

State: MEGHALAYA
Agriculture Contingency Plan for District: North Garo Hills, Resubelpara

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	North-Eastern Hills (Purvachal), Warm to hot per humid ecosystem (17.1)			
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Region (II)			
	Agro Climatic Zone (NARP)	Sub-Tropical Hill Zone(NEH-5)			
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	East Khasi Hills, Jaintia Hills, Ribhoi, South Garo Hills, West Garo Hills			
	Geographic coordinates of district headquarters	Latitude 25.88983° N	Longitude 90.6019 ° E	Altitude 126 m above msl	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ICAR Research Complex for NEH Region, Umroi Road, Umiam, Dist:- Ri-bhoi, Meghalaya- 793103			
	Mention the KVK located in the district with address	None but nearest KVK Krishi Vigyan Kendra, West Garo Hills district, Sangsanggre P.O- Dobasipara-794005, Meghalaya			
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisoris in the Zone	District and Local Research Station and Laboratory, Govt. of Meghalaya, Sangsanggre, Tura, West Garo Hills			
1.2	Rainfall	Normal RF (mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	-	-	First week of June	Last week of Sept
	NE Monsoon(Oct-Dec):	-	-	First week of Oct	Last week of Oct
	Winter (Jan- March)	-	-	-	
	Summer (Apr-May)	-	-	First week of April	Last week of May
	Annual	-	-	-	-

Note; New district no AWS for Rainfall data

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent Pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	-	-	-	-	-	-	-	-	-	-

Note; New district ,information not available

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)**	Percent (%) of total geographical area
	1. Red and lateritic sandy loam soils	Not available	
	Others (specify):		

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

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area			
	Gross irrigated area			
	Rainfed area			
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals			
	Tanks			
	Open wells			
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)			

Total Irrigated Area			
Pump sets			
No. of Tractors			
Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
Over exploited			
Critical			
Semi- critical			
Safe			
Wastewater availability and use			
Ground water quality			

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

1.6a	Fertiliser and pesticides use	Total ('000 tonnes)	Kg/ha
1.	Fertiliser		
2.	Pesticides	Total (....)	Quantity/ha for which crop (....)

1.7 Area under major field crops & horticulture

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Rice	-							
	Jhum rice	-							
	Maize	-							
	Wheat	-							
	Potato	-							
	Rape seed & mustard	-							
	Gram pulses	-							
	Mesta	-							
	Jute	-							
	Cotton	-							
	Arhar	-							
	Cow pea	-							
	Lentil	-							
	Sesamum	-							

Horticulture crops - Fruits	Total('000 ha)
Pineapple	
Citrus	
Banana	
Papaya	
Sweet potato	
Tapioca	
Horticulture crops - Vegetables	Total ('000 ha)
Pumpkin	
Tomato	
Cabbage	
Cauliflower	
Brinjal	
Beans	
Carrot	
Cucumber	
Radish	
Onion	
Bitter gourd	
Ridge gourd	
Chilli	
Okra	
Bottle gourd	
Knolkhol	
Turnip	
Medicinal and Aromatic crops	Total ('000 ha)
Turmeric	
Ginger	
Others	
Plantation crops	Total
Arecanut	
Cashewnut	
Tea	
Eg., industrial pulpwood crops etc.	
Fodder crops	Total ('000 ha)
Others	-

	Total fodder crop area	Not available
	Grazing land	0.86
	Sericulture etc	1.28
	Others (specify)	-

1.8	Livestock		Male ('000)	Female ('000)	Total ('000)		
	Non descriptive cattle(local low yielding)						
	Crossbred cattle						
	Non descriptive Buffaloes (local low yielding)						
	Graded Buffaloes						
	Goat						
	Sheep						
	Pig(crossbred)						
	Pig(indigenous)						
Commercial dairy farms (Number)							
1.9	Poultry		No. of farms	Total No. of birds ('000)			
	Commercial						
	Backyard						
	Fowl (Desi)		-				
	Fowl (improved)		-				
	Ducks (Desi)		-				
1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department,2009-10)	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, 2009-10)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks		

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)				
Others (Inland) , Data Source: Superintendent of Fisheries,				

1.11 Production and Productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 08;)

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)							
Major Field crops (Crops to be identified based on total acreage)										
	Paddy	-	-	-	-	-	-	-	-	-
	Maize	-	-	-	-	-	-	-	-	-
	Rapeseed & Mustard	-	-	-	-	-	-	-	-	-
	Jute*	-	-	-	-	-	-	-	-	-
	Cotton*	-	-	-	-	-	-	-	-	-
	Sesame	-	-	-	-	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Arecanut	-	-	-	-	-	-	-	-	-
	Cashewnut	-	-	-	-	-	-	-	-	-
	Banana	-	-	-	-	-	-	-	-	-
	Pineapple	-	-	-	-	-	-	-	-	-
	Ginger	-	-	-	-	-	-	-	-	-
	Potato	-	-	-	-	-	-	-	-	-

* Fibre crops in bales

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Paddy	Maize	Rapeseed & Mustard	Cotton	Jute
	Kharif- Rainfed	1 st week of June-last week of June	March-April	-	March-May	March-April
	Kharif-Irrigated	-		-	-	-
	Rabi- Rainfed	-	Oct-Nov	Oct-Nov	-	-
	Rabi-Irrigated	2 nd week of Dec-1 st week of Jan	Oct-Nov	-	-	-

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought			
	Flood			
	Cyclone			
	Hail storm			
	Heat wave			
	Cold wave			
	Frost			
	Sea water intrusion			
	Pests and disease outbreak (Paddy: Stem borer, Gandhi bug, rice hispa, Blast, leaf spot; Maize: cob borer & leaf spot)			
	Others (hail storm at milk stage of boro paddy)			

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: No
		Soil map as Annexure 3	Enclosed: No

Location map of North Garo Hills district
Annexure I



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 2 weeks (June 3 rd week)	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric Cotton, Mesta	No change of usual cropping practices	No change of usual cropping practices	-
	Rainfed medium land	Sali Paddy Sali paddy-mustard	-do-	-do-	
		Maize (sole)	-do-	-do-	
		Maize-mustard /vegetable Amaranthus, Bhendi	-do-	-do-	
		Jute	-do-	-do-	
Rainfed lowland	Boropaddy	-do-	-do-		

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 4 weeks (July 1 st week)	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Paddy: Bhalum-1, Bhalum-2 Maize: Da61a, Vijay composite Intercropping: Maize+ cowpea, Maize+ Blackgram/ greengram Turmeric: Lakadang, RCT-1 Ginger: Nadia	Conservation furrow, Intercultivation, mulching	-
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard	Paddy: Sahsarang Swarna mahsuri	SRI, ICM method for paddy cultivation	

		Maize (sole)	Maize: Vivek hybrid, RCM-1-1, RCM-1-2 and RCM-1-3	Mulching with weed spp. Adopt closer spacing 40x30cm in maize	
		Maize-mustard/vegetable	Maize: Vivek hybrid, RCM-1-1, RCM-1-2 and RCM-1-3		
		Cowpea, bhindi, amaranthus, chilli, banana, pumpkin			
	Rainfed lowland	Boropaddy	Boro paddy: KRH-2, Jaymati, Naveen		

Early and mid season drought Outbreak of pests and diseases due to unusual rains	Suggested contingency measures			
	Vegetative stage	Flowering stage	Crop maturity	Post harvest
Paddy	1.Weed control 2.For seed and root pests and stem borers, seedling maggots and locust suitable IPM measures should be followed 3.For Rhizoctonia root rot-cultural, chemical (mancozeb 3g/lit of water for foliar application) and biological control	Follow suitable crop protection measures	Spray with suitable insecticides to avoid cut worm infestation Rodent holes should be treated with Aluminium phosphide @ 6 pellets per hole.	Harvest the crop at maturity, dry properly and store in gunny bags.
Pulses	1.Remove weeds 2.seedling mortality can be reduced by delayed planting until mid November 3.For powdery mildew disease spray the crop at the appearance of the disease with wettable sulphur like sulfex. Spray at 15 days interval. 4 For hairy caterpillars and loopers spray with phosphomedon 2ml/lit of water.	Follow suitable crop protection measures	Rodent holes should be treated with Aluminium phosphide @ 6 pellets per hole. After harvest collect the plants left in the field and burn them.	leave the harvested crop in small heaps for 2-3 days for curing. After curing collect the crop at one place and detach the pods either by hand or using groundnut plucker for separating the pods from the plants.
Maize,pumpkin,tapioca,sweet potato(mixed cropping)	Need based plant protection measures both IPM & IDM.	Need based plant protection measures both IPM & IDM	Need based plant protection measures both IPM & IDM	-

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli + Tapioca + Sweet Potato + Ginger + Turmeric	Intercropping: Maize+ cowpea(2:1), Maize+Blackgram/ greengram(1:1) Blackgram: T 9, kalindi Green gram: K-851, samrat Soybean: JS 80-21, JS 335	Conservation furrow, mulching, harvest green cob of maize	
	Rainfed medium land	Sali Paddy Sali paddy-mustard/vegetable	Paddy: Satyaranjan, Basundhara Frenchbean, Bhindi, Amaranthus	SRI/ICM method for Paddy cultivation, Zero tillage Mustard	
	Rainfed lowland	Boropaddy	Boro paddy: Jaymati, Kanaklata, Naveen		

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)	Rainfed upland	Jhum rice + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato + Ginger + Turmeric	Sesamum: AST-1 Short duration Blackgram (var. kalindi), Greengam (Samrat/K-851)	Adopt closer spacing 25x10cm	
	Rainfed medium land	Sali Paddy (sole) Sali paddy-mustard/vegetable	Paddy: Disang, Luit, Kapilee Radish, Pumpkin. frenchbean	Direct seeding of rice , *SRI method for Paddy cultivation, *Direct wet seeding of sprouted rice seeds, *Zero tillage Mustard/greengram	
	Rainfed lowland	Boropaddy	Boropaddy: Jaymati, kanaklata, KRH-2, chandrama, TRC Borodhan, Naveen		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Early season drought (Normal onset)					
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Thinning and gap filling of existing crop,	IPNS(Organic + inorganic+ BF), INM(Organic + inorganic), Weed mulching	
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard/vegetable	Life saving irrigation, Resowing, if required Gap filling weeding	SRI, ICM method for paddy cultivation, Direct wet seeding of sprouted seeds,	
		Radish cowpea, palak and Coriander			
	Rainfed lowland	Boropaddy			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell, consecutive 2 weeks rainless (<2.5 mm) period)					
At vegetative stage	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Weeding, Life saving irrigation from Jalkund, farm pond	Jalkund, mulching, conservation furrow, repair bunds	
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard	Dual cropping of paddy with Azolla Postponement of topdressing of Nitrogen, life saving irrigation, IPM, IDM for pest &	Azolla, Compost, Vermicompost, Integrated nutrient management	
		Maize (sole) Maize- mustard/vegetable			

			disease management		
		Cowpea, French bean, coriander, radish, palak			
	Rainfed lowland	Boropaddy	No change	-	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell)					
At flowering/ fruiting stage	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Life saving irrigation from Jalkund, fam pond	Jalkund, Vermicompost @ 2t/ha,	
	Rainfed medium to shallow land	Sali Paddy(sole) Sali paddy-mustard	Weeding, life saving irrigation	Vermicompost@ 2t/ha, FYM@ 5 t/ha, Mulching, farm pond	
		Maize (sole)	Earthing up for maize		
		Maize- mustard/vegetable			
Rainfed lowland	Boropaddy	Life saving irrigation			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		Remarks on Implementation
			Crop management	Rabi Crop planning	
Terminal drought (Early withdrawal of monsoon)					
Heavy uneven rainfall, mid season dry spell, medium to shallow soils	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Harvest mature crops Damaged crops may used as fodder depending on the suitability	Plan for Winter vegetables (cabbage, cauliflower, tmato, broccoli etc)	
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard		Mustard, Pea Vegetables greengram	
		Maize (sole)	Harvest green cob		
		Maize- mustard/vegetable			
		Cole crops, French bean, radish, carrot,	Cole crops nursery under protected polyhouse, Ridge	- Rabi cropping with cole crops such as	

			plot for French bean, radish	<p>Cauliflower (mid season varieties – Improved japaneses, Pusa Synthetic, Pusa snowball etc.) and Cabbage (Varieties – Golden acre, Pride of india, Pusa Mukta etc.), Knolkhol (White viena) etc.</p> <p>- Growing of Tomato, Brinjal, pea, potato and Leafy vegetables like Spinach, Radish etc. with recommended varieties and package of practices.</p> <p>--Growing of rabi field crops like toria, lentil,</p>	
	Rainfed lowland	Boropaddy			

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	Medium to shallow land	Sali Paddy(sole) Sali paddy-mustard	Boro paddy	Weeding, life saving irrigation Earthing up for maize, Mulching	-
		Maize (sole)	Intercropping		
		Maize- mustard			
		Cowpea and French bean			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Medium to shallow land		Boro paddy Rice-fallow	Life saving irrigation, Mulching	
	Sali Paddy(sole) Sali paddy-mustard Maize (sole) Maize- mustard	Bhindi, radish, tomato, abbage, cauliflower			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Lateritic soils	Fallow	Sali Paddy(sole late sown)	Life saving irrigation weeding	
		Tapioca, colocasia, sweet potato			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Medium to shallow land	Fallow	Boro paddy	Weeding, life saving irrigation	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
		Vegetables	Root crops, onion, colocasia	Mulching	

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	Low land shallow tube well	Cropping system 1: Fallow	Boro paddy Lentil, pea, mustard, vegetables	Limited irrigation at critical stages, SRI & ICM method	

2.2 Unusual rains (untimely, unseasonal etc)

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Paddy + soybean /blackgram/greengram	Provide drainage	Provide drainage	Drain out excess water Harvesting at physiological maturity stage	Shift to safer place & dry shed, safe storage against storage pest& diseases
Maize + soybean/blackgram/greengram				
Redgram +sesamum				
Redgram+millet				
Paddy sole	Making bunds			
Horticulture	Ridge making for frenchbean, tomato, cabbage, cauliflower			
Heavy rainfall with high speed winds in a short span				
Horticulture				
Outbreak of pests and diseases due to unseasonal rains				
Paddy + soybean /blackgram/greengram	Need based plant protection measures	Need based plant protection IPDM method		Safe storage against storage pest and
Maize + soybean/blackgram/greengram				

Redgram +sesamum				diseases
Redgram +millet				
Paddy sole				
Horticulture				

Outbreak of pests and diseases due to unseasonal rains	Suggested contingency measures			
	Vegetative stage	Flowering stage	Crop maturity	Post harvest
Rice	<p>1.Drain the excess water as early as possible. 2.Proper weed control should be taken. Take up 3.suitable plant protection measures against pest & disease outbreaks</p> <ul style="list-style-type: none"> • Leaf folder: Spray Chlorpyrifos@2.5ml or Acephate 1.5g or Cartaphydrochloride 2.0g / 1 or apply 8.0kg Cartaphydrochloride granuals per acre. • Sheath blight: Apply recommended nitrogen in 3-4 splits. Spray Propiconazole 1.0 ml or Hexaconazole 2.0 ml or validamycin 2.0 ml /1 at 15 days interval based on need. • Blast : remove weeds on the bunds Spray Tricyclozole 0.6/ml or Edifenphos 1.0 ml • Bacterial leaf blight: Avoid application of excess Nitrogen 	<p>1.Drain the excess water as early as possible. 2.Proper weed control should be taken.</p> <p>Rodents: Fumigate the burrow with luminium phosphide 2 pellets of 0.6 g per burrow. Poison bait with bromadiolone</p> <ul style="list-style-type: none"> • False smut: Spray Carbendazim 1.0g or COC 2.5g at weekly interval • Sheath blight: Apply recommended nitrogen in 3-4 splits. Spray Propiconazole 1.0 ml or Hexaconazole 2.0 ml or validamicin 2.0 ml /1t at 15 days interval • Blast : remove weeds on the bunds Spray Tricyclozole 0.6ml or Edifenphos 1.0 ml • Bacterial leaf blight: Nitrogen management 	<p>Drain the excess water as early as possible</p> <ul style="list-style-type: none"> • Take up suitable plant protection measures against grain fest and disceases • Cut worm: SprayChlorpyrifos 2.5 ml or DDVP 1.0 ml • Rodents :Fumigate the burrow with aluminium phosphide 2 pellets of 0.6 g per burrow. Poison bait with bromadiolone 	Thresh after drying the sheathes properly

Maize	Drain the excess water as early as possible Take up timely control measures for Pink stem borer, sheath blight and Turcicum leaf blight	Drain the excess water as early as possible Take up timely control measures for Pink stem borer, sheath blight and Turcicum leaf blight Take up timely control measures for sheath blight and post flowering stalk rots	Allow the crop to dry completely before harvesting	Harvest the cobs after dried up properly. Dry the grain to optimum moisture condition before storing
Pulses(Black gram,red bram,green gram etc)	Drain the excess water as early as Possible Spray fungicides like Copper oxychloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% two to three times by rotating the chemicals • Take up timely control measures against sucking pests whitefly that transmits YMV	Drain the excess water as early as Possible Spray fungicides like Copper oxychloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% two to three times by rotating the chemicals • Take up timely control measures against Bihar hairy caterpillar.	Drain the excess water as early as Possible Allow the crop to dry completely before harvesting	Thresh the bundles after they are dried properly • Dry the grain to proper moisture per cent before bagging and storing to prevent deterioration in quality during storage
pumpkin,tapioca,sweet potato(mixed cropping)	Need based plant protection measures both IPM & IDM	Need based plant protection measures both IPM & IDM	Need based plant protection measures both IPM & IDM	-

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Paddy	Modified Mat nursery	Drain out excess water	Drain out excess water	Harvesting at physiological maturity stage
Horticulture	-	-	-	-
Continuous submergence	-	-	-	-

for more than 2 days				
Horticulture	-	-	-	-
Sea water intrusion	-	-	-	-

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Not applicable			
Horticulture				
Cold wave				
Horticulture				
Frost				
Horticulture				
Hailstorm				
Horticulture				
Cyclone				
Horticulture				

2.5 Contingent strategies for live stock, poultry & Fisheries

2.5.1 Livestock

Drought	Suggested contingency measures		
	Before the event	During the event	After the event
	<ul style="list-style-type: none"> *Establishment of local emergency management group involving local people. * Insurance of the animals. *Establishment of permanent sites for livestock camps in drought prone areas. *perennial fodder cultivation on sloppy area, terrace and wastelands *Establishment of fodder banks *cultivation of tree fodders 	<ol style="list-style-type: none"> 1. Active part of the local management group to give information about camps, fodder banks to the farmers. 2. Bringing the animals to the established camps. 3.Fodder trees for livestock 4. Hay and silage making 5. Concentrate feeding with locally available feed ingredients 6. transporting excess fodder/crop residue from adjoining area 	<ol style="list-style-type: none"> 1.Restocking of animals 2. Proper health and nutritional management 3. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area.

Feed and fodder availability	<ol style="list-style-type: none"> 1. Establishment of feed, fodder and seed bank. 2. Encouraging cultivation of drought tolerant perennial grasses like Stylosanthes, trees and bushes on field boundaries, bunds and waste land. 3. Burning of paddy straw (Common in tribal people) should not be allowed. Paddy straw can be fortified using urea and molasses and transported to areas of fodder scarcity. 4. Efforts should be made to increase the production of supplements like UMMB (Urea Molasses Mineral Block) lick, which can be easily transported (as animal chocolate) to be offered to the animals along with crop residues to increase their palatability and digestibility. 5. Storage of fodder as hay and silage 	<ol style="list-style-type: none"> 1. Utilising feed and fodder from the bank reserves. 2. Transporting excess fodder, paddy straw from surplus area. 3. Supply of UMMB. 4. Vegetable/fruit wastes can be collected from the market yards and factories. After Sun-drying these can be transported to deficit areas. The nutritive value of these by-products is reported quite high. Apart from providing additional feed resource, such type of recycling also helps in reducing the environmental pollution. 5. State Forest Dept. to arrange for the cutting and bailing of grasses in forests, where ever possible. 6. Feeding of perennial fodder tree top feed 7. feeding of hay and silage 	<ol style="list-style-type: none"> 1. Culling of unproductive livestock to minimize the feed and fodder requirement.
Drinking water	<ol style="list-style-type: none"> 1. Preserving water in tank/pond for drinking purpose. 2. Rainwater harvesting provided its quality is retained. 3. Excavation of bore wells 	<ol style="list-style-type: none"> 1. Using preserved water in tank/pond. 2. Wherever ground water resources are available. 3. Priority for drinking purpose. 	
Health and disease management	<ol style="list-style-type: none"> 1. Veterinary preparedness with medicines and vaccines 2. Culling of non-productive animals 	<ol style="list-style-type: none"> 1. Organizing mass animal health camps. 2. Vaccination and treatment of the animals. 3. Guard against heat stress. 4. Deworming of the animals will improve fodder and feed absorption. 	<ol style="list-style-type: none"> 1. Culling of sick animals 2. Supplementation of minerals mixture and vitamins

Suggested contingency measures			
Flood	Before the event	During the event	After the event
	<ol style="list-style-type: none"> 1. Establishment of local emergency management group involving local people. 2. Insurance of the animals. 3. Establishment of permanent sites for livestock camps in the location of high grounds away from the 	<ol style="list-style-type: none"> 1. Active part of the local management group to give information about flood forecasts, road closures, relief camps, fodder banks to the people. 2. Evacuate the animals immediately and 	<ol style="list-style-type: none"> 1. Restocking of animals 2. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area.

	flood.	bringing to the established camps.	
Feed and fodder availability	Establishment of feed, fodder and seed bank in the place away from flood.	1. Distribution of emergency feed and fodder. 2. Supply of UMMB.	Culling of unproductive livestock to minimize the feed and fodder requirement.
Drinking water		Sanitation programme.	Measure against the occurrence of water borne diseases.
Health and disease management	Veterinary preparedness with medicines and vaccines	Veterinary aid to the animals. Balance feeding Mineral mixture supplements .	1. Organizing mass animal health camps. 2. Vaccination and treatment of the animals. 3.Culling of sick animals

Vaccination programme for cattle and buffalo

Disease	Age and season at vaccination
Anthrax	In endemic areas only, Feb to May
Haemorrhagic septicaemia (HS)	May to June
Black quarter(BQ)	May to June
Foot and Mouth disease (FMD)	July/August and November/December

Vaccination programme for small ruminants (sheep & Goat)

Disease	Age and season at vaccination
Foot and Mouth disease (FMD)	Preferably in winter/autumn
Peste des Petits Ruminants (PPR)	Preferably in January
Black quarter(BQ)	May to June
Enterotoxaemia(ET)	May
Haemorrhagic septicaemia (HS)	May to June
Sheep pox(SP)	November

2.5.2 Poultry

	Suggested contingency measures		
Drought	Before the event	During the event	After the event
	1. Establishment of local emergency management group involving local people. 2. Insurance of the birds. 3. Establishment of feed bank	1. Active part of the local management group to give information about feed and fodder banks to the people.	1. Strengthening feed serve banks 2. Availing insurance. 3. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area
Shortage of feed ingredients	1. Establishment of feed reserve bank on community basis.	1. Distribution of emergency feed from the reserves.	1. Strengthening feed reserve banks.
Drinking water	1. Preserving water in tank/pond for drinking purpose. 2. Rainwater harvesting provided its quality is retained. 3. Excavation of bore wells	1. Birds should be provided sufficient drinking water by using preserved water in tank/pond. 2. Wherever ground water resources are available.	
Health and disease management	Veterinary preparedness with medicines and vaccines	1. Veterinary aid to the birds. 2. Mass Vaccination.	Culling of sick birds
Flood			
	1. Establishment of local emergency management group involving local people. 2. Insurance of the birds. 3. Establishment of relief camps in the location of high grounds away from the flood.	1. Active part of the local management group to give information about flood forecasts, road closures, relief camps, advice on evacuation to the people. 2. Evacuate the birds immediately and bringing to the camps.	1. Availing insurance. 2. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area.
Shortage of feed ingredients		Distribution of emergency feed	Culling of unproductive livestock to minimize the feed and fodder requirement.
Drinking water		Sanitation programme.	Measure against the occurrence of water borne diseases.
Health and disease management	Veterinary preparedness with medicines and vaccines	Veterinary aid to the birds.	1. Organizing mass vaccination camps. 2. Culling of sick animals

2.5.3

Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought	-	-	-
A. Capture	-	-	-
Marine	-	-	-
Inland	-	-	-
(i) Shallow water depth due to insufficient rains/inflow	-	-	-
(ii) Changes in water quality	-	-	-
(iii) Any other	-	-	-
B. Aquaculture	-	-	-
(i) Shallow water in ponds due to insufficient rains/inflow	Desilting or deepening of pond so that more water can be stored	Provision of additional bore well in plain area and use Euryhaline specie	Manitaining pond water level at least one metre depth
(ii) Impact of salt load build up in ponds / change in water quality	Replacement of water in pond with fresh water	30 % exchange of water	10% exchange of water
(iii) Any other	-	-	-
2) Floods	-	-	-
A. Capture	-	-	-
Marine	-	-	-
Inland	-	-	-
(i) No. of boats / nets/damaged	-	-	-
(ii) No.of houses damaged	-	-	-
(iii) Loss of stock	-	-	-
(iv) Changes in water quality	-	-	-
(v) Health and diseases	-	-	-
B. Aquaculture	-	-	-
(i) Inundation with flood water	Repair, strengthening of dykes	Enhancement of dykes height by sand bags, catch the fish and keep in nets	-
(ii) Water contamination and changes in water quality	Use of calcium hydroxide@ 150 kg/ha	Infected fishes to be treated with KMNO4 1% as prophylactics	Lime treatment for oxidation
(iii) Health and diseases	Antibiotics fortified feeding as prophylactics	Disinfectant formalin treatments as prophylactics	-do-
(iv) Loss of stock and inputs (feed, chemicals etc)	Stock cover under insurance	-	-

(v) Infrastructure damage (pumps, aerators, huts etc)			Repaire and maintencnce of aquastructure to be given
(vi) Any other			
3. Cyclone / Tsunami	-	-	-
4. Heat wave and cold wave	-	-	-

^a based on forewarning wherever available