State: Jharkhand

Agriculture Contingency Plan for District : Palamau

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 eco sub región (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 or part thereof falling under the NARP Zone	Chatra, Garwa, Gumal, Latehar, Lohardaga, Palamau, Simdega		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		$23^0 5^0 – 28^0$-08N	$83^0.55^0$ 84^0 30 E	228.6 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Zonal Research Station (Z.R.S.), Chianki, medninagar, Palamau, Pin – 822133 (Birsa Agricultural University, Ranchi) Pin – 834006.		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Palamau, Medninagar, Pin - 822133		
1.2	**Rainfall**	**Normal RF(mm)**	**Normal Onset (specify week and month)**	**Normal Cessation (specify week and month)**
	SW monsoon (June-Sep):	1101	2nd week of June	1st week of October
	NE Monsoon(Oct-Dec):	70	2nd week of October	3rd week of December
	Winter (Jan- March)	52	1st week of January	4th week of March
	Summer (Apr-May)	62	1st week of April	4th week of May
	Annual	1285		

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)	459	107	167	28	18	108	-	136	28	-

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area ('000 ha)**	**Percent (%) of total**
	Alfisols	282	53.9
	Entisols	113	21.5
	Inceptisols	105	20.0

*** mention colour, depth and texture (heavy, light, sandy, loamy, clayey etc) and give vernacular name, if any, in brackets**

1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	107	112
	Area sown more than once	13	
	Gross cropped area	120	

1.6	**Irrigation**	**Area ('000 ha)**		
	Net irrigated area	10.7		
	Gross irrigated area	22.84		
	Rainfed area	96.3		
	Sources of Irrigation	Number	**Area ('000 ha)**	**Percentage of total irrigated area**
	Canals		4	
	Tanks		0.8	
	Open wells		0.6	
	Bore wells			
	Lift irrigation schemes			

	Micro-irrigation			
	Other sources (please specify)			
	Total Irrigated Area		10.7	
	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 2009-10.)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice	1.42	5.6	7.1					7.1
	Maize	4.40	17.6	22.00					22.0
	Pigeonpea	2.38	9.5	11.90					11.90
	Blackgram	0.9	3.6	4.50					4.50
	Wheat				1.4	5.8	7.2		7.27

	Gram and other pulses				0.60	2.41	3.01		3.01
	Mustard and other oil seeds				1.11	4.54	5.56		5.56
				0.01					0.01

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
		Total : 2.681		
	Horticulture crops - Vegetables			
		Total 11.133		**-**
	Medicinal and Aromatic crops	**-**	**-**	**-**
	Plantation crops		**-**	**-**
	Eg., industrial pulpwood crops etc.	**-**	**-**	**-**
	Fodder crops	**-**	**-**	**-**
	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)			1.3
	Crossbred cattle			1.6
	Non descriptive Buffaloes (local low yielding)			12.0
	Graded Buffaloes			
	Goat			1.8
	Sheep			1.2
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			
1.9	**Poultry**		**Total No. of birds ('000)**	**No. of farms**
	Commercial			1.8
	Backyard			

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**	
	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			

1.11 Production and Productivity of major crops (2009-10)

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	11.56	1628					11.56	1628	
	Maize	20.51	932					20.51	932	
	Pigeonpea	6.164	518					6.164	518	
	Urd	2.304	512					2.304	512	
	Wheat			13.187	1830			13.187	1830	
	Gram & other pulses			2.049	680			2.049	680	
	Mustard & other pulses									
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**	**Maize**	**Pigeonpea**	**Blackgram**	**Chickpea**
	Kharif- Rainfed	2nd week of June- 4th week of July	2nd week of June- 2nd week of July	2nd week of June – 2nd week of August	2nd week of June – 2nd week of August	
	Kharif-Irrigated					

	Rabi- Rainfed					October to December
	Rabi-Irrigated					

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)			

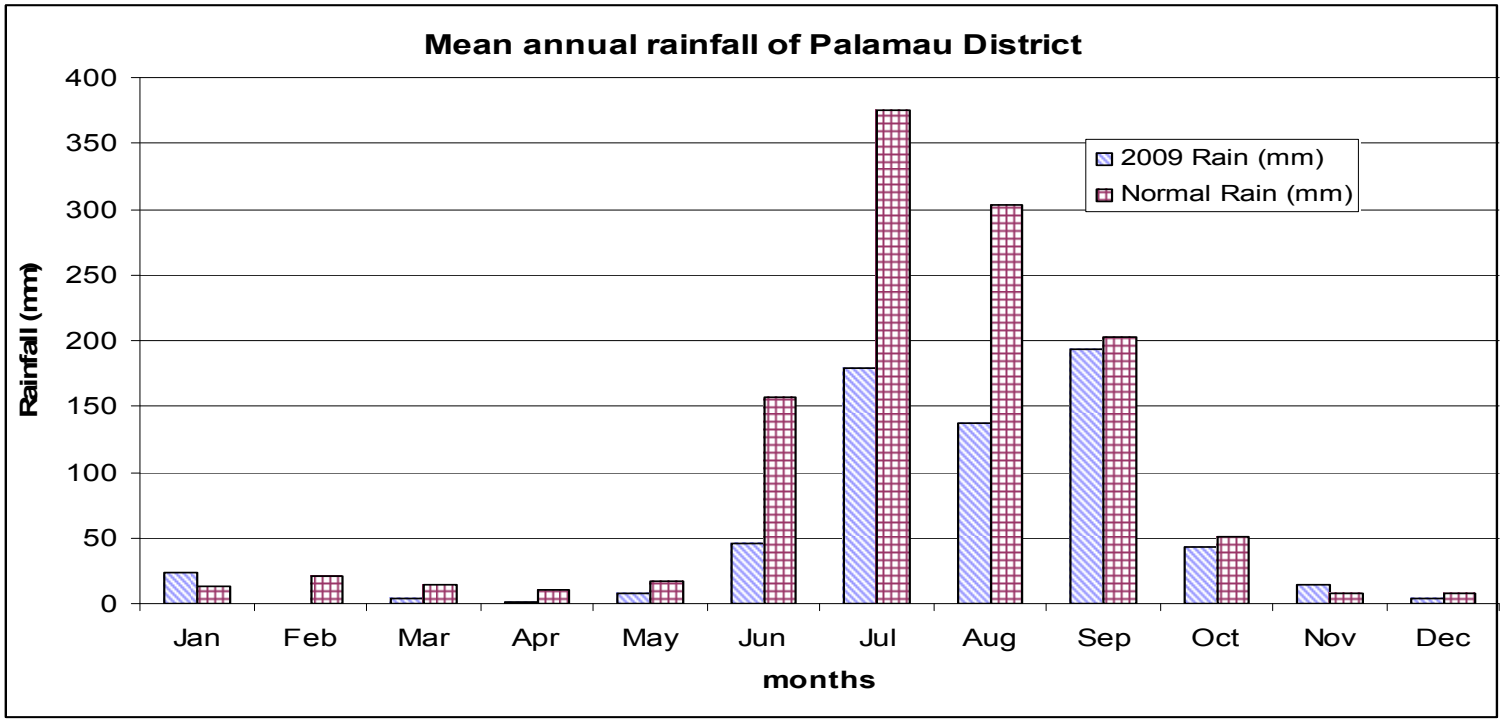
1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

Annexure I

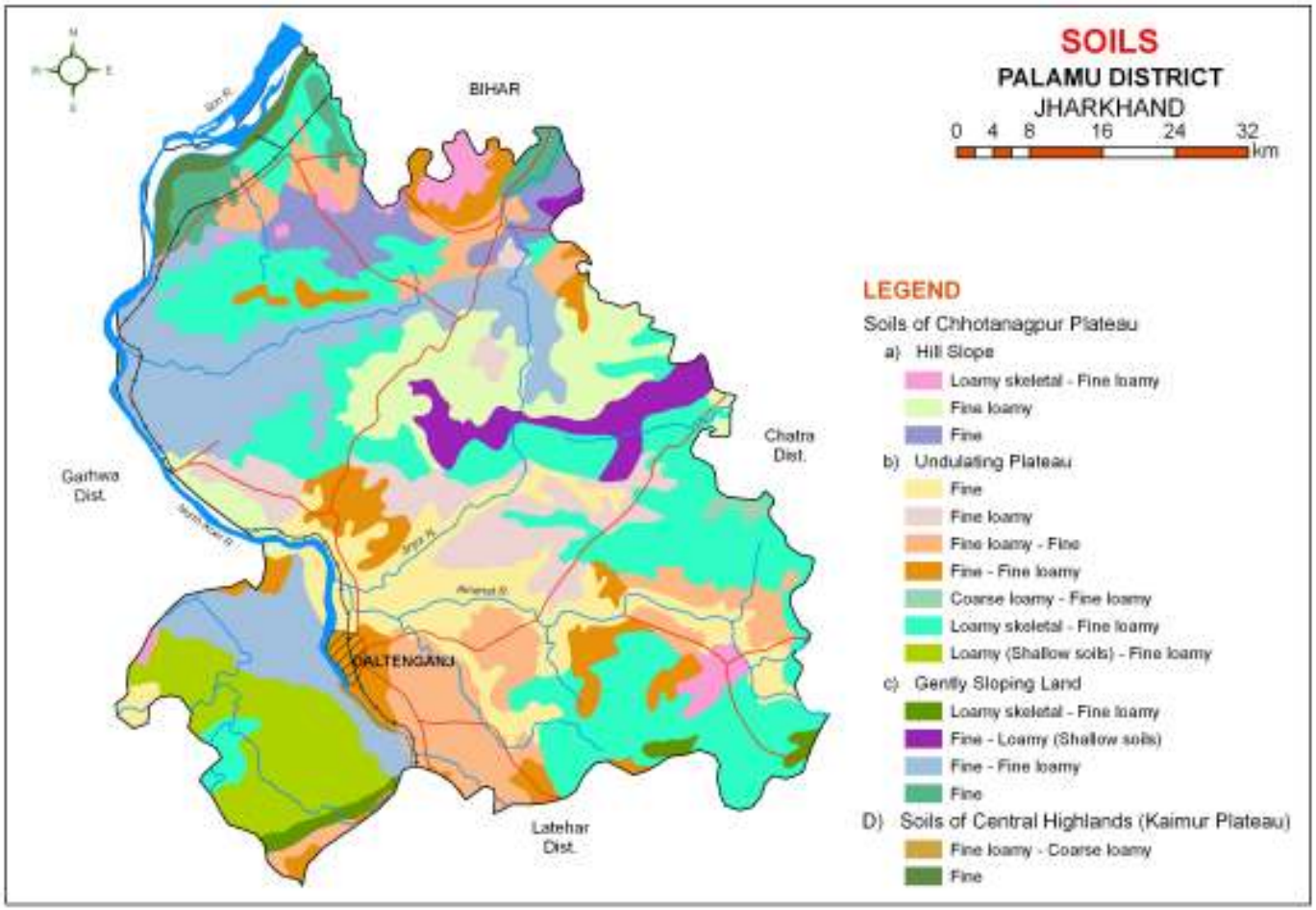

Bihar
Bihar
Bihar
SAHIBGA
GODDA
PAKUR
KODERMA
GIRIDIH
PLALAMAU
CHATRA
DEOGHAR
DUMKA
GARHWA
LATEHAR
HAZARIBAGH
JAMTARA
BOKARO
DHANBAD
LOHARDAGA
West Bengal
Chattisgarh
RANCHI
GUMLA
SARAIKELA
West Bengal
SIMDEGA
W.SINGHBHUM
E.SINGHBHUM
Orissa
Orissa

ANNEXTURE-II

MEAN ANNUAL RAINFALL



ANNEXTURE-III



SOURCE: NBSSLUP, Kolkata

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks **4th week of June**	Upland	Maize	No change	Line sowing Adopt wider spacing (75 X 25 cm) in Pigonepea Adopt seed treatment	Supply of seeds through D.A.O., Supply of seeds through N.F.S.M.
		Pigeonpea, Birsa Arhar – 1, Bahar, BR-65, local	Pigeonpea+Maize		
		Pigeonpea + Maize	Pigeonpea+Groundnut		
		Rice Rice – BVD – 109, 110, Vandana, Sweet Potato-local	Pigeonpea + Sorghum Sorghum – CSV – 20, CSV - 17 Hybrid Pigeonpea - ICPH – 2671, ICPH-8		
		Blackgram- Birsa Urd – 1, T-9, Pant U-19	No change		
		Soybean-Birsa Soybean-1	No change		
	Medium land with medium deep sandy loam soils	Rice – IR -36, IR – 64, Lalat , Birsa Dhan-202	Rice – Naveen, shabhagi		
	Low land deep clay soil	Rice: Birsamati, Rajendra munsuri – 1,MTU - 7029	Hybrid Rice - PAC – 807, Uday – 111, 27P31, Arize – 6444	-	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks	Upland	**Cropping system**		Line sowing	Supply of seeds through D.A.O. ,

2nd week of July		**Maize**	Kanchan , Suwan Composit -1, BVM – 2 or **Finger Millet-**A-404, Birsa Marua-1	Wider spacing (75 c.m X 25 c.m) Pigonepea Use of potash fertilizer Seed treatment Integrated pest management	Supply of seeds through N.F.S.M, MNREGS and NWDPRA Schemes.
		Pigeonpea + Maize	Pigeonpea + Sorghum Sorghum – CSV – 20, CSV - 17 Pigeonpea + Okra Okra – Pravani kranti, Arka Anamika, A – 4 Pigeonpea+ Groundnut **Groundnut**- Birsa Bold		
		Pigeonpea , Birsa Arhar –1, Bahar, BR-65, local	Hybrid pigeon pea -ICPH – 2671 Maize – HQPM-1		
		Rice- Vandana, Birsa Vikash Dhan-109	Hybrid Rice - PAC – 807, Uday – 111, 27P31, Arize – 6444		
		Blackgram	**Blackgram** : Birsa Urd-1, T – 9, Pant U – 19/ **Finger Millet-**A-404, Birsa Marua-1 **Groundnut**- Birsa Bold,		
	Medium lands	**Rice –** IR -36, IR – 64, Lalat	**Rice –** Naveen, shabhagi		
	Low lands	**Rice -** Birsamati, Rajendra munsuri – 1, MTU - 7029	**Hybrid Rice** - PAC – 807, Uday – 111, 27P31, Arize – 6444		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks 4th week of July	**Upland**	**Maize**	Pigeonpea + Sorghum Sorghum – CSV – 20, CSV - 17 **Finger Millet**- A 404, Birsa Marua-1 **Maize** - Kanchan , Suwan Composit -1, BVM – 2	Adopt line sowing Wider spacing (75 cm X 25 cm) in pigonepea	Supply of seeds through D.A.O. Supply of seeds through N.F.S.M.
		Pigeonpea/ **Pigeonpea + Maize** **Pigeonpea** , Birsa Arhar – 1, Bahar, local, BR-65.	Pigeonpea + Okra Okra – Pravani kranti, Arka Anamika, A – 4 Hybrid Pigeonpea - ICPH - 2671		
		Rice – Vandana, BVD – 109, 110.	Hybrid Rice - PAC – 807, Uday – 111, 27P31, Arize – 6444 Blackgram– Birsa Urd – 1, T – 9, Pant U – 19 Finger Millet- A 404, Birsa Marua-1		
	Medium lands	**Rice –** IR -36, IR – 64, Lalat	**Rice –** Naveen, shabhagi		
	Low lands	**Rice -** Birsamati, Rajendra mahsuri – 1	**Hybrid Rice** - PAC – 807, Uday – 111, 27P31, Arize – 6444		

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks 2nd week of August	Upland	Maize/ Upland rice/ Pigeonpea	Plan to sow Toria/ cowpea/ niger/ Vegetable pea Toria – Bhawani, Panchali, Pant Toria – 303, Lotni (Local) Hybrid pigeonpea –ICPH – 2671, ICPH-8 Niger – N- 5, Birsa Niger – 2 and 3 Vegetable pea- Azad, Arkel Mustard- Pusa Bold, Shivani, Pusa Kranti Kulthi Kulthi – Birsa Kulthi – 1, Madhu Kharif Potato- Kanchan	**In Finger millet :** 1.Seed hardening-(18 hrs. soaking in water followed by 24 hrs. shade drying 2.Thinning to retain one seedling at 30 cm 3. Inter cultivation 4. Conservation furrow Thinning	Supply of seeds through D.A.O. Supply of seeds through N.F.S.M.
	Medium lands	Transplanting of rice	Transplanting of rice if seedling is available Sowing of early Toria Var—T-9, PT- 303, Niger, Horse gram and Kharif Potato	Transplanting rice with 5-6 seedling/hil, If age of seedling is more than 30 days	
	Lowlands	Transplanting if seedling of medium variety Sahbhagi, BVD 109, 110, 111 is available	Transplanting if seeding is available of mid early variety Anjali, BVD 109,110,111	Reduce RDF fertilizer dose by 20 % NPK/ha Increase no. of seedling (5-6 seedling/hill) Transplanting with closes	

				spacing 15x10 cm	

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**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Upland	**Pigeonpea + Maize** **Pigeonpea** , Birsa Arhar – 1, Bahar, local **Maize -** Kanchan , Suwan Composit -1, BVM – 2 Cropping system – 2 Maize Cropping system – 3 **Rice** Rice – Vandna, BVD – 109, **Blackgram** – Birsa Urd – 1, T–9, Pant U - 19	1. Thinning and gap filling of existing crop. 2. Re sowing of crop if previous crop completely fails Rice – Vandna, Sahbhagi Hybrid Rice – Uday 111 Sesame – Kanke white, Krishna	Soil mulching Gap filling Conservation Furrow	-
	Medium lands	**Rice –** IR -36, IR – 64, Lalat	Extend the area under Shabhagi Dhan variety	Life saving irrigation.	
	Lowlands	MTU-7029, Birsamati, Rajendra munsuri – 1	-	Life saving irrigation	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**

(>2.5 mm) period)					
At vegetative stage	Uplands	Maize + Pigeon Pea / Blackgram Pigeon Pea + Sesame Maize + Groundnut	Weeding cum – hoeing to break capillarity.	1. Presowing application of compost to enhance the water holding capacity of soil. 2.Remove the weeds and use uprooted weeds as mulching. 3.Life saving irrigation through Pumps and sprinkler.	Supply of Pumps (Sprinkler) sets under RKVY
	Medium lands	Rice – IR – 36, IR – 64	Area extension in next season under Shabhagi Dhan variety which is drought tolerant.		
	Low lands	Low lands mostly covered under hybrids with stand 2 – 3 weeks long stress PHB – 71, A – 801, Arize 6444, Rupali, Sonam	-	Life saving irrigation through Pumps	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Upland	Maize + Arhar (Pigeon Pea) Maize + Blackgram Pigeon Pea + Sesame Maize + Groundnut Pigeon Pea + Groundnut Fingermillet	Weed – cum – hoeing and weed mulching	Intercultivation (soil mulching) Conservation Furrow Life saving irrigation through sprinkler system	Supply of Pumps (Sprinkler) sets under RKVY,
	Medium land	Rice : IR – 36 , IR - 64	-		
	Low land	Rice : Varieties and Hybrids Sonam, Rupali, Arize – 6444, PHB – 71	-		

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Uplands	Maize + Pigeon Pea / Blackgram/ Groundnut/Cowpea Pigeon Pea + Sesame Fingermillet	Life saving irrigation Harvesting of pods of Cowpea and Blackgram for vegetable purpose and fodder.	Plan for rabi with Niger/ Rai/ Chickpea/ Linseed.	Supply of Pumps (Sprinkler) sets under RKVY,
	Medium lands	Rice	Supply of life saving irrigation lifting the water from ponds wells.	Plan for rabi with Rai + Wheat, Linseed + Horsegram/ Niger/ Toria/ Chickpea, Vegetable like – tomato, Vegetable pea, Potato. Wheat + Mustard Lentil.	
	Low lands	Long duration rice varieties and hybrids.	Life saving irrigation Crop protection measures		

2.1.2 Drought - Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Uplands	Rice (Rainfed condition)	Maize	Effective use of irrigation (Sprinkler)	Supply of seeds through D.A.O. Supply of seeds thhrough N.F.S.M.
			Vegetable	Limited irrigation	
			Aerobic rice		
	Mid land (Don-II) & low land (Don-I)	Rice	Adopt SRI cultivation	-	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	Not applicable				
Non release of water in canals under delayed onset of monsoon in catchment					
Lack of inflows into tanks due to insufficient /delayed onset of monsoon					
Insufficient groundwater recharge due to low rainfall					

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**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Pigeonpea + Maize / Pigeonpea + sorghum / Pigeonpea + Okra	Provided drainage	Provided drainage	Rain water harvesting	Safe storage against storage pest and disease
Heavy rainfall with high speed winds in a short span[2]				
Outbreak of pests and diseases due to unseasonal rains				

2.3 Floods

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days[2]	Not applicable			
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]				
Wheat		Provided irrigation	Provided irrigation	
Lentil		Interculture	Interculture	
Cold wave	Not applicable			
Frost	Not applicable			
Hailstorm	Not applicable			
Cyclone	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**
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.	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.	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.

	Rice/ wheat straw: 250 t Urea molasses mineral bricks (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.** **2. Establishment of silvi-pastoral system and cultivation of fodder tress** Establishment of silvi-pastoral system in CPRs with ***Stylosanthus hamata*** and	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 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. Livestock should not be traveled long distance for grazing to save energy and drinking water intake. Animals should not be watered	Rapeseed, mustard, Chinese 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.

	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 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.	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.	

	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 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)	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 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	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
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. Report the location, identification and disposition of	Conducting psahu sibir, mass animal health camps, fertility camps and deworming camps. Conducting fertility camps. Disposal of carcass by above means. Pregnancy 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 contact with healthy

		livestock and poultry to authorities handling the disaster.	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.

[s] based on forewarning wherever available

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event[a]	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Floods				

Shortage of feed ingredients				
Drinking water				
Health and disease management				
Cyclone				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Heat wave and cold wave				
Shelter/environment management				
Health and disease management				

[a] based on forewarning wherever available

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 fish density (ii) Arrangement of water supply from external resource (iii) Deepening of ponds to accommodate more water	(i) Partial harvesting (ii) Addition of water in ponds (iii) Stocking of air breathing fishes (Singhi, Magur or Murrel)	(i) Maintenances of remaining stock till onset of favorable conditions or otherwise. (ii) Harvesting or transfer of fish stock to other place. (ii) Preparation of ponds for next crop.
(ii) Impact of salt load build up in ponds / change in water quality	(i) Regular monitoring of water quality parameters. (ii) Arrangement for water from external source. (iii) Arrangement for aeration.	(i) Addition of required water. (ii) Arrangement of aeration. (iii) Continuous monitoring of water quality parameters. (iv) Reduction in manuring.	(i) Exchange and addition of water. (ii) Manuring if required.
(iii) Any other	Laying of Polythene lining in ponds having water seepage problem.		
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	(i) Elevation and renovation dykes of ponds. (ii) Construction of ponds in upland areas (ii) Arrangement for shifting of	(i) Collection of naturally bred fish seed from flood water. (ii) Stocking of seed in nursery ponds constructed in upland area.	(i) Repairing of damaged pond dykes. (ii) Removal of unwanted fishes from ponds. (iii) Sale large sized fishes.

	inputs, crafts and gears.	(iii) Further raising of dykes by putting sand bags/fencing dykes with nylon nets.	
(ii) Water contamination and changes in water quality	(i) Arrangement for monitoring of water quality parameters.		(I) Use of lime/Pott. Permanganate.
(iii) Health and diseases	(i) Arrangement of Pott. Permanganate and lime. (ii) (ii) Arrangement for CIFAX/ or other medicines.	Use of Pott. Permanganate and lime.	(i) Sampling of water and diseased fish for pathological analyses. (ii) Use of Pott. Permanganate and lime. (iii) Treatment with medicines/ CIFAX.
(iv) Loss of stock and inputs (feed, chemicals etc)	(i) Shifting of inputs to safer place. (ii) Raising height of pond dykes by fencing with nylonnet/bamboo mats.	(i) Arrangement of fish seed/inputs	(i) Fertilization of ponds, stocking with fish fingerlings and restoring supplementary feeding. (ii) Harvesting and sale of produce.
(v) Infrastructure damage (pumps, aerators, huts etc)	Arrangement, repairing and shifting of equipments,crafts and gears to safer place.		Restoration of infrastuctural facility to its original.
(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) 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			
(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			

[a] based on forewarning wherever available