State: Jharkhand

Agriculture Contingency Plan for District: Chatra

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Moderately To Gently Sloping ChattisgarhMahanadi Basin, Hot Moist/Dry Subhumid Transitional ESR With Deep Loamy To Clayey Red And Yellow Soils (11.0)		
	Agro-Climatic Zone (Planning Commission)	Eastern Plateau And Hills Region (VII)		
	Agro Climatic Zone (NARP)	WESTERN PLATEAU ZONE (BI-5)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	**CHATRA, GARWA, GUMAL, LATEHAR, LOHARDAGA, PALAMAU, SIMDEGA**		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		$23^0$44" 44" N -24` 32`` 43`` N	84^0 2700E-85^0 21 03 E	525m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Zonal Research Station Chianki Daltenjanj		
	Mention the KVK located in the district with address	Kulu Farm , Near Tapej, Chatra, Jharkhand - 825401		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Zonal Research Station Chianki Daltenjanj		

(2009-2010)

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):	-	41	1st week of June	4th week of September

	NE Monsoon(Oct-Dec):	-	6		
	Winter (Jan- March)	-	-	-	-
	Summer (Apr-May)	-	2		-
	Annual	1250	49	-	-

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 and Pasture Land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (‘000 ha)	369.51	122.64	221.11	257.49	-	153.93	-	-	-	-

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area (‘000 ha)**	**Percent (%) of total**
	Very Strongly to strongly acidic (pH<5.5)	731	19.8
	Moderately acidic to slightly acidic (pH5.6 – 6.5)	1720	46.4
	Neutral (pH 6.6 – 7.3)	654	17.6
	Slightly alkaline to moderately alkaline (pH>7.4)	569	15.3
	Miscellaneous	32	0.9
	Total	3706	100

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	45.37	112
	Area sown more than once	5.93	
	Gross cropped area	51.29	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	9.36		
	Gross irrigated area	-		
	Rainfed area			
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		0.52	9
	Tanks		1.22	
	Open wells		6.00	
	Bore wells		1.37	
	Lift irrigation schemes		6.73	
	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%				

1.7 Area under major field crops & horticulture (as per latest figures) (Specify year 2009.)

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			*Rabi*				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice	-	14.73	14.73	-	-	-	-	14.73
	Maize	-	6.10	6.10	.21	-	.21	-	.82
	Pigeonpea	-	2.33	2.33	-	-	-	-	2.33
	Ground Nut	-	.11	.11	-	-	-	--	.11
	Wheat	-	-	-	4.05	-	4.05	-	4.05
	Gram	-	-	-	-	3.94	3.94	-	3.94

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	0.236	0.236	
	Guava	0.193	0.193	
	Lemon	0.072	0.072	
	Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**

	Potato	3.25	3.25	
	Okra	0.668	0.668	
	Tomato	0.561	0.561	
	Brinjal	0.503	0.503	
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
		-	-	-
	Plantation crops	**Total**	**Irrigated**	**Rainfed**
		-	-	-
	Fodder crops	**Total**	**Irrigated**	**Rainfed**
		-	-	-
	Total fodder crop area			
	Grazing land	-	-	-
	Sericulture etc	-	-	-
	Others (specify)	-	-	-

1.8	**Livestock**	**Male (‘000)**	**Female (‘000)**	**Total (‘000)**
	Non descriptive Cattle (local low yielding)			196.68
	Improved cattle			2.16
	Crossbred cattle			2.46

	Non descriptive Buffaloes (local low yielding)			
	Descript Buffaloes			45.96
	Goat			181.81
	Sheep			1.35
	Others (Camel, Pig, Yak etc.)			2.70
	Commercial dairy farms (Number)			0.012
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	2.30	36000 x 12 = 432.00	
	Backyard		37.84	

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)	
	282	**-**	**-**	**-**	**-**	**NO**

ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of village tanks**
	182	**2.28**	**652**

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)	215.00	1.5	3.22
Others			

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder (‘000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Rice	191.084	1320	-	--	-	-	-	-	2
	Maize	56.140	931	.483	2257	-	-	56.623	2259	
	Arhar	2.202	942	-	-	-	-	2.202	942	-
	Wheat			7.466	1843	-	-	7.466	1843	
	Chickpea			4.640	1175	-	-	4.640	1175	
						-				
Major Horticultural crops (Crops to be identified based on total acreage) -										

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

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 (specify)			
	Others (specify)			

1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: No
		Mean annual rainfall as Annexure 2	Enclosed: No
		Soil map as Annexure 3	Enclosed: No

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop / Cropping system[b]**	**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 2 weeks (Specify month)* 3rd week of June	Upland	Rice/ Maize/ Pigeonpea	• Rice with improved varieties: Anjali, Vandana • Intercropping of Maize + Pigeonpea • Intercropping of Pigeonpea + Groundnut • Introduction of new crops i.e. sweet potato	Balance use of chemical fertilizer Use of manual operated weeding tools Proper plant spacing Maintain proper plant population	Supply of seeds through D.A.O.
	Medium land	Rice: IR -36, IR – 64, Lalat	Rice – Naveen, Shabhagi		Supply of seeds through N.F.S.M.
	Lowland	Rice: Birsamati, Rajendra Mahsuri – 1, MTU - 7029	Hybrid Rice: PAC – 807, Uday – 111, 27P31, Arize – 6444		
Delay by 4 weeks (Specify month)* 1st week of July	Upland	Rice/ Maize/ Pigeonpea	• Rice with improved varieties: Anjali, Vandana • Intercropping of Maize + Pigeonpea • Intercropping of Pigeonpea + Groundnut • Introduction of new	Balance use of chemical fertilizer Use of manual operated weeding tools Proper plant spacing Maintain proper plant population	Supply of seeds through D.A.O.

			crops i.e. sweet potato		
	Medium land	Rice: IR -36, IR – 64, Lalat	Rice – Naveen, Shabhagi		Supply of seeds through N.F.S.M.
	Lowland	Rice: Birsamati, Rajendra Mahsuri – 1, MTU - 7029	Hybrid Rice: PAC – 807, Uday – 111, 27P31, Arize – 6444		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 6 weeks (Specify month) 3rd week of July	Upland	Niger	Niger : Birsa Niger – 1, Birsa Niger – 2	Use of recommended dose of chemical fertilizer Maintain proper plant spacing. Maintain proper plant population	Supply of seeds through D.A.O.
		Horsegram	Horsegram: Birsa Kulthi – 1, Madhu	Use of recommended dose of chemical fertilizer Maintain proper plant spacing. Maintain proper plant population	Supply of seeds through N.F.S.M.
	Medium land	Rice: IR -36, IR – 64, Lalat	Rice – Naveen, Shabhagi		
	Lowland	Rice: Birsamati, Rajendra Mahsuri – 1, MTU - 7029	Hybrid Rice: PAC – 807, Uday – 111, 27P31, Arize – 6444		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 8 weeks (Specify month) 1st week of August	Upland	Niger	Niger : Birsa Niger – 1, Birsa Niger – 2	Use of recommended dose of chemical fertilizer Maintain proper plant spacing Maintain proper plant population	Supply of seeds through D.A.O. Supply of seeds through N.F.S.M
		Horsegram	Horsegram: Birsa Kulthi – 1, Madhu	Use of recommended dose of chemical fertilizer Maintain proper plant spacing. Maintain proper plant population	

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Upland	Pigeonpea + Maize/ Pigeonpea/ Maize/Rice/Blackgram Pigeonpea:Birsa Arhar – 1, Bahar, local Maize: Kanchan , Suwan Composite -1,BVM–2	Thinning and gap filling of existing crop. Resowing of crop Rice: Vandana and Sahbhagi ,Uday 111/ Sesame: Kanke white and Krishna	Soil mulching Gap filling Resowing Conservation Furrow	Supply of seeds through D.A.O. Supply of seeds through N.F.S.M.

		Rice: Vandna, BVD – 109 Blackgram:Urd – Birsa Urd – 1, T–9, Pant U - 19			
	Medium land	Rice: IR -36, IR – 64, Lalat	Life saving irrigation through pumps and sprinkler		
	Lowland	Rice: Birsamati, Rajendra Mahsuri – 1	Life saving irrigation through Pumps		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
At vegetative stage	Upland	Maize + Pigeonpea / Blackgram + Sesame/ Maize +Groundnut/ Cowpea/ Finger millet	Supply of life saving irrigation Weeding cum – hoeing to break capillarity Finger millet has better drought tolerance capacity (Area extension) Weeding and weed mulching of the field	Application of compost to enhance the water holding capacity of soil. Judicious application of P for better penetration of root system Weeding and weed mulching of the field	

	Medium land	Rice: IR – 36, IR – 64	Life saving irrigation through pumps and sprinkler	Application of compost to enhance the water holding capacity of soil Judicious application of P for better penetration of root system	Supply of pumps (Sprinkler) sets under RKVY
	Lowland	Rice hybrids: PHB – 71, 801, Arize 6444, Rupali, Sonam	Life saving irrigation through pumps		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
At flowering/ fruiting stage	Upland	Maize + Pigeonpea/ Maize + Blackgram/ Pigeonpea + Sesame/ Maize + Groundnut/ Pigeonpea + Groundnut/ Finger millet	Life saving irrigation through sprinkler system Weed – cum – hoeing and weed mulching	Intercultivation (soil mulching) Conservation Furrow	Supply of seeds trough D.A.O. Supply seeds trough N.F.S.M.
	Medium land	Rice : IR – 36 , IR - 64	Life irrigation by lifting the water from ponds/ wells		Supply of irrigation devices under RKVY
	Lowland	Rice : Sonam, Rupali, Arize – 6444, PHB – 71	Life saving irrigation through Pumps/Ponds/wells		

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
	Upland	Maize + Pigeonpea / Blackgram/ Groundnut/ Cowpea/ Pigeonpea + Sesame/Finger millet	Life saving irrigation Harvesting of pods of Cowpea and Blackgram for vegetable purpose and fodder	Niger, Mustard, Chickpea, Linseed	Supply of Pumps (Sprinkler) sets under RKVY
	Medium land	Rice	Supply of life saving irrigation Lifting the water from ponds and wells		
	Lowland	Long duration rice varieties and hybrids.	Life saving irrigation Crop protection measures		Ponds/wells under MNREGS and RKVY

2.1.2 Drought - Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Delayed release of water in canals due to low rainfall	Upland	Rice (Rainfed condition)	Maize	Effective use of irrigation through sprinkler	Supply of seeds through D.A.O. Supply of seeds thhrough N.F.S.M.
			Vegetable	Limited irrigation	
			Aerobic rice		

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Limited release of water in canals due to low rainfall	Not applicable				

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Non release of water in canals under delayed onset of monsoon in catchment	Not applicable				

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Lack of inflows into tanks due to insufficient /Delayed onset of monsoon	Not applicable				

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Insufficient groundwater recharge due to low rainfall	Not applicable				

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

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Pigeonpea + Maize	Provide drainage	Provide drainage	Rain water harvesting	Safe storage against storage pest and disease
Pigeonpea+ Sorghum	Provide drainage	Provide drainage	Harvest for vegetable purpose	Safe storage against storage pest and disease
Pigeonpea + Okra	Provide drainage	Provide drainage		Safe storage against storage pest and disease
Horticulture	-	-	-	-
Heavy rainfall with high speed winds in a short span[2]	-	-	-	-
Horticulture	-	-	-	-
Outbreak of pests and diseases due to unseasonal rains	-	-	-	-
Horticulture	-	-	-	-

2.3 Floods

Condition	Suggested contingency measure[o]			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Horticulture				
Continuous submergence for more than 2 days[2]				
Horticulture				
Sea water intrusion[3]				

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

Extreme event type	Suggested contingency measure[r]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave[p]	N. A.	Provide irrigation	Provide irrigation	Short duration variety of Wheat (HW – 1166)
Wheat		Intercultural operation	Intercultural operation	Short duration chickpea (KAK – 2)
Chickpea		3. Top dressing of "N"	3. Top dressing of "N"	Short duration lentil
Lentil		4. Timely sowing	4. Timely sowing	
Horticulture				
Cold wave[q]				
Pigeonpea		Spray of fungicide and IPM	Before initiation of flower use of IPM which include fungicide + insecticide	
Chickpea		Spray of fungicide and IPM	Watering of plant	
Mustard		Spray of fungicide and IPM	Smoking at 3 to 4 am in the morning	

Horticulture	N. A.
Frost	
Horticulture	
Hailstorm	
Horticulture	
Cyclone	
Horticulture	

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Feed and Fodder availability	**1. Reserve feed/ fodder bank at community level** Each district should have reserves (feeding 5000 ACU maintenance ration for about 1-3 weeks period) of the following at any point of the year for mobilization to the needy areas. Checking of feed availability may be made at 3 months interval, particularly before onset of summer. Rice/ wheat straw: 250 t Urea molasses mineral bricks	Harvest and use all the failed crop (Maize, Rice, Wheat, Horse gram etc) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipol, Gular, Sessame, Sal, Jamun, Mango, Jackfruit, Bamboo etc) and unconventional feeds resources like banana plants, babool pods, Mahua seed cake etc for use as feed/ fodder for livestock (LS). Fallen leaves from forest may also be used as fodder. Aquatic plants like lotus, water hyacinth, duckweed may be fed to livestock mixing with straw. During drought, sorghum may accumulate HCN, which is toxic to livestock. Care may be taken in feeding of stunted grown Sorghum fodder. Available feed and fodder should be collected from	Short duration fodder crops of Sorghum / Bajra / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, Gaint Bajra, L-74, K-6677, Ananand / African tall, Kissan composite, Moti, Manjari, BI-7) and cowpea should be sown in unsown and crop failed areas. Cultivation of Jowar/Cowpea/ Maize in September-October. Rapeseed, mustard, Chinese

	(UMMB): and complete feed block (CFB) 50-100 t Dried grass collected from forest: 20-25 t Concentrates: 20-50 t Minerals and vitamin supplements mixture:1-5 t **2. Preparation and storage of straw and dried grass/ grass hay/ fallen leaves at household level** Preserve the fodder in the form of hay from Berseem, cowpea, oat & other grasses. Large farmers may prepare silage from (a Maize- harvesting at dough stage. (b) Jowar - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hycianth mixing with Paddy straw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacinth. Bales of hay and other dry fodder should be stored and covered with asbestos sheet or polythene sheet. **3, Creation of permanent fodder seed banks in all drought prone areas.**	CPRs/ forest and stall fed in order to reduce the energy requirements of the animals **Mild drought :** Hay/straw should be transported to the needy areas **Moderate drought:** Hay/ straw and vitamin & minerals mixture should be transported to the needy areas **Severe drought:** UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the needy areas. All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS. In acute drought affected areas, animal camp may be organized along nearby canals or water sources. Farmers along with canal may be persuaded to cultivate fodder crops (where canal exists). Herd should be split and supplementation should be given only to the highly productive and breeding animals (pregnant and lactating animals). Due to prolonged under-feeding, there is a chance of abortion in pregnant animals and lactating cows may show the symptoms of hypoglycemia. Comparatively good quality feed may be offered to milch and pregnant animals. Dry and non-productive animals may be reared on dry roughages sprayed with 10% molasses or crude jaggery solution and 2% urea for maintenance of animals. Available kitchen waste should be mixed with dry fodder while feeding. Livestock should be kept in shelter or under shed during daytime. In case of hot weather condition, grazing may be done in morning and afternoon.	cabbage etc and maize may be grown as fodder where feasible. These crops will be harvested in November to facilitate the sowing of wheat, pulses etc. Under irrigated conditions sowing of barseem with Chinese cabbage in last week of September may be taken up for early availability of green fodder. Oats may be grown in October as multi cut fodder to ensure the fodder availability for longer period. Concentrates supplementation should be provided to all lactating indigenous, crossbred and buffaloes In highly affected areas, where animals have died, soft loan or subsidy may be given for purchase of dairy animals. Backyard poultry, pig, goat may be distributed among resource poor farmers for immediate income generation.

	2. Establishment of silvi-pastoral system and cultivation of fodder tress Establishment of silvi-pastoral system in CPRs with ***Stylosanthus hamata*** and ***Cenchrus ciliaris*** as grass with ***Leucaena leucocephala*** as tree component. Fodder trees may be planted around the house, wasteland etc. Recently, Chaya tree (*Cnidoacolus aconitifolius*) has been introduced in IGFRI, Jhansi which has high protein value, may be introduced in drought prone regions. **3. Management of CPRs** Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production **4. Short duration and low water requiring fodder cultivation** Increase area under short duration fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti) and cowpea. **5. Feeing management** Chopping of fodder should be made	Livestock should not be traveled long distance for grazing to save energy and drinking water intake. Animals should not be watered immediately after return from grazing. Washing of animals may be done at least twice a day. 40-50 g of salt and 30-40 g mineral mixture per adult animal and 10-20 g for small ruminants and calves to be provided daily through feed to reduce the imbalances of minerals. Livestock may be provided with drinking water from wells, hand pumps or from pond. In case of bad water quality, bleaching powder or chlorine or lime may be applied to water. Arrangements should be made for mobilization of small ruminants across the districts where no drought exits Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals) Subsidized loans (5-10 crores) should be provided to the livestock keepers.	

	as mandatory in every village through supply and establishment of good quality crop cutters. Establishment of backyard production of Azolla for feeding dairy animals. Establishment of back yard cultivation of para grass/ hybrid Napier with drain water from bath room/washing area Avoid feed wastage by offering chaffed fodder and less quantity feed for 4 times a day. Avoid wastage of maize stover. Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon. If excess grasses are collected, dried grass may be stored. Proper drying, bailing and densification of harvested grass.		

Cyclone	Harvest all the possible wetted grain (rice/ wheat/maize etc) and use as animal feed after drying. Arrange for storing minimum required quantity of hay (25-50 kg) and concentrates (10-25 kg) per animal in farmer's / LS keepers house/ shed for feeding during cyclone. Don't allow the animals for grazing in case of early fore warning (EFW) In case of EFW, shift the animals to safer places. Identification of animals may be done. Keep animals untied in the shed in case of EFW.	Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Diarrhea out break may happen, arrangement should be made to mitigate the problem Protect the animals from heavy rains and thunder storms In severe cases un-tether **or** let loose the animals Arrange transportation of highly productive animals to safer place Spraying of fly repellants in animal sheds	Repair of animal shed Deworm the animals through mass camps Vaccinate against possible out breaks Proper disposable of the dead animals / carcasses by burning / burying with lime/ bleaching powder in pit Bleach / chlorinate (0.1%) drinking water or water resources Collect drowned crop material, dry it and store for future use Sowing of above mention short duration fodder crops in unsown and water logged areas Application of urea (20-25kg/ha) in the CPR's to enhance the bio mass production. After cyclone, for livelihood improvement of highly affected areas, backyard poultry, pig, goat etc may be distributed for immediate income generation.
Floods	NA	NA	NA
Heat & Cold wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) Water sprinklers / foggers in the shed ot frequent	Allow the animals early in the morning or late in the evening for grazing during heat waves Allow for grazing between 10AM to 3PM during cold waves Feed green fodder/silage / concentrates during day	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)

	washing of animals. **iii)** Application of white reflector paint on the roof or putting rice straw on the roof of the shed. **Cold wave :** Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	time and roughages / hay during night time in case of heat waves Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves. Molasses may be added in the concentrate feed during heat waves. Put on the foggers / sprinkerlers and frequent washing of animals during heat weaves and heaters during cold waves In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves. Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation	
Health and Disease management	Specify the endemic diseases (species wise) in that region. Identification of veterinary staff and animal health workers. Constitution of Rapid Action Veterinary Force Storage of emergency medicines and medical kits Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases Surveillance and disease monitoring network establishment Provision for mobile ambulatory van.	Rescue of sick and injured animals and their treatment Conducting mass animal health camps Animals may be checked for any external injury and illness, Pregnant animals may be checked for any discomfort and uneasiness. Animals may be dewormed with suitable anti-parasitic drug and be checked and treated for ecto-parasites, if any. Deworming will improve fodder and feed absorption. During flood do not leave halter or headstalls on animals. Do not tie animals together when releasing.	Conducting psahu sibir, mass animal health camps, fertility camps and deworming camps. Conducting fertility camps. Disposal of carcass by above means. gnancy toxemia may occur due to prolonged under-feeding. Hypoglycemia is also observed. Treatment may be provided to affected animals. Adequate attention is to be paid to disinfect the premises of temporary sheds with the help of bleaching powder, phenol, carbolic acid etc. In no case the carcass/ cadaver should come in

		Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.	contact with healthy animals rehabilitated in sheds.
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals
Drinking water	Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Identification of water resources	Restrict wallowing of animals in water bodies/resources	Specify the options (place and area) for establishment of drinking water reserves.

Vaccination schedule in small ruminants (Sheep & Goat)

Disease	**Season**
Foot and mouth disease (FMD)	Before rainy season and in winter / autumn
PPR	All seasons, preferably in June-July
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May

Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	December / March

Vaccination programme for cattle and buffalo:

Disease	**Age and season at vaccination**
Anthrax	In endemic areas only, Feb to May
HS	May to June
BQ	May to June
FMD	November to December

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, wheat etc,	Supplementation only for productive birds with	Supplementation to all

	Culling of weak birds	house hold grain Supplementation of shell grit (calcium) for laying birds	
Drinking water	Rain water harvesting	Sanitation of drinking water	Give sufficient water as per the bird's requirement
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with line powder in pit
Floods	NA	NA	NA
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house with bleaching powder/ lime etc. Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD

Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD

Heat wave and cold wave			
Heat wave			
Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged Don't allow for scavenging during mid day	Routine practices are followed
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed. Increase energy and vitamin concentration in feed (supplementation with grain).	Routine practices are followed
Cold wave			
Shelter/environment management	Provision of proper shelter	Close all openings with	Routine practices are followed

	Arrangement for brooding Assure supply of continuous electricity	polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	
Health and disease management	Arrangement for protection from chilled air	Supplementation of grains Antibiotics in drinking water to protect birds from pneumonia	Routine practices are followed

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event[a]	**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	(i) Thinning of population (ii) Arrangement of water supply from external resource (iii) Deepening of ponds for more storage of water	(i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes (Singhi, Magur or Murrel)	(i) Maintenances of remaining stock till favorable condition achieved (ii) If not feasible, total harvesting or transfer of fishes may be done. (iii) Preparation of the pond for next crop.
(ii) Impact of salt load build up in ponds / change in water quality	(i) Regular monitoring of water quality parameter. (ii) Addition of water from external resource	(i) Addition of water (ii) Arrangement of aeration. (iii) Monitoring of water quality (iv) Reduction of manuring according to water level.	
(iii) Any other	Polythene lining in ponds having more water seepage		
2) Floods			
A. Capture			
Marine			
Inland			
(i) Average compensation paid due to loss of human life			
(ii) No. of boats / nets/damaged			
(iii) No.of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(vi) Health and diseases			
B. Aquaculture			
(i) Inundation with flood water			
(ii) Water contamination and			

changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
(vi) Any other			
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds			
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			

(vi) Any other			
4. Heat wave and cold wave			
A. Capture			
Marine			
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			
(iii) Any other			
	Suggested contingency measures		
	Before the event[a]	**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			

(ii) Impact of salt load build up in ponds / change in water quality			
(iii) Any other			
2) Floods			
A. Capture			
Marine			
Inland			
(i) Average compensation paid due to loss of human life			
(ii) No. of boats / nets/damaged			
(iii) No.of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(vi) Health and diseases			
B. Aquaculture			
(i) Inundation with flood water			
(ii) Water contamination and changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
(vi) Any other			
3. Cyclone / Tsunami			

A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds			
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			
(vi) Any other			
4. Heat wave and cold wave			
A. Capture			
Marine			
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)			

(ii) Health and Disease management			
(iii) Any other			