Department**

<b>1.3</b>	<b>Land use pattern of the district (latest statistics)</b>	Geographical area	Cultivable area (Net area sown)	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	Reporting Area
	<b>Area ('000 ha)</b>	274.8	32.7	104.0	20.9	-	55.2	17.3	34.2	4.6	5.7	274.5

Source: District Statistical Handbook, East Khasi Hills 2011-12

<b>1.4</b>	<b>Major Soils (common names like red sandy loam deep soils (etc.))*</b>	<b>Area (ha)</b>	<b>Percent (%) of total geographical area</b>	<b>PH</b>
	Clay Loam	60367.4	20.9	5.12 – 5.68
	Sandy Loam	10646.9	3.7	5.85 – 5.95
	Sandy Clay	47313.9	16.4	5.21 – 5.23
	Sandy Clay Loam	156749.4	54.2	5.285 – 5.91
	Clay	11229.5	3.9	4.41 – 5.465
	Town	2725.7	-	
	<b>Total</b>	289032.8		

Source: Directorate of Soil and Water Conservation, 2013

<b>1.5</b>	<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>
	Net sown area	32.704	123.9
	Area sown more than once	7.821	
	Gross cropped area	40.525	

Source: District Statistical Handbook, East Khasi Hills 2011-12

<b>1.6</b>	<b>Irrigation</b>	Area ( ha)		
	Net irrigated area	4010.04		
	Gross irrigated area	5312.85		
	Rain fed area	-		
	<b>Sources of Irrigation</b>	Number	Area ('000 ha)	Percentage of total irrigated area( Area may be indicated)
	Canals	38	1723.29	43 %
	Tanks	-	-	-
	Open wells	-	-	-
	Bore wells	-	-	-
	Lift irrigation schemes	-	-	-
	Micro-irrigation	-	-	-
	Other sources like Pipeline	37	2286.752	57 %
	Total Irrigated Area	75	4010.042	100 %
	Power tiller under State Plan Scheme	37	-	-
	Power tiller under Centrally Sponsored Scheme	25	-	-
	<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	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	8	-	Sporadic occurrence of high concentration of Fe	
Wastewater availability and use	-	-	-	
Ground water quality	Good fit for drinking			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

**Source: Office of the Executive Engineer Water Resources, East Khasi Hills (2011-2012)**

1.6. a.	Fertilizer and Pesticides use	Type	Total quantity (tones)
1	Fertilizers*	Urea DAP Potash SSP Other straight fertilizers (specify) Other complex fertilizers (specify)	555.95 Mt 251.3 Mt 58.95 Mt 5000 Mt( use of fertilizer per ha should be 17 kg avg state)
2	Chemical Pesticides*	Insecticides 1) Chlorpyriphos 2) Fenvalerate 3) Carbofuran	540 Lts. 4 Mt. 1.1 Mt.
3	Fungicides	Carbendazim Biopesticide Sticker Rodenticides (Zinc Phosphide)	345 kgs. 18.7 Lits/ 255 Kgs. 200 Lits. 5 Kgs.

Source: District Agriculture Office, Shillong, EKH 2012-13

#### 1.7 Area under major field crops & horticulture (as per latest figures)

1.7	Major field crops cultivated	Area (ha)							Grand total
		<i>Kharif</i>			<i>Rabi</i>			Summer	
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
Rice	1723.29	3698.71	5417	37	239	276	112	<b>5805</b>	
Maize	-	2011	2011	-	-	-	-	<b>2011</b>	
Soybean	-	305	305	-	-	-	-	305	
Millets	-	206	206	-	-	-	-	206	
Rabi pulses	-	320	320	-	-	-	-	320	
Sesame	-	63	63	-	-	-	-	63	
Rape & Mustard	-	73	73	-	-	-	-	73	

Source: Directorate of Agriculture, Meghalaya Shillong, 2011-12

<b>Horticulture crops - Fruits</b>	<b>Area ( ha)</b>		
	<b>Total</b>	<b>Total Area Under Irrigation of Major Fruit Crops</b>	<b>Rainfed</b>
<b>Citrus fruits</b>			
a. Khasi Mandarin	3893	171.09	3721.91
b. Assam Lemon	370	-	370
<b>Total Citrus Fruits</b>	<b>4263</b>	<b>171.09</b>	<b>4091.91</b>
c. Pineapple	887	-	887
d. Banana	760	-	760
e. Papaya	95	-	95
<b>Total Fruits</b>	<b>6005</b>	<b>171.09</b>	<b>5833.91</b>
<b>Tuber Crops</b>			
	<b>Total</b>	<b>Total Area Under Irrigation of Major Vegetable Crops</b>	<b>Rainfed</b>
a. Potato	11273	-	11273
b. Sweet potato	664	-	664
c. Tapioca	428	-	428
<b>Total Tuber Crops</b>	<b>12365</b>	<b>-</b>	<b>12365</b>
<b>Plantation Crops</b>			
Arecanut	4521	415.26	4105.74
Tea	72		
Beetle vine		1303.20	
<b>Total Plantation Crops</b>	<b>4593</b>	<b>1718.46</b>	<b>4593</b>
<b>Spice Crops</b>			
Ginger	476	-	476
Turmeric	90	-	90
Black Pepper	172	-	172
Chillies	116		116
<b>Total Spices</b>	<b>854</b>		<b>854</b>
<b>Vegetables (Cabbage, carrot, capsicum, raddish, brinjal, knol khol, etc. )</b>	<b>6315</b>	<b>360.202</b>	

Source: Directorate of Agriculture, Meghalaya, Shillong, 2011-12

### Live Stock

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Indigenous cattle	26.645	73.274	99.919			
	Improved / Crossbred cattle	0.479	8789	9.268			
	Buffaloes (local low yielding)	0.213	413	0.626			
	Improved Buffaloes	-	-	-			
	Goat	20.944	35.688	56.632			
	Sheep	3.451	5.506	8.957			
	Pig	67.318	52.039	119.357			
	Yak	-	-	-			
	Others (Horse, mule, donkey etc., specify)	-	-	-			
	Commercial dairy farms (Number)	-	-	-			
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Government Poultry Farm	2	475.253				
	Private Farms, Individual rearers #	-	Including#				
<b>Source: Directorate of Animal Husbandry &amp; Veterinary, Meghalaya, Shillong 2007</b>							
1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		-	-	-	-	-	-
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		1070		1		40	
	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)		25494	1.5 t/ha	0.382		

**Source: Directorate of Fisheries, Meghalaya, Shillong, 2012-13**

### 1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production (tonnes)	Productivity (kg/ha)	Production (tonnes)	Productivity (kg/ha)	Production (tonnes)	Productivity (kg/ha)	Production (tonnes)	Productivity (kg/ha)	
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Rice	11326	2090.825	724	2623.18	214	1910.71	12264	2208.24	35.656
	Maize	5443	2707	-	-	-	-	5443	2707	18.50
	Rabi pulses	-	-	836	2612.5	-	-	836	2612.5	-
	Millets	258	1252.427	-	-	-	-	258	1252.427	-
	Soybean	365	1196.72	-	-	-	-	365	1196.72	-
	Sesame	53	841.2698	-	-	-	-	53	841.2698	-
	Rapeseed	55	753.4247	-	-	-	-	55	753.4247	-
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
	Potato	-	-	-	-	-	-	110971	9844	-
	Sweet potato	-	-	-	-	-	-	2626	3955	-
	Tapioca	-	-	-	-	-	-	2260	5280	-
	Citrus fruits	-	-	-	-	-	-	19819	4649	-
	Banana	-	-	-	-	-	-	7870	10355	-
	Pineapple	-	-	-	-	-	-	6386	7200	-
	Papaya	-	-	-	-	-	-	663	6979	-
	Ginger	-	-	-	-	-	-	3891	8174	-

	Turmeric							457	5078	
	Chillies							244	2103	
	Arecanut							4824	1067	
	Black pepper							112	651	
	Tea							6	83	

Source: Directorate of Agriculture, Meghalaya, Shillong, 2011-12

1.12	Sowing window for 5 major field crops	Rice (Lowland)	Rice (Upland)	Maize	Rabi pulses	Winter Vegetables	Summer Vegetables	Ginger
	<b>Low altitude (Kharif rainfed)</b>	Kharif: 1 <sup>st</sup> week to last week of June Rabi: 1 <sup>st</sup> Week of November to 1 <sup>st</sup> week of December	Kharif : 1 <sup>st</sup> week of July-last week of July	Kharif :2 <sup>nd</sup> week of April – 2 <sup>rd</sup> week of May	-	-	-	-
	<b>Low altitude (Rabi irrigated)</b>	-	-	2 <sup>nd</sup> week of September to last week of October	1 <sup>st</sup> week of November – last week of November	2 <sup>st</sup> week of October to 1 <sup>st</sup> week of November for Cabbage, raddish, carrot, pea, french bean, tomato, mustard, brinjal.	-	-
	<b>Low altitude (Summer rainfed)</b>	-	-	-	-	-	1 <sup>st</sup> week of April to last week of May Sponge gourd, ridge gourd, bindhi, pumpkin	-



	<b>Mid altitude (Kharif rainfed)</b>	Kharif: 1 <sup>st</sup> week of May to 1 <sup>st</sup> week of June	-	2 <sup>nd</sup> week of March to 2 <sup>nd</sup> week of April	-	-	1 <sup>st</sup> week to last week of May for tomato, chilli, Egg plant	-
	<b>Mid altitude (Rabi irrigated)</b>	-	-	-	-	1 <sup>st</sup> week to last week of January for tomato	-	-
	<b>Mid altitude (Summer rainfed)</b>	-	-	-	-	-	-	1 <sup>st</sup> to last week of April
	<b>High altitude (Kharif Rainfed)</b>	1 <sup>st</sup> to last week of May	-	Kharif :2 <sup>nd</sup> week of March to 2 <sup>nd</sup> week of April Also, 1 <sup>st</sup> week of August to last week of August	-	1 <sup>st</sup> week of Aug to 1 <sup>st</sup> week of September	1 <sup>st</sup> to last week of May for Cauliflower 1 <sup>st</sup> to last week of August for Potato	-
	<b>High altitude (Rabi irrigated)</b>	-	-	-	-	1 <sup>st</sup> week of Nov., to Last week of December	-	-
	<b>High altitude (Summer Rainfed)</b>	-	-	-	-	-	2 <sup>nd</sup> week of Feb. to last week of March for cabbage. 2 <sup>nd</sup> week of Feb to 2 <sup>nd</sup> week of March for potato	-

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			
	Snowfall			
	Landslides			
	Earthquake			
	Pests and disease outbreak (specify)			
	Others (like fog, cloud bursting etc.)			

\*When contingency occurs in six out of 10 years

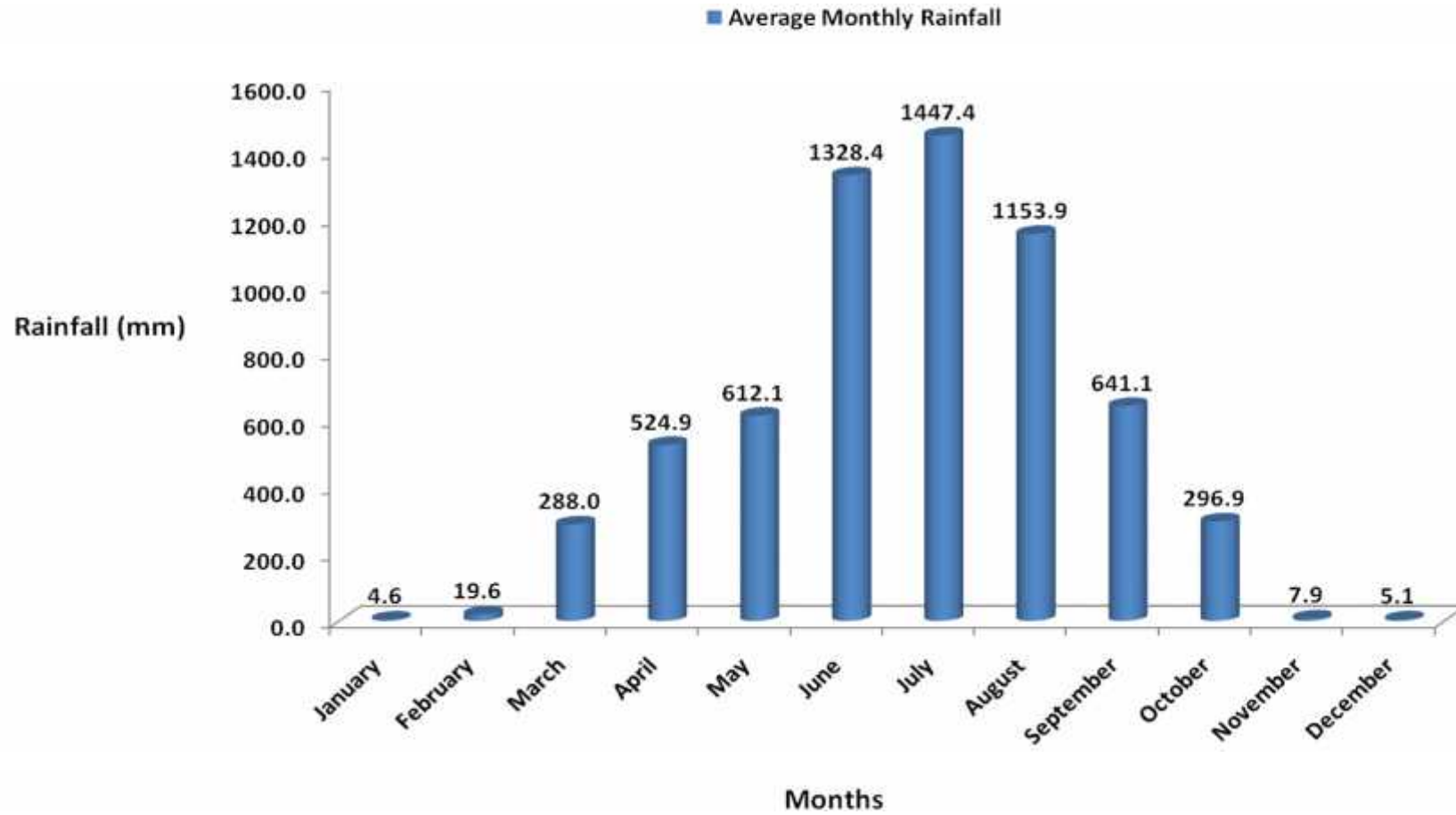
1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

Annexure 1

Location map of East Khasi Hills

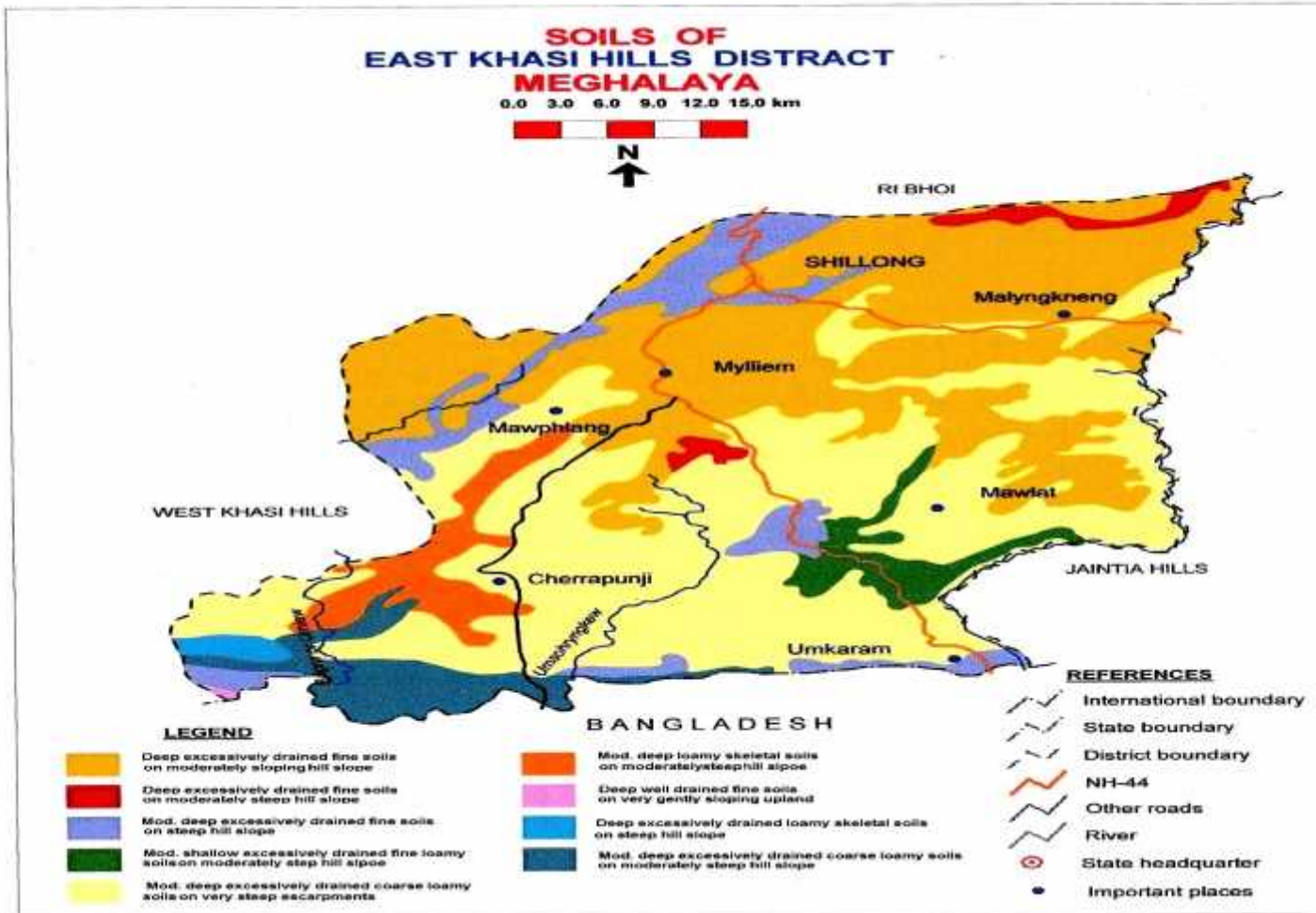


Annexure- II



Average Monthly Rainfall of East Khasi Hills

Annexure-III



## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition		Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
<b>Early season drought (delayed onset)</b>	<b>Major Farming situation</b>				
<b>Delay by 2 weeks (upto 15<sup>th</sup> May, 2014)</b> <b>Low Altitude (&lt;800m above msl)</b>	1. Maize var. Vijay Comp., local, Hybrid, DA-61A 2. Lady's finger var. Pusa Sawani 3. Onion var. N-53 4. Brinjal var. Pusa Purple long 5. Chilli var. Pusa Jwala	<b>Maize+ Winter veg crops/Boro Rice</b>	Introduction of legumes as inter crop in maize based cropping system	Preventive irrigation. Mulching in maize, tomato, ginger. Earthing up application of 2 <sup>nd</sup> dose of urea of potato. Prophylactic spray of fungicides 1 <sup>st</sup> dose with indofil 2%.	Construction materials for Jhalkund may be procured from concerned KVKs. National Agriculture Insurance Scheme, available in all nationalized banks.
<b>Mid Altitude (800&gt;1300m above msl)</b>	1. Rice var. local, Hyb 6444 2. Maize var. Vijay Comp., local, Hybrid, DA-61A 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Potato var. Jyoti, Megha, Giridhari, Giriraj. 5. Ginger var. Nadia, vareda. 6. Chilli var. Pusa jwala (Nursery)	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>	Introduction of legumes as inter crop in maize based cropping system	Shading with shade net or poly tunnels for nursery beds of cole crops.	
<b>High Altitude (&gt;1300)</b>	1. Rice var. Meg 1,2. 2. Potato var. Jyoty, Megha, Giridhari, Giriraj, Local. 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Pea var. Cherrapunji pea, Arkel, Azaad-1	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	Introduction of legumes as inter crop in maize based cropping system	Construction of Jhalkund (water harvesting structure).	

				Insurance of all crops should be done by the farmers. Judicious application of K fertilizers in all crops.	
<b>Delay by 4 weeks (upto 31<sup>st</sup> May, 2014)</b> <b>Low Altitude (&lt;800m above msl)</b>	1. Maize var. Vijay Comp., local, Hybrid, DA-61A 2. Lady's finger var. Pusa Sawani 3. Onion var. N-53 4. Brinjal var. Pusa Purple long 5. Chilli var. Pusa Jwala 6. Rice var. Ranjit, local, Hyb 6444(nursery)	<b>Maize+ Winter veg crops/Boro Rice</b>	Replace maize var. Vijay comp. with var. Navjot(Shorter duration).		
<b>Mid Altitude (800&gt;1300m above msl)</b>	1. Rice var. local, Hyb 6444 2. Maize var. Vijay Comp., local, Hybrid, DA-61A 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Potato var. Jyoti, Megha, Giridhari, Giriraj. 5. Ginger var. Nadia, vareda. 6. Chilli var. Pusa jwala	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>		Insurance of all crops should be done by the farmers. Mulching in maize, tomato, ginger. Preventive irrigation. Nursery raising for SRI. Nursery Raising for tomato.	Maize var. Navjot seeds may be procured from Department of Agriculture, Govt. of Meghalaya and neighboring KVKs. National Agriculture Insurance Scheme, available in all nationalized banks.
<b>High Altitude (&gt;1300)</b>	1. Rice var. Meg 1,2. 2. Potato var. Jyoty, Megha, Giridhari, Giriraj, Local. 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Cauliflower (Nursery)	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>			

<p><b>Delay by 6 weeks (upto 15<sup>th</sup> June, 2014)</b>  <b>Low Altitude (&lt;800m above msl)</b></p>	<p>1. Maize var. Vijay Comp., local, Hybrid, DA-61A  2. Rice var. Ranjit, local, Hyb 6444</p>	<p><b>Maize+ Winter veg crops/Boro Rice</b></p>	<p>Medium short duration varieties like Vivek Dhan-82, Luit (local), VL-dhan-61 should replace other varieties of rice. Replace with pulses like green gram var. PDM 11 (65-75 days., blackgram T<sub>9</sub>  Cover crops like bottle gourd var.local, Pusa summer prolific long, ridge gourd var. local, Pusa nasdar, sponge gourd var. chikni. pumpkin var. local can be replaced for rice which could not be transplanted.</p>	<p>Mulching and preventive irrigations in maize.</p>	<p>Seeds may be procured from the Department of Agri., Govt. of Meghalaya, KVK.</p>
<p><b>Mid Altitude (800&gt;1300m above msl)</b></p>	<p>1. Rice var. local, Hyb 6444  2. Maize var. Vijay Comp., local, Hybrid, DA-61A  3. Tomato var. Avinash, Rocky, Hyb. 017  4. Potato var. Jyoti, Megha, Giridhari, Giriraj.  5. Ginger var. Nadia, vareda.  6. Chilli var. Pusa jwala</p>	<p><b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b></p>	<p>Replacement of rice (could not be transplanted) by vegetable crops like brinjal var. Pusa purple long, ladies finger var. Pusa sawani, bitter gourd var. Pusa Do Mausami, groundnut ICGS 76.</p>	<p>Insurance of all crops should be done by the farmers. Mulching in maize, tomato, ginger. Preventive irrigation.</p>	<p>Seeds may be procured from the Department of Agri., Govt. of Meghalaya, KVK. National Agriculture Insurance Scheme, available in all nationalized banks.</p>



<b>High Altitude Altitude (&gt;1300)</b>	<ol style="list-style-type: none"> <li>Rice var. Meg 1,2</li> <li>Tomato var. Avinash, Rocky, Hyb. 017Cauliflower (Nursery)</li> </ol>	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	Replace rice which could not be transplanted by vegetables like beetroot var. Detroit dark red, carrot var. kuroda super selection, chilli var. Pusa jwala, turnip var. purple top white globe, coriander var. summer queen, raddish var. local.	Arrangements for Irrigation for all crops should be done. Insurance of all crops should be done by the farmers.	National Agriculture Insurance Scheme, available in all nationalized banks.
<b>Delay by 8 weeks (upto 30<sup>th</sup> June, 2014) Low Altitude (&lt;800m above msl)</b>	<ol style="list-style-type: none"> <li>Maize var. Vijay Comp., local, Hybrid, DA-61A</li> <li>Bottle gourd var. local,</li> <li>Pusa Summer Prolific long,</li> <li>Ridge gourd var. local, Pusa Nasdar</li> <li>Sponge gourd var. Pusa Chikni.</li> <li>Pumpkin var. local.</li> <li>Greengram PDM 11</li> <li>Blackgram T<sub>9</sub>.</li> </ol>	<b>Maize+ Winter veg crops/Boro Rice</b>		Preventive irrigation.	
<b>Mid Altitude (800&gt;1300m above msl)</b>	<ol style="list-style-type: none"> <li>Brinjal var. Pusa Purple Long,</li> <li>Ladies finger var. Pusa Sawani,</li> <li>Bitter gourd var. Pusa Do Mausami</li> <li>Groundnut ICGS 76.</li> </ol>	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>		Insurance of all crops should be done by the farmers. Mulching in maize, tomato, ginger. Preventive irrigation.	Seeds may be procured from the Department of Agri., Govt. of Meghalaya, KVK. National Agriculture Insurance Scheme, available in all nationalized banks.
<b>High Altitude Altitude (&gt;1300)</b>	<ol style="list-style-type: none"> <li>Rice var. Meg 1,2</li> <li>Tomato var. Avinash, Rocky, Hyb. 017Cauliflower (Nursery)</li> </ol>	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	Replace rice which could not be transplanted by vegetables like beetroot var.	Arrangements for Irrigation for all crops should be done. Insurance of all	National Agriculture Insurance Scheme, available in all nationalized banks.

			Detroit dark red, carrot var. kuroda super selection, chilli var. Pusa jwala, turnip var. purple top white globe, coriander var. summer queen, raddish var. local.	crops should be done by the farmers.	
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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	Remarks on Implementation
<b>Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand, etc.</b>	<b>Low Altitude (&lt;800m above msl)</b>	1. Maize var. Vijay Comp., local, Hybrid, DA-61A 2. Lady's finger var. Pusa Sawani 3. Onion var. N-53 4. Brinjal var. Pusa Purple long 5. Chilli var. Pusa Jwala	<b>Maize+ Winter veg crops/Boro Rice</b>	If dry spell in between is forecasted, plant population for crops may be increased in case of direct sown crops. Protrays should be used for vegetable nurseries. Medium short duration varieties like Vivek Dhan-82, Luit (local), VL-dhan-61.	Mulching in all crops. Construction of Jhalkund (water harvesting structure). Judicious application of K fertilizers in all crops.	Leaflets and guide on mulching may be collected from KVKs. Construction materials for Jhalkund may be procured from concerned KVKs.
	<b>Mid Altitude (800&gt;1300m)</b>	1. Rice var. local, Hyb 6444 2. Maize var. Vijay Comp., local, Hybrid, DA-61A	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>	If dry spell in between is forecasted, plant population for crops may be	Mulching in all crops. Construction of Jhalkund (water	Leaflets and guide on mulching may be collected from KVKs.

	<b>above msl)</b>	3. Tomato var. Avinash, Rocky, Hyb. 017 4. Potato var. Jyoti, Megha, Giridhari, Giriraj. 5. Ginger var. Nadia, vareda. 6. Chilli var. Pusa jwala (Nursery)		increased in case of direct sown crops. Shading with shade net or poly tunnels for nursery beds of rice. Protrays should be used for vegetable nurseries.	harvesting structure). Judicious application of K fertilizers in all crops.	Construction materials for Jhalkund may be procured from concerned KVKs.
	<b>High Altitude</b>	1. Rice var. Meg1,2. 2. Potato var. Jyoty, Megha, Giridhari, Giriraj, Local. Tomato var. Avinash, Rocky, Hyb. 017 4. Pea var. Cherrapunji pea, Arkel, Azaad-1	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	If dry spell in between is forecasted, plant population for crops may be increased in case of direct sown crops. Shading with shade net or poly tunnels for nursery beds of rice. Pro-trays should be used for vegetable nurseries.	Mulching in all crops. Construction of Jhalkund (water harvesting structure).	Leaflets and guide on mulching may be collected from KVKs. Construction materials for Jhalkund may be procured from concerned KVKs.
<b>At vegetative stage</b>	<b>Low Altitude (&lt;800m above msl)</b>	1. Maize var. Vijay Comp., local, Hybrid, DA-61A	<b>Maize+ Winter veg crops/Boro Rice</b>	-	Mulching in all crops. Construction of Jhalkund (water harvesting structure). Protrays should be used for vegetable nurseries.	Leaflets and guide on mulching may be collected from KVKs. Construction materials for Jhalkund may be procured from concerned KVKs.

	<b>Mid Altitude</b> <b>(800&gt;1300m above msl)</b>	1. Rice var. local, Hyb 6444. 2. Maize var. Vijay Comp., local, Hybrid, DA-61A 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Potato var. Jyoti, Megha, Giridhari, Giriraj. 5. Ginger var. Nadia, vareda. 6. Chilli var. Pusa jwala (Nursery)	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>	Shading with shade net or poly tunnels for nursery beds of chilli and rice. Earthing up of potato, chilli, tomato & ginger and use of antitranspiration for controlling stomatal transpiration.	Mulching in all crops. Construction of Jhalkund (water harvesting structure). Protrays should be used for vegetable nurseries. Judicious use of K fertilizer	Leaflets and guide on mulching may be collected from KVKs. Construction materials for Jhalkund may be procured from concerned KVKs.
	<b>High Altitude</b> <b>(&gt;1300)</b>	1 Rice var. Meg1,2. 2 Potato var. Jyoty, Megha, Giridhari, Giriraj, Local. Tomato var. Avinash, Rocky, Hyb. 017 4. Pea var. Cherrapunji pea, Arkel, Azaad-1	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	Shading with shade net or poly tunnels for nursery beds of rice.	Mulching in all crops. Construction of Jhalkund (water harvesting structure).	Leaflets and guide on mulching may be collected from KVKs. Construction materials for Jhalkund may be procured from concerned KVKs.
<b>At flowering/fruiting stage</b>	<b>Low Altitude</b> <b>(&lt;800m above msl)</b>	1. Maize var. Vijay Comp., local, Hybrid, DA-61A	<b>Maize+ Winter veg crops/Boro Rice</b>			
	<b>Mid Altitude</b> <b>(800&gt;1300m above msl)</b>	1. Rice var. local, Hyb 6444. 2. Maize var. Vijay Comp., local, Hybrid, DA-61A 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Potato var. Jyoti, Megha, Giridhari,	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>			

		Giriraj. 5. Ginger var. Nadia, vareda. 6. Chilli var. Pusa jwala (Nursery)				
	<b>High Altitude Altitude (&gt;1300)</b>	1 Rice var.Meg1,2 . 2 Potato var. Jyoty, Megha, Giridhari, Giriraj, Local. Tomato var. Avinash, Rocky, Hyb. 017 4. Pea var. Cherrapunji pea, Arkel, Azaad-1	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	Dehauling of poatato	Preventive irrigation followed by mulching in tomato and pea. Construction of Jhalkund (water harvesting structure).	Leaflets and guide on mulching may be collected from KVKs. Construction materials for Jhalkund may be procured from concerned KVKs.
<b>Terminal Drought. (Early withdrawal of monsoon).</b>						
	<b>Low Altitude (&lt;800m above msl)</b>	1.Maize var. Vijay Comp., local, Hybrid, DA-61A 2.Rice	<b>Maize+ Winter veg crops/Boro Rice</b>	In case of maize based cropping system, relay cropping of pulses (Early sowing).		Pulse seeds like pea may be procured from the Deptt. Of Agri. and KVKs.
	<b>Mid Altitude (800&gt;1300m above msl)</b>	1. Rice var. local, Hyb 6444. 2. Maize var.Vijay Comp., local, Hybrid, DA-61A 3. Tomato var. Avinash, Rocky, Hyb. 017 4.Potato var. Jyoti, Megha, Giridhari, Giriraj. 5. Ginger var. Nadia, vareda. 6. Chilli var. Pusa jwala (Nursery)	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>	In case of rice and maize based cropping system, relay cropping of pulses (Early sowing). Dehauling of potato	Irrigation in standing crop of tomato & chilli.	

	<b>High Altitude Altitude (&gt;1300)</b>	1. Rice var. Meg1, 2. Potato var. Jyoty, Megha, Giridhari, Giriraj, Local. 3. Tomato var. Avinash, Rocky, Hyb. 017 4. Pea var. Cherrapunji pea, Arkel, Azaad-1	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>	Dehauling in potato Removal of dead and diseased plant and plant parts in tomato.	Preventive irrigation in tomato earthing up followed by mulching in pea	Leaflets and guide on mulching may be collected from KVKs.
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### 2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	<b>Low altitude:</b> <b>Cereals:</b> Rice, Boro Rice <b>Winter vegetables:</b> cabbage, tomato, raddish, chilli, broccoli, pea <b>Pulse:</b> lentil	<b>Rice+Boro rice/winter vegetables/lentil</b>	Replace rice variety with kharif short duration variety like luit & Vivek Dhaan -82 Replace with pulses like green gram var. PDM 11 (65-75 days., blackgram T-9 Cover crops like bottle gourd var.local, Pusa summer prolific long, ridge gourd var. local, Pusa nasdar, sponge gourd var. chikni. pumpkin var. local can be replaced for kharif rice which could not be transplanted.	Construction of Jhalkund (water harvesting structure) before hand and its utilization during dry periods.	Construction materials for Jhalkund may be procured from concerned KVKs.
Limited release of water in canals due to low rainfall	<b>Low altitude:</b> <b>Cereals:</b> Rice, Boro Rice <b>Winter vegetables:</b> cabbage, tomato, raddish, chilli, broccoli, pea <b>Pulse:</b> lentil	<b>Rice+Boro rice/winter vegetables/lentil</b>		Adopt SRI method of cultivation. Only life saving irrigation to be done. Construction of Jhalkund (water harvesting structure) before hand and its utilization during dry periods.	Leaflets and guide on SRI may be collected from KVKs.

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	<b>Low altitude:</b> <b>Cereals:</b> Rice, Boro Rice <b>Winter vegetables:</b> cabbage, tomato, raddish, chilli, broccoli, pea <b>Pulse:</b> lentil	<b>Rice+Boro rice/winter vegetables/lentil</b>	Replace rice variety with kharif short duration variety like luit & Vivek Dhaan -82 Replace with pulses like green gram var. PDM 11 (65-75 days., blackgram T <sub>9</sub> Cover crops like bottle gourd var.local, Pusa summer prolific long, ridge gourd var. local, Pusa nasdar, sponge gourd var. chikni. pumpkin var. local can be replaced for kharif rice which could not be transplanted.	Adopt SRI method of cultivation. Only life saving irrigation to be done. Construction of Jhalkund (water harvesting structure) before hand and its utilization during dry periods.	Leaflets and guide on SRI may be collected from KVKs.
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	NA				
Insufficiency of surface water for irrigation	<b>Low altitude:</b> <b>Cereals:</b> Rice, Boro Rice <b>Winter vegetables:</b> cabbage, tomato, raddish, chilli, broccoli, pea <b>Pulse:</b> lentil	<b>Rice+Boro rice/winter vegetables/lentil</b>	Replace with pulses like green gram var. PDM 11 (65-75 days., blackgram T <sub>9</sub> Cover crops like bottle gourd var.local, Pusa summer prolific long, ridge gourd var. local, Pusa nasdar, sponge gourd var. chikni. pumpkin var. local can be replaced for kharif rice which could not be transplanted.	Adopt SRI method of cultivation. Only life saving irrigation to be done. Construction of Jhalkund (water harvesting structure) before hand and its utilization during dry periods.	Leaflets and guide on SRI may be collected from KVKs.
	<b>Mid altitude:</b> <b>Cereals:</b> Rice	<b>Tomato/Potato/Ginger/ Maize + Rice(Nursery)/Tomato+Maize/Tomato/chilli</b>	Replace rice by pea var. Arkel (zero tillage)	Adopt SRI method of cultivation or late transplanting may be done with lesser spacing. Only life saving irrigation to be done. Construction of	Leaflets and guide on SRI may be collected from KVKs.

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				Jhalkund (water harvesting structure) before hand and its utilization during dry periods.	
<b>High altitude: Cereals: Rice</b>	<b>Potato/Maize/Pea+ Cole crops/Rice/Maize+Cauliflower/Potato/Pea</b>		Replace rice by pea var. Arkel (zero tillage)	Adopt SRI method of cultivation. Only life saving irrigation to be done. Construction of Jhalkund (water harvesting structure) before hand and its utilization during dry periods.	Leaflets and guide on SRI may be collected from KVKs.

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	NA				

**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
<b>Continuous high rainfall in a short span leading to water logging</b>				
Rice	Drain out excessive water	Drain out excessive water	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store in air tight condition at higher elevations Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Maize	Ridge planting, proper drainage	Proper drainage		



<b>Horticulture</b> (Vegetable crops)				
Cole Crops	Proper drainage,	Proper drainage	Drain out, Harvesting at physiological maturity stage	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Solanaceous Crops	Proper drainage, earthing up in potato Staking in tomato & chillies	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Leguminous crops	Proper drainage, earthing up and staking in pea, French bean etc.	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Spice crops	Proper drainage & earthing up in ginger	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Okra	Proper drainage, earthing up and staking	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Root crops	Proper drainage and earthing up	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and

			timely harvesting of crop to avoid heavy losses.	storage loss
Citrus Fruits	Proper drainage	Application of PGRs, (Auxin) and boron to enhance fruit set	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Temperate Fruits	Proper drainage	Application of PGRs to enhance fruit set	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
<b>Heavy rainfall with high speed winds in a short span</b>				
Rice	Drain out excessive water	Drain out excessive water	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store in air tight condition with anti-transpirant Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Maize	Ridge planting, proper drainage	Proper drainage		
<b>Horticulture (Vegetable crops)</b>				
Cole Crops	Proper drainage,	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Solanaceous Crops	Proper drainage, earthing up in potato Staking in tomato & chillies	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss

Leguminous crops	Proper drainage, earthing up and staking in pea, French bean etc.	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Spice crops	Proper drainage & earthing up in ginger	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Okra	Proper drainage, earthing up and staking	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Root crops	Proper drainage and earthing up	Proper drainage	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Citrus Fruits	Proper drainage	Application of PGRs, (Auxin) and boron to enhance fruit set	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss
Temperate Fruits	Proper drainage	Application of PGRs to enhance fruit set	Drain out, Harvesting at physiological maturity stage Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast for timely harvesting of crop to avoid heavy losses.	Store at optimum temperature in cool and dry place Broadcasting of Agro-met Advisory Services to the farmers regarding weather forecast to take up precautionary measures against post harvest and storage loss

			heavy losses.	
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### Outbreak of Pests and Diseases due to Unseasonal Rains

#### Low Altitudes (Pests)

Common crops	Vegetative stages	Flowering stages	Crop maturity stage	Post harvest
Rice	Rice stem borer, leaf folder (released of <i>Trichogramma japonicum</i> @ 50,000 adults/ha for rice stem borer and five to six released of <i>T. chilonis</i> @ 1lakh/ha for leaf folder)	Rice gundhi bug (Use rotten crab in a plastic funnel trap @ 100 traps/ha during milking stage controls gundhi bug effectively)	Brown plant hopper (BPH) White backed plant hopper (WBPH) (Application of neem oil 3% and neem seed kernel extract 5%)	Rice moth (Proper drying of grains at the optimum moisture level)
Maize	Cut worm (Drenching or foliar spary with Chloropyriphos 20 EC @ 2.5 lit in 800-1000 lit/ha)	Stem borer (application of carbofuron 3 G@ 7.5 kg/ha)	Cob borer (Spraying of Neemarc @ 3ml/lit at the silking stage reduce the cob borer population )	-
Brinjal	Spotted leaf beetle (spray Fenvalarate 20 EC @ 250 ml/250 l of water)	Leaf roller (spray Fenvalarate 20 EC @ 250 ml/250 l of water)	Fruit and shoot borer (Use of lucilure sex pheromone @ 100 traps/ha at 20-25 DAT and replacing the lure at monthly interval.)	-
Tomato	White fly (1-2 foliar spray imidacloprid 0.03 %	Red spidermite (spray sulfex @ 3g/liter of water	Tomato fruit and shoot borer (spray Fenvalarate 20 EC @ 250 ml/250 l of water	-
Cabbage / cauliflower	Cabbage butter fly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	Cabbage butter fly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	Cabbage borer Spary 375 g of Carbaryl 50 WP in 150 l of water/ha	-
Mustard	Aphids (Neem based pesticides or Dimethoate 30 EC @ 2ml/lit OR Imidacloprid 17.8% SL @ 1 ml/ 4 lit of water for effective control of aphids.)	Saw fly (application of 0.025 % quinalphos)	Aphids (Neem based pesticides or Dimethoate 30 EC @ 2ml/lit OR Imidacloprid 17.8% SL @ 1 ml/ 4 lit of water for effective control of aphids.)	-

<b>Low Altitudes (Diseases)</b>				
<b>Common crops</b>	<b>Vegetative stages</b>	<b>Flowering stages</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Rice	Blast (spray tricyclazole @ 0.6 g per liter of water)	Brown spot (Treat the seeds with 0.2% Thiram)	False smut (Spray Tilt (propiconazole) @1% )	-
Maize	Sheath blight (2-3 sprays of Mancozeb 0.25% at weekly interval manage the disease)	Sheath blight (2-3 sprays of Mancozeb 0.25% at weekly interval manage the disease)	Sheath blight (2-3 sprays of Mancozeb 0.25% at weekly interval manage the disease)	-
Brinjal				
Tomato	Late blight	Bacterial wilt , late blight	Late blight	-
Cabbage / cauliflower	Black leg (hot water treatment 50 °C for 30 mins or seed treatment with mercuric chloride @ 1g/liter for 30 seconds )	Black rot (hot water treatment 50 °C for 30 mins)	Black rot (hot water treatment 50 °C for 30 mins)	-
Mustard	Alternaria blight (Spray of Mencozeb (Indofil M 45/ Dithane M-45) or Iprodione (Rovral) @ 2 g/ litre of water in 500 – 800 litres of water/ ha on seeing the disease symptoms)	White rust (Spray of Ridomil MZ 72 WP @ 2 g/ litre of water in 500-800 litres of water / ha)	Powdery mildew (Spray of wettable sulphur @ 2 g/ litre of wate)	-
<b>Mid altitudes (pest)</b>				
<b>Common crops</b>	<b>Vegetative stages</b>	<b>Flowering stages</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Rice	Rice stem borer, leaf folder (released of <i>Trichogramma japonicum</i> @ 50,000 adults/ha for rice stem borer and five to six released of <i>T. chilonis</i> @ 1lakh/ha for leaf folder)	Rice gundhi bug (Use rotten crab in a plastic funnel trap @ 100 traps/ha during milking stage controls gundhi bug effectively)	Brown plant hopper (BPH) White backed plant hopper (WBPH) (Application of neem oil 3% and neem seed kernel extract 5%)	Rice weevil (Proper drying of grains at the optimum moisture level )
Maize	Cut worm (drenching or foliar spary with	Stem borer (application of carbofuron 3	Cob borer Spraying of Neemarc @ 3ml/lit at	-

	Chloropyriphos 20 EC @ 2.5 lit in 800-1000 lit/ha)	G@ 7.5 kg/ha	the silking stage reduce the cob borer population )	
Ginger	Shoot borer (Spraying of Malathion (0.1%) at monthly intervals during July – October for the effective control of shoot borer)	Leaf roller (Spraying of infested drop with (0.03%) Phosphamidon 85 EC or (0.07%) Carbaryl is quite effective in checking)	Rhizome weevil (apply 1.25 kg Carbaryl 50 WP in 625 liters of water)	Scales (Storage of rhizomes in dried leaves of <i>Strychnos nuxvomica</i> and saw dust (1:1) helps in keeping the seed rhizome free from scale infestation. Discard severely infested rhizomes and treat seed material with Quinalphos 0.075% for 20-30 minutes before storage)
Tomato	White fly ( spray Imidacloprid 17.8%SL @ 1ml/4lt of water)	Red spidermite (spray sulfex @ 3g/liter of water)	Tomato fruit and shoot borer (spray Fenvalarate 20 EC @ 250 ml/250 l of water	-
Mandarin	Leaf miner Spraying of Monocrotophos (0.05%) or NSKE 5% or Dimethoate30 EC 2 ml /lit or Imidacloprid 17.8%SL @ 1ml/4lt of water, after every new flush)	Citrus psylla, aphids (Spraying of Monocrotophos (0.05%) or NSKE 5% or Dimethoate30 EC 2 ml /lit or Imidacloprid 17.8%SL @ 1ml/4lt of water, after every new flush)	Trunk borer (Injecting 5 ml of Dichlorvos (0.05%) or Monocrotophos (0.2%) per hole by syringe and sealing with mud kills larvae of trunk borer and orange shoot borer).	-
<b>Mid altitudes (Diseases)</b>				
<b>Common crops</b>	<b>Vegetative stages</b>	<b>Flowering stages</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Rice	Blast (spray tricyclazole @ 0.6 g per liter of water)	Brown spot (Treat the seeds with 0.2% Thiram)	False smut (Spray Tilt (propiconazole) @1% )	Rice weevil (Proper drying of grains at the optimum moisture level )
Maize	leaf blight (2-3 sprays of Mancozeb 0.25% at weekly interval manage the disease)	Leaf blight (2-3 sprays of Mancozeb 0.25% at weekly interval manage the disease)	Sheath blight (2-3 sprays of Mancozeb 0.25% at weekly interval manage the disease)	-
Ginger	Leaf spot (Spraying with 0.2% solution of <i>Dithane M-45</i> or <i>Dithane Z-78</i> )	Leaf spot (Spraying with 0.2% solution of <i>Dithane M-45</i> or <i>Dithane Z-78</i> )	Rhizome rot (Spraying with 0.2% solution of <i>Dithane M-45</i> during rainy season)	-

Tomato	Late blight, bacterial wilt (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there) Dip seedling in biofor pf or biozene @ 5ml/l of water	late blight (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there)	Late blight (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there)	-
Mandarin	Powdery mildew (Spray of wettable sulphur @ 2 g/ litre of water)	Canker (three sprays of Streptocycline 100 ppm (10 g of Streptocycline + 5 g Copper Sulphate in 100 litres water for canker )	Scab ( Spray Bordeaux mixture 1% for scab)	blue and green mould (Fruits should be treated with Bavistin @ 1000ppm)
<b>High altitudes (Pests)</b>				
<b>Common crops</b>	<b>Vegetative stages</b>	<b>Flowering stages</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Cabbage	Cabbage butterfly fly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	Cabbage butterfly fly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	Cabbage borer Spary 375 g of Carbaryl 50 WP in 150 l of water/ha	-
Cauliflower	Cabbage butterfly fly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	Cabbage butterfly fly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	Cabbage butterfly (use Trichocards <i>T.brassicae</i> @ 2.5 cards /ha	-
Tomato	White fly (1-2 foliar spray imidacloprid 0.03 %	Red spidermite (spray sulfex @ 3g/liter of water	Tomato fruit and shoot borer (spray Fenvalarate 20 EC @ 250 ml/250 l of water	-
Pea	Pea aphid (Spray Chloropyriphos (0.05%) to control the pests)	Leaf miner (Spraying of 250ml of phosphamidon or 1 litre of metasystox in 500 litres water per hectare)	Stem fly (Soil application of 30kg/ha Furadon 3G before sowing)	-
Potato	Cut worm (drenching or foliar spary with Chloropyriphos 20 EC @ 2.5 lit in 800-1000 lit/ha	Cut worm (drenching or foliar spary with Chloropyriphos 20 EC @ 2.5 lit in 800-1000 lit/ha)	Potato tuber moth (Spray 30 days old crop with monocrotophos @ 1.5 lit in 1000 liter of water )	Potato tuber moth (cover the ventilator of the store room with wire net or net or In a cement or wooden floor cover the floor with saw dust, sand and spread crushed dried leaves of lantana upto 2-2.5 cm and

				keep the tuber over it)
Chillies	Aphids (apply methyl demeton 25 EC @ 0.5 lit/ha)	Thrips (spray 3% and 5% of neem oil)	Aphids (apply methyl demeton 25 EC @ 0.5 lit/ha)	-
Temperate fruits	Aphids (Spraying of Monocrotophos (0.05%) or NSKE 5% or Dimethoate30 EC 2 ml /lit or Imidacloprid 17.8%SL @ 1ml/4lt of water)	Aphids (Spraying of Monocrotophos (0.05%) or NSKE 5% or Dimethoate30 EC 2 ml /lit or Imidacloprid 17.8%SL @ 1ml/4lt of water)	Trunk borer, fruit fly (Injecting 5 ml of Dichlorvos (0.05%) or Monocrotophos (0.2%) per hole by syringe and sealing with mud kills larvae of trunk borer and orange shoot borer, spray carbaryl @ 3.2 ml/l of water.	-
<b>High altitudes (Diseases)</b>				
<b>Common crops</b>	<b>Vegetative stages</b>	<b>Flowering stages</b>	<b>Crop maturity stage</b>	<b>Post harvest</b>
Cabbage / cauliflower	Black leg (hot water treatment 50 °C for 30 mins or seed treatment with mercuric chloride @ 1g/liter for 30 seconds )	Black rot (hot water treatment 50 °C for 30 mins)	Black rot (hot water treatment 50 °C for 30 mins)	-
Tomato	Late blight , bacterial wilt (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there) Dip seedling in biofor pf or biozene @ 5ml/l of water	late blight (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there)	Late blight (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there)	-
Pea	Rhizoctonia stem rot (seed treatment with Trichoderma viridae @ 5ml/l of water for 1 kg seeds )	Powdery mildew (Spray of wettable sulphur @ 2 g/ litre of water)	Rust (2-3 sprays of Dithane M-45 @2 kg/ha in 1000 litres of water)	-
Potato	Late blight, Bacterial wilt (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there, Dip seedling in biofor pf or biozene @ 5ml/l of water for bacterial wilt)	late blight (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there)	Late blight (Prophylactic spray with indofil M-45 @ 2g/l of water followed by second spray with Ridomil MZ-75 @ 3g/l of water and need based spay if the diseases is still there)	-



Chillies	Cercospora leaf spot (Spraying of bavistin @ 1g/litres of water at 15 days intervals)	Cercospora leaf spot (Spraying of bavistin @ 1g/litres of water at 15 days intervals)	Fruit rot/anthracnose (Two to three sprays of Dithane-M-45 (Mancozeb) @ 2g/litres of water or Bordeaux mixture @ 1% or copper oxychloride @ 3g/litre of water at 8-10 days interval)	-
Temperate fruits	Powdery mildew (Spray of wettable sulphur @ 2 g/ litre of water)	leaf curl virus (spray Dithane M-45 or captan @ 2ml/ l of water)	Gummosis (apply Mashobra paste)	-

### 2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation <sup>1</sup>				
Continuous submergence for more than 2 days	Re-sowing	Drain out excess water.	Drain out excess water.	Drain out excess water. Harvesting at physiological maturity stage
Sea water intrusion	-	-	-	-

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

Extreme event type	Suggested contingency measure <sup>f</sup>			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	-	-	-	-
Cold wave	-	-	-	-
Frost	-	-	-	-
Horticulture	-	-	-	-
Cole crops	Provide shade	Irrigation before and just after the occurrence of frost		

Fruits trees	Mulching	Mulching	Mulching	Mulching
<b>Hailstorm</b>				
Rice	Replanting of seedlings	ITK & Top dressing	Availing Insurance.	Availing Insurance
Maize	Introduction of short duration late sowing varieties. Resowing may be advised. Crop/weather insurance.	Cultural operations-Earthing up, Top dressing Crop can be used as fodder. Availing Insurance	Crop can be used as fodder. Availing Insurance.	Availing Insurance.
Rabi Pulses	-	-	-	-
Millets	-	Cultural operations-Earthing up	-	-
<b>Horticulture</b>				
Potato	Resowing with short duration varieties	Cultural operations-Earthing up	Availing insurance	dehalming
Vegetables	Replanting of seedlings, Introduction of short duration late sowing variety Crop/weather insurance Anti hail protection, crop covers and shade net.	Gap filling Anti hail protection, crop covers and shade net.	Availing Insurance.	Availing Insurance.
Ginger	-	Adequate mulching. Availing Insurance.	-	-
<b>Cyclone</b>	Not applicable			
<b>Sand deposition or heavy siltation</b>	Not applicable			

## 2.5 Contingent strategies for Livestock, Poultry & Fisheries

### 2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Feed and fodder availability	i. Creation of permanent fodder, feed and seed banks ii. Raising drought tolerant perennial grasses and fodders like congosignal,	i. Feeding of locally available jungle tree leaves like <i>Artocarpus hetrophyllus</i> , <i>Fircus hookerii</i> , <i>Symingtonia populnea</i> , <i>Schefflera</i>	i. Cultivation of high yielding and drought tolerant varieties of grasses and fodder like oat, congosignal, guinea, para and napier grasses.

	<p>guinea, oat etc. as permanent source of fodder.</p> <p>iii. Preservation and conservation of legume trees, bushes, brooms, grasses and legumes through silage and hay making</p> <p>iv. Burning of jungles of hills and paddy straw should not be allowed.</p> <p>v. Development of fodder varieties of cultivated crops having tolerance for varying degree of drought.</p>	<p><i>wallichiana</i> for ruminant.</p> <p>ii. Feeding of non conventional feed and forage resources like broom, stylosanthes, Job's tears etc.</p> <p>iii. Feeding of crop residues (rice straw) and agro industrial byproduct after chemical or biological treatment and processing.</p> <p>iv. The maintenance ration should be reduced to half.</p>	<p>ii. Introduction of fodder trees, bushes and grasses as rehabilitation option on all kinds of wasted and abandoned lands.</p>
Drinking water	<p>i. Creation of alternate drinking water bodies</p> <p>ii. Livestock based water management strategy which focuses as recycling of water</p> <p>iii. Searching of natural stream of water</p>	<p>i. Use of water from water reservoir/natural stream</p> <p>ii. Animal should be forced to drink saline water</p>	<p>i. Development of watershed based livestock farming.</p> <p>ii. Harvesting of rain water through Jalkund.</p>
Health and Disease management	<p>i. Precautionary measures like vaccination and deworming of animals should be done.</p> <p>ii. Life saving approaches such as drenching/watering, guard against heat stress, drips of normal saline and dextrose, therapeutic care and drugs should be available.</p>	<p>i. Health checkup of animal particularly for dehydration which may cause death of animals.</p> <p>ii. There should be safe provisions for disposal of dead animals.</p> <p>iii. Additional supplementation of concentrates and fodders for productive, lactating and pregnant animals should be provided.</p>	<p>i. Deworming and vaccination against common diseases should be done.</p> <p>ii. Supplementation of minerals and vitamins in feed for few days to restore the normal fertility of animals.</p> <p>iii. Organization of animal health</p>
<b>Floods</b>	<b>Not Applicable</b>		
<b>Cyclone</b>			
<b>Heat wave and cold wave</b>			

### 2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
<b>Drought</b>			
Shortage of food ingredients	<p>i. Establishment of permanent storage facilities for feed ingredients.</p> <p>ii. Raising drought tolerant non conventional grasses, crops, bushes like Job tears, Buck wheat, Jack beans,</p>	<p>Feeding of non conventional feed and forage resources</p>	<p>Cultivation of non conventional grasses, crops, bushes like Job tears, Buck wheat, Jack beans, Stylosanthes etc as permanent feed ingredients for poultry.</p>

	Stylosanthen etc as permanent feed ingredients for poultry.		
Drinking water	Creation of alternate drinking water bodies	Use of water from water reservoir/stream	i. Development of watershed based poultry farming. ii. Harvesting of rain water through Jalkhund.
Health and Disease management	Precautionary measures like vaccination and deworming of animals should be done.	Health checkup of bird particularly for dehydration which may cause death of birds	i. De-worming and vaccination against common diseases should be done. ii. Supplementation of minerals and vitamins in feed for few days .
<b>Floods</b>	<b>Not Applicable</b>		
<b>Cyclone</b>			
<b>Heat wave and cold wave</b>			

### 2.5.3 Fisheries/ Aquaculture

	<b>Suggested contingency measures</b>		
	<b>Before the event <sup>a</sup></b>	<b>During the event</b>	<b>After the event</b>
<b>1) Drought</b>			
<b>A. Capture</b>			
Marine	NA	NA	NA
Inland	NA	NA	NA
(i) Shallow water depth due to insufficient rains/ inflow	NA	NA	NA
(ii) Changes in water quality	NA	NA	NA
(iii) Any other	NA	NA	NA
<b>B. Aquaculture</b>			
(i) Shallow water depth due to insufficient rains/ inflow	<ol style="list-style-type: none"> <li>1. Water supply from other sources</li> <li>2. Proper planning of water storage</li> <li>3. Adopt rain water harvest techniques.</li> <li>4. Conservation of rivers/ reservoir /ponds.</li> <li>5. To make people aware about conservation of water.</li> </ol>	<ol style="list-style-type: none"> <li>1. Water supply from other sources/Reduce stock</li> <li>2. Maintenance of dams &amp; reservoirs</li> <li>3. Proper use of water resources on priority basis.</li> <li>4. Use stored water.</li> <li>5. Aeration of water in ponds/reservoirs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Regular de-siltation of reservoirs &amp; dams.</li> <li>2. To develop demand oriented system.</li> <li>3. Intensive forestation program.</li> <li>4. Rain water harvesting.</li> <li>5. Partial harvesting &amp; lime/fertilizer application.</li> </ol>
(ii) Impact of salt load build up in ponds/ change in water quality	<ol style="list-style-type: none"> <li>1. Aeration of water surface to increase the dissolved Oxygen</li> <li>2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> </ol>	<ol style="list-style-type: none"> <li>1. Partial dewatering, refilling with fresh water to avoid salt builds up.</li> <li>2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> </ol>	<ol style="list-style-type: none"> <li>1. Partial harvesting &amp; lime/fertilizer application</li> <li>2. Analysis of water quality (pH, alkalinity, salinity, temperature</li> </ol>

	<ol style="list-style-type: none"> <li>3. Dilution of water if salt load is high.</li> <li>4. Available resources will be identified &amp; need to be kept ready for each district on the basis of forecasting of insufficient rain to reduce the salinity by trapping available water resources.</li> <li>5. On the basis of forecasting advising fish farmers for harvesting of marketable fish.</li> <li>6. Preparedness with stocks of chemicals, disinfectants and therapeutic drugs</li> </ol>	<ol style="list-style-type: none"> <li>3. Harvesting the marketable fish to reduce the density.</li> <li>4. Use disinfectants and therapeutic drugs.</li> </ol>	<p>etc.)</p> <ol style="list-style-type: none"> <li>3. Trapping the water resources from other places for dilution to reduce salt load.</li> <li>4. Need based research data should be generated on water quality.</li> </ol>
<b>2) Floods</b>			
<b>A. Capture</b>			
Marine	NA		
<b>Inland</b>			
(i) Average compensation paid due to loss of human life	<ol style="list-style-type: none"> <li>1. Fishermen will be given forewarning regarding heavy rains and advised not to go for fishing in rivers/reservoirs.</li> <li>2. Preparation of flood control action plan.</li> </ol>	<ol style="list-style-type: none"> <li>1. Advise on use of Life saving jackets and life boats.</li> <li>2. The life saving appliances/ machinery shall be kept ready for rescue operation.</li> <li>3. Sufficient stock of food, medicine etc. should be available.</li> <li>4. Human evacuation from the area.</li> <li>5. Coordination of assistance.</li> <li>6. Damage and need assessment.</li> <li>7. Immediate management of relief supplies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rehabilitation of people.</li> <li>2. Arrangement for rescue and casualty care.</li> <li>3. Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan.</li> </ol>
(ii) No. of boats/ nets damaged	<ol style="list-style-type: none"> <li>1. Prior information on safe keeping of boats and nets will be provided to the fishermen.</li> <li>2. Annual repair of boats/nets and gears.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fishermen will be advised to stop fishing during the floods and heavy rainfall.</li> <li>2. Continuous monitoring on water level is required.</li> </ol>	<ol style="list-style-type: none"> <li>1. Education and training for the repair of boats/nets and gears.</li> </ol>
(iv) Loss of stock	<ol style="list-style-type: none"> <li>1. Harvesting the existing fish stock</li> <li>2. Keep boats, nets/gears ready for emergency use.</li> </ol>	<ol style="list-style-type: none"> <li>1. Search/locate the stock/input.</li> <li>2. Mobilize local people for protection.</li> <li>3. Hire stock/inputs from distant areas/company/ farmers who are not affected by floods.</li> </ol>	<ol style="list-style-type: none"> <li>1. Follow flood control management plan.</li> <li>2. Notify utilities of the critical demand about loss of stock and inputs.</li> </ol>
(v) Changes in water quality	<ol style="list-style-type: none"> <li>1. Storage of water disinfectant</li> </ol>	<ol style="list-style-type: none"> <li>1. Use water filtration system for the</li> </ol>	<ol style="list-style-type: none"> <li>1. Removal of runoff from land by</li> </ol>

	<p>such as chlorine, alum etc. at district level.</p> <ol style="list-style-type: none"> <li>2. Store chemicals, disinfectants and therapeutic drugs.</li> <li>3. Develop flood control management plan.</li> </ol>	<p>ponds to overcome the water contamination-Do not use contaminated water.</p> <ol style="list-style-type: none"> <li>2. Proper preparation and management through emergency aeration.</li> <li>3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> </ol>	<p>proper means before decomposition.</p> <ol style="list-style-type: none"> <li>2. Use of water filtration system even after the event &amp; creating awareness among the farmers.</li> <li>2. Need based research data should be generated to maintain water quality.</li> <li>3. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> </ol>
(vi) Health and Diseases	<ol style="list-style-type: none"> <li>1. Use of water filtration system &amp; control measures for diseases should be available.</li> <li>2. Advance planning and preparedness.</li> <li>3. Storage of chemicals, disinfectants and therapeutic drugs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodical checking particularly with respective fish mortality should be done during flood &amp; dead fishes disposed properly.</li> <li>2. Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal.</li> <li>3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>3. Emergency aeration or splashing in water bodies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread.</li> <li>2. Eradicating the disease where possible.</li> <li>3. Follow up surveillance and monitoring after disease outbreak.</li> <li>4. Need based research data should be generated.</li> </ol>
<b>B. Aquaculture</b>			
(i) Inundation with flood water	<ol style="list-style-type: none"> <li>1. In the flood prone areas proper draining system from ponds need to be developed and planned in flood situation.</li> <li>2. Proper channels to be provided to pass surplus water &amp; to avoid breakage to the bundh.</li> <li>3. Proper facility construction for ponds and its stock safety.</li> <li>4. Development of flood control management plan. Preparedness with emergency backup equipment on site.</li> <li>5. Preventive measures against entry of alien/wild organisms through flood water.</li> </ol>	<ol style="list-style-type: none"> <li>1. Siphon excess water from the pond</li> <li>2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>3. Lime, fertilizer application based on the water quality</li> <li>4. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various media.</li> <li>5. Proper drainage should be adopted so that inundation with flood water should be minimized.</li> <li>6. Lower the water level in culture facilities.</li> </ol>	<ol style="list-style-type: none"> <li>1. Maintaining desired water level</li> <li>2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.</li> <li>3. Liming, fertilizer application based on the water quality</li> <li>4. Planning even after the event should be made for proper drainage and creating awareness and trainings in flood situations.</li> <li>5. Support to rehabilitation, logistics, training and awareness build up &amp; testing and updating the plan</li> <li>6. Reduce or cease feeding to avoid deterioration in water quality.</li> <li>7. Strengthening of water</li> </ol>

			bodies/ponds.
(ii) Water contamination and changes in water quality	<ol style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. lime, fertilizer application based on the water quality</li> <li>3. Availability of water purifier i.e., chlorine, alum etc at district level.</li> <li>4. Use of calcium hydroxide @ 150 kg/ha</li> <li>5. Store chemicals, disinfectants and therapeutic drugs</li> <li>6. Develop flood control management plan</li> </ol>	<ol style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Use of water purifier for the ponds to overcome the contamination and changes in BOD.</li> <li>4. Use of kmno4 for bath of fish as prophylactics</li> <li>5. Proper preparation and management through emergency aeration (paddle wheel aerator/circulating aerator), that may improve water quality in affected areas.</li> <li>6. Use appropriate amount of disinfectants, chemicals and therapeutic drugs.</li> <li>7. Maintaining the purity and quality of water bodies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. lime, fertilizer application based on the water quality</li> <li>3. Supply of water purifier even after the event and creating awareness among the farmers.</li> <li>4. Dumping of solid, liquid and waste should be stopped through enactment of legislation.</li> <li>5. Immediate remedy and cleaning of water bodies.</li> </ol>
(iii) Health and diseases	<ol style="list-style-type: none"> <li>1. Maintaining proper hygiene/water quality</li> <li>2. Store chemicals, disinfectants and therapeutic drugs in sufficient quantity</li> </ol>	<ol style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.</li> </ol>
(iv) Loss of stock and inputs (feed, chemicals, etc)	<ol style="list-style-type: none"> <li>1. Harvesting the existing fish stock</li> <li>2. Keep boats, nets/gears ready for emergency use.</li> <li>3. Develop flood control management plans.</li> </ol>	<ol style="list-style-type: none"> <li>1. Search/locate the stock/input.</li> <li>2. Mobilize local people for protection.</li> <li>3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood</li> </ol>	<ol style="list-style-type: none"> <li>1. Locate backup stocks and verify its usability time.</li> <li>2. Follow flood control management plan.</li> <li>3. Notify utilities of the critical demand about loss of stock and inputs.</li> </ol>
(v) infrastructure damage (pumps, aerators, huts etc)	<ol style="list-style-type: none"> <li>1. Prior information regarding removal of Pumps and aerators shall be given to the fish farmers.</li> <li>2. Flood situation going to exist then move the pumps, aerators &amp; other</li> </ol>	<ol style="list-style-type: none"> <li>1. Pumps, aerator and generators shall be removed from the pond before the event.</li> <li>2. Use manual techniques for aeration or make substitute arrangement for the</li> </ol>	<ol style="list-style-type: none"> <li>1. Install the equipments during flood.</li> <li>2. Locate backup equipment and verify its operation.</li> <li>3. its operation.</li> <li>4. Repair of damaged infrastructure.</li> </ol>

	<p>accessories to safer places.</p> <p>3. Educate and provide training for the repair of infrastructure.</p> <p>4. Follow flood control management plan.</p> <p>5. Store raw materials for repairing of pumps aerators, huts etc.</p>	<p>same.</p> <p>3. Notify utilities of the critical demand.</p>	
(vi) Any other			
<b>3) Cyclone/ Tsunami</b>			
<b>A. Capture</b>	NA	NA	NA
Marine	NA	NA	NA
(i) Average compensation paid due to loss of fishermen lives	NA	NA	NA
(ii) Average no. of boats/ nets damaged	NA	NA	NA
(iii) Average mo. of houses damaged	NA	NA	NA
Inland	NA	NA	NA
<b>B. Aquaculture</b>			
(i) Overflow/ flooding of ponds	<p>1. Drainage system on the sides of the pond to prevent the surface runoff water from entering the pond.</p> <p>2. If intensity of cyclone with heavy rain fall exists then harvest existing fish stock.</p> <p>3. Dyke should be stable in all weather condition &amp; not liable to collapse during flood.</p>	<p>1. Siphon excess water from the pond</p> <p>2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</p> <p>3. Lime, fertilizer application based on the water quality</p> <p>4. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility.</p> <p>5. Proper drainage should be adopted so that inundation with storm water should be managed</p> <p>6. Enhancement of dykes height by sand bags</p>	<p>1. Maintaining desired water level</p> <p>2. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</p> <p>3. Liming, fertilizer application based on the water quality.</p>
(ii) Changes in water quality (fresh water/ brackish water ratio)	<p>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</p> <p>2. lime, fertilizer application based on the water quality</p> <p>3. Supply of water for correcting the changes in fresh water &amp; brackish water.</p> <p>4. Maintain salinity by addition of fresh water up to 20-25 ppt.</p>	<p>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</p> <p>2. lime, fertilizer application based on the water quality</p> <p>3. Supply of water for correcting the changes in water quality</p> <p>4. Availability of water purifier i.e., chlorine, alum etc at district level.</p> <p>5. Use of calcium hydroxide @ 150 kg/ha</p>	<p>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</p> <p>2. lime, fertilizer application based on the water quality</p> <p>3. Water storage facility needs to be developed to overcome the problem of changes in water quality.</p> <p>5. Availability of water purifier i.e., chlorine, alum etc at district level.</p> <p>6. Use of calcium hydroxide @ 150</p>



	<ul style="list-style-type: none"> <li>7. Availability of water purifier i.e., chlorine, alum etc at district level.</li> <li>8. Use of calcium hydroxide @ 150 kg/ha</li> <li>9. Store chemicals, disinfectants and therapeutic drugs</li> </ul>	6. Store chemicals, disinfectants and therapeutic drugs	kg/ha 7. Store chemicals, disinfectants and therapeutic drugs
(iii) Health and diseases	<ul style="list-style-type: none"> <li>1. Maintaining proper hygiene/water quality</li> <li>2. Store chemicals, disinfectants and therapeutic drugs</li> <li>3. Availability of water purifier i.e., chlorine, alum etc at district level.</li> </ul>	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.</li> <li>4. Store chemicals, disinfectants and therapeutic drugs</li> <li>5. Availability of water purifier i.e., chlorine, alum etc at district level.</li> </ul>	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.</li> <li>4. Store chemicals, disinfectants and therapeutic drugs</li> <li>5. Availability of water purifier i.e., chlorine, alum etc at district level.</li> </ul>
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps. Aerators, shelters/huts etc)			
(vi) Any other			
<b>4. Heat wave and cold wave</b>			
<b>A. Capture</b>			
Marine	NA	NA	NA
Inland	NA	NA	NA
<b>B. Aquaculture</b>			
(i) Changes in pond in pond environment (water quality)	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. lime, fertilizer application based on the water quality</li> </ul>	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. lime, fertilizer application based on the water quality</li> </ul>	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. lime, fertilizer application based on the water quality</li> </ul>
(ii) Health and Disease management	<ul style="list-style-type: none"> <li>1. Maintaining proper hygiene/water quality</li> <li>2. Water filtration system &amp; control measures for disease should be available.</li> <li>3. Adequate stock of medicine should be available at each district level.</li> <li>3. Liming and formalin treatment</li> </ul>	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.</li> </ul>	<ul style="list-style-type: none"> <li>1. Analysis of water quality (pH, alkalinity, salinity, temperature etc.)</li> <li>2. Lime, fertilizer application based on the water quality</li> <li>3. Separation of infected fishes in quarantine ponds/identification of the causing agent/proper treatment procedure to be followed.</li> </ul>

	4. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals & other accessories to safer places.	4. Periodically checking particularly in respective of fish mortality & water parameter during flood. 5. Disinfectants treatments 6. Available fish stock should be recovered.	4. Settling health & disease management training centre at district level for fishermen. 5. Feeds, chemicals etc required for the culture operation should be purchased.
(iii) Any other	-	-	-