

State: Jharkhand

Agriculture Contingency Plan for District: Khunti

| 1.0 District Agriculture profile | | | |
|----------------------------------|--|---|-----------|
| 1.1 | Agro-Climatic/Ecological Zone | | |
| | Agro Ecological Sub Region (ICAR) | Eastern plateau (chhotanagpur) And Eastern Ghats, Hot Subhumid Eco sub region (12.3) | |
| | Agro-Climatic Zone (Planning Commission) | Eastern Plateau And Hills Region (VII) | |
| | Agro Climatic Zone (NARP) | Central and North Eastern Plateau Zone (BI-4) | |
| | List all the districts falling under the NARP Zone* (*>50% area falling in the zone) | Bokaro, Deoghar, Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Jamtara, Khunti, Pakaur, Ramgarh, Ranchi, Sahebganj, Koderma | |
| | Geographic coordinates of district headquarters | Latitude | Longitude |
| | | 23.08°N | 85.28°E |
| | | Altitude | |
| | | 611 m | |
| | Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS | ZRS, Dumka (Birsra Agricultural University, Ranchi) | |
| | Mention the KVK located in the district with address | - | |
| | Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone | Birsra Agricultural University, Ranchi | |

| 1.2 | Rainfall | Normal RF(mm) | Normal Onset | Normal Cessation |
|-----|------------------------|---------------|---------------------------------|-----------------------------------|
| | SW monsoon (June-Sep): | 1090 | 2 nd week of June | 1 st week of October |
| | NE Monsoon(Oct-Dec): | 103 | 2 nd week of October | 3 rd week of December- |
| | Winter (Jan- March) | 38 | 1 st week of January | 4 th week of March |
| | Summer (Apr-May) | 99 | 1 st week of April | 4 th week of May |
| | Annual | 1323 | - | - |

| 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) | - | - | - | - | - | - | - | - | - | - |

* The data is not available as it is newly formed district in Jharkhand

| 1.4 | Major Soils (common names like red sandy loam deep soils (etc.,))* | Area ('000 ha) | Percent (%) of total |
|-----|--|----------------|----------------------|
| | 1. Red lateritic (UlticPaleustalfs) | - | - |
| | 2. Loam soil (Haplustalfs) | - | - |
| | 3. Fine Loam (Rhodustlafs) | - | - |
| | 4. Fine mixed Loam (Paleustalfs) | - | - |

| 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 | | 9.9 | |
| | Tanks | | 2.3 | |
| | Open wells | | 16.02 | |
| | Bore wells | | | |
| | Lift irrigation schemes | | | |
| | Micro-irrigation | | | |
| | Other sources (Check Dam) | | 3.7 | |
| | 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

| 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 | | | 159.2 | | | | | 159.2 |
| | Maize | | | 9.04 | | | 0.65 | | 9.69 |
| | Pigeonpea | | | 8.02 | | | | | 8.02 |
| | Blackgram | | | 6.82 | | | | | 6.82 |
| | Greengram | | | 0.95 | | | | | 0.95 |
| | Groundnut | | | | | | | | 159.2 |
| | Wheat | | | | | | 2.790 | | 2.79 |
| | Chick pea | | | | | | 1.028 | | 1.02 |
| | Pea | | | | | | 2.000 | | 2.0 |
| | Lentil | | | | | | 0.445 | | 0.44 |
| | Mustard | | | | | | | | |

| | Horticulture crops - Fruits | Area (acre) | | |
|--|-----------------------------|-------------|-----------|---------|
| | | Total | Irrigated | Rainfed |
| | Mango | 2351.4 | | |
| | Jack fruit | 177.8 | | |

| | | | | |
|--|--|--------------|------------------|----------------|
| | Guava | 129.8 | | |
| | Banana | 0.3 | | |
| | Litchi | 36.1 | | |
| | others | 204.4 | | |
| | Horticulture crops - Vegetables | Total | Irrigated | Rainfed |
| | Potato | 5892 | | |
| | Onion | 2137 | | |
| | Peas | 2017.56 | | |
| | Ginger | 2733 | | |
| | Tomato | 1893.86 | | |
| | Cauliflower | 2762 | | |
| | cabbage | 1952 | | |
| | okra | 3603 | | |
| | other | 9500 | | |
| | Spices | Total | Irrigated | Rainfed |
| | coriander | 43.2 | | |
| | ginger | 83.8 | | |
| | garlic | 317.8 | | |
| | chilli | 101.6 | | |
| | 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) | | | 671.1 |
| | Improved cattle | | | |

| | | | | | | | |
|-------------|---|-------------------------------|----------------------------------|--------------------------|------------------------------------|--|---|
| | Crossbred cattle | | | | | | |
| | Non descriptive Buffaloes (local low yielding) | | | | | | |
| | Descript Buffaloes | | | | | 155.0 | |
| | Goat | | | | | 642.7 | |
| | Sheep | | | | | 81.4 | |
| | Others (Camel, Pig, Yak etc.) | | | | | 127.03 | |
| | Duckery | | | | | | |
| | Commercial dairy farms (Number) | | | | | | |
| 1.9 | Poultry | No. of farms | Total No. of birds ('000) | | | | |
| | Commercial | | | | | | |
| | Backyard | | | | 2105 | | |
| 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

| 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 | 150.2 | | | | | | 150.27 | | |
| | Maize | 3.6 | | 0.436 | | | | 4.04 | | |
| | Pigeonpea | 1.8 | | | | | | 1.87 | | |
| | Blackgram | 2.9 | | | | | | 2.96 | | |
| | Greengram | 0.5 | | | | | | 0.59 | | |
| | Groundnut | 0.5 | | | | | | 0.55 | | |
| | Wheat | | | 20.9 | | | | 20.9 | | |
| | Chick pea | | | 23.2 | | | | 23.25 | | |
| | Pea | | | 6.07 | | | | 6.07 | | |
| | Lentil | | | 3.26 | | | | 3.26 | | |
| | Mustard | | | 1.28 | | | | 1.28 | | |
| Major Horticultural crops (Crops to be identified based on total acreage) | | | | | | | | | | |
| | Cauliflower | 44192 | 16.0 | | | | | | | |
| | Potato | 52894 | 8.9 | | | | | | | |
| | Cabbage | 31232 | 16.0 | | | | | | | |
| | Tomato | 36340 | 20.0 | | | | | | | |

| | | | | | | | | | | |
|--------|--------------|-------|------|--|--|--|--|--|--|--|
| | Brinjal | 54660 | 20.0 | | | | | | | |
| | Chilli | 23196 | 12.0 | | | | | | | |
| | L. Finger | 50442 | 14.0 | | | | | | | |
| | Bitter gourd | 1122 | 6.0 | | | | | | | |
| | Ridge gourd | 606 | 6.0 | | | | | | | |
| | Sponge gourd | 8172 | 12.0 | | | | | | | |
| Others | | 27096 | 12.0 | | | | | | | |

| 1.12 | Sowing window for 5 major field crops (start and end of normal sowing period) | Rice | Blackgram | Pigeonpea | Maize | Groundnut |
|-------------|---|--|---|---|---|--|
| | Kharif- Rainfed | 4 th week of June - 4 th week of July | 1 st week of June- 4 th week of July | 1 st week of June- 4 th week of July | 2 nd week of June- 2 nd week of July | 2 nd week of June – 2 nd week of July |
| | Kharif-Irrigated | 4 th week of June - 4 th week of July | - | - | - | - |
| | Rabi- Rainfed | - | - | - | - | - |
| | 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) | | | |

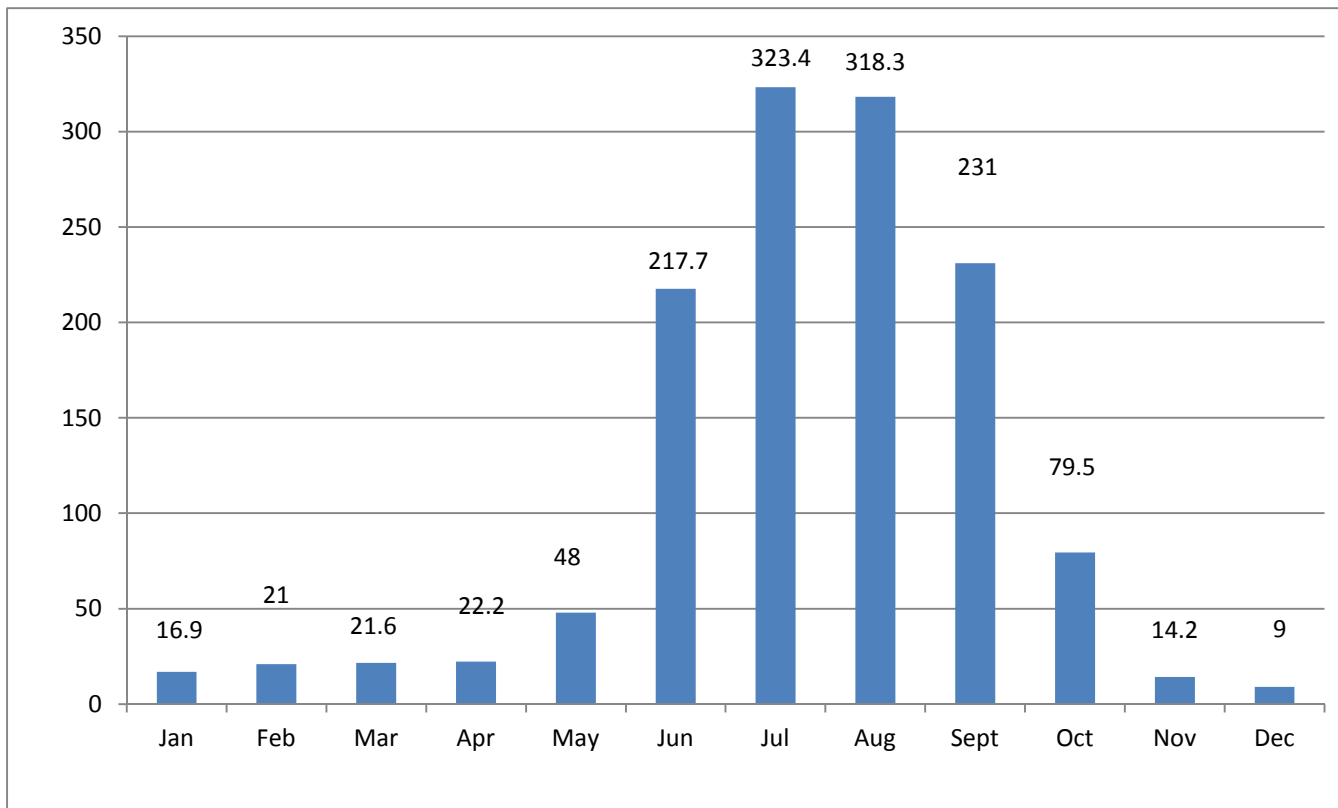
| 1.14 | Include Digital maps of the district for | | |
|------|--|---|---------------|
| | | Location map of district within State as Annexure I | Enclosed: Yes |
| | | Mean annual rainfall as Annexure 2 | Enclosed: Yes |
| | | Soil map as Annexure 3 | Enclosed: Yes |

Annexure I

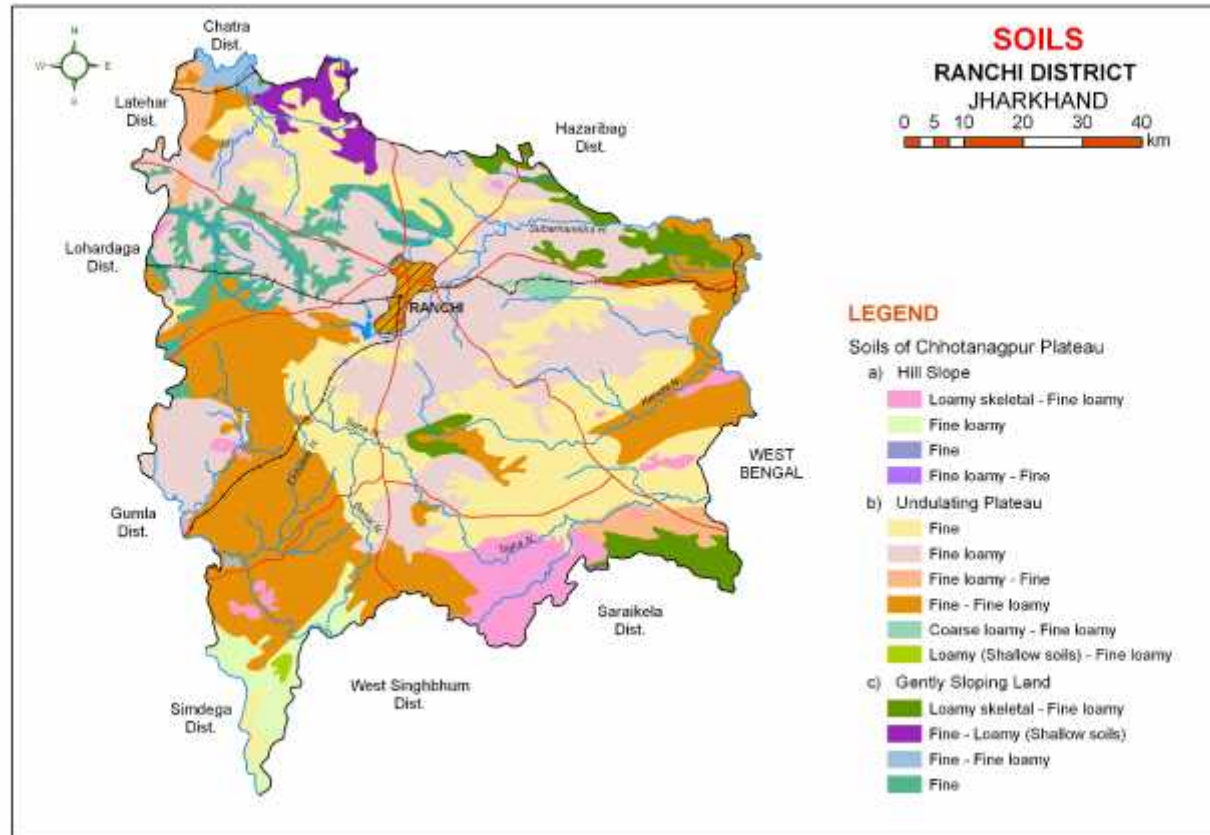


The district of Khunti was carved out of Ranchi district on 12 September 2007

ANNEXTURE-II



ANNEXTURE-III



SOURCE: NBSSLUP, Kolkata

Note: Khunti district is a newly formed district, earlier it was carved out from Ranchi

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 4 th week | Upland red sandy lateritic soils | Pigeonpea,blackgram, soybean, Groundnut, Upland rice, Maize, Finger millet Pigeonpea+ groundnut Pigeonpea + maize Vegetables- Brinjal, ,tomato, spongegourd | No change | Prefer intercropping in standing crop like maize, pigeonpea | - |
| | Midland sandy loam soils | Rice sowing in dry method Var- Naveen, IR-64, Lalat, Sahbhagi, BirsaDhan 201, BirsaVikashDhan 203 | Nursery raising with medium duration varieties Nursery raising of Hybrid rice varieties Var- ArizeTez, PAC 801, 27P31 | - | |
| | Lowland sandy clay loam soils | Seedling of rice with dry method Var- MTU- 7029, BPT 5204, Birsamati | No change | Seeding with sprouted seed | |

| 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 2 nd week | Upland red sandy lateritic soils | Upland rice, Maize, Pigeonpea, Groundnut, Black gram, Green gram, Soybean , Finger millet Vegetables- Cauliflower, Cabbage, Brinjal, Tomato | No change | Sowing of pigeonpea on ridges Prefer intercropping in standing crop like maize, pigeonpea | - |
| | Midland sandy loam soils | Rice sowing in dry method Var- Naveen, IR-64, Lalat, Sahbhagi, BirsaDhan 201, BirsaVikashDhan 203 | 1. Seedling raising with medium duration rice Var- IR- 64, Lalat, Navin, BirsaDhan 201, BirsaVikasDhan 203, ArizeTez, PAC 801 | Nursery raising by wet method with sprouted seed Prefer direct dry sowing may be sown behind the plough with 30-50kg seed / ha Life saving irrigation to nursery | Promotion of SRI technique through RKVY |
| | Lowland sandy clay loam soils | Nursery raising of MTU- 7029, BPT 5204, Birsamati and Arize 6444 | Transplanting will be done with available seedlings Prefer IR 64, Naveen, Sahbhagi | - | - |

| Condition | Major Farming situation | Normal Crop / Cropping system | Suggested Contingency measures | | |
|---|----------------------------------|---|--|---|---------------------------|
| | | | Change in crop / cropping system including variety | Agronomic measures | Remarks on Implementation |
| Delay by 6 weeks July 4 th week | Upland red sandy lateritic soils | Upland rice, Maize, Pigeonpea, Groundnut, Black gram, Green gram, Soybean , Finger millet | Sorghum, Pearl millet Soybean French bean, Bhindi, Tomato, Brinjal, Chilli, Cow Pea | Increase seed rate by 20% and line sowing on ridges | - |
| | Midland sandy loam soils | Rice | Direct sowing of rice- Anjali, Vandana, Abhisekh, BirsaVikas Dhan-109, 110 & 111 | Direct sowing of rice with seed rate of 50-60 kg/ha behind the plough | - |

| | | | | | |
|--|-------------------------------|-----------------------|---|---|---|
| | Lowland sandy clay loam soils | Transplanting of rice | Transplanting of medium duration rice variety Sahbhagi, Naveen, IR-64 | - | - |
|--|-------------------------------|-----------------------|---|---|---|

| Condition | | | Suggested Contingency measures | | |
|--|----------------------------------|---|---|--|----------------------------------|
| Early season drought (delayed onset) | Major Farming situation | Normal Crop / Cropping system | Change in crop / cropping system including variety | Agronomic measures | Remarks on Implementation |
| Delay by 8 weeks 2 nd week of August | Upland red sandy lateritic soils | Upland rice, Maize, Pigeonpea, Groundnut, Black gram, Green gram, Soybean , Finger millet | Niger, Horse gram, Kharif Potato, Toria and Vegetable pea | Adopt line sowing | - - |
| | Midland sandy loam soils | Rice | Transplanting of rice if seedling is available Sowing of early Toria Var—T-9, PT- 303, Niger, Horse gram and Kharif Potato | If 30 days age of seedling is available than transplanting of rice with 5-6 seedling/hill | |
| | Lowland sandy clay loam soils | 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/hil) | |

| 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 red sandy soils | Upland rice Pigeonpea + Groundnut Maize Pigeonpea + Maize Pigeonpea + Bhindi Maize + Bhindi Pigeonpea- Aghani (local) Vegetables- Brinjal,tomato, spongegourd, cucurbits, cow pea, bean, bhindi, chilli | Interculturing in standing crop with thinning & gap filling Resowing Pigeonpea- UPAS- 120, Asha, ICPH-2671 Maize- Suwan- 1, HQPM-1 BVM-2, Kanchan Groundnut- TG-22, Birsa GN-2 Sesame- Kankesafed, TC-25 Upland rice + Pigeonpea (1:3) Pigeonpea+ Black gram (1:2) Resowing of brinjal, tomato , cucurbits | Interculture | 1. Supply of weeding machine 2. Supply of seeds on subsidized rate |
| | Midland sandy loam soils | Rice Var- IR- 36, IR- 64, Lalat | Rice- Lalat, Navin, MTU- 1010, Abhishek Life saving irrigation Direct sowing of rice is preferred | Weeding | Increase water harvesting structures like ponds, check dams & open well |
| | Lowland sandy clay loam soils | Rice-MTU- 7029, 1001, Kanak, BPT 5204, Birsamati, Rajshree, Arize 6444, | Rice :MTU- 7029, BPT- 5204, Rajendra Hybrid- Arize- 6444 | Supplemental irrigation to the rice nursery | Ponds check dam through water shed management & MNREGA scheme |

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|--|--------------------------------|------------------------------------|---------------------------------------|--|----------------------------------|
| | | | Crop management | Soil nutrient & moisture conservation measues | Remarks on Implementation |
| Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) | | | | | |

| | | | | | |
|----------------------------|-------------------------------|---|--|---|--|
| At vegetative stage | Upland red sandy soils | Upland rice variety Birsa Dhan108,BVD 109,110,111, Vandana Pigeonpea + Groundnut Maize Pigeonpea + Maize Maize + Bhindi VegetableCow pea | Interculture in standing crop Thinning to maintain optimum plant population | Life saving irrigation to vegetable crops | Rain water harvesting structure should made through watershed programme / MNREGA |
| | Midland sandy loam soils | Rice IR- 64, IR – 36, Lalat | Foliar application of Urea (2%) | Life saving irrigation Weeding | Farm ponds Check dams Rain water harvesting |
| | Lowland sandy clay loam soils | Rice MTU- 7029, 1001, Kanak | | Ponds check dam through water shed management & MNREGA scheme | |

| 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 red sandy soils | Upland rice Groundnut+ Pigeonpea Maize Maize + Pigeonpea Bhindi + Maize Vegetable Cow pea Maize- Local (Sathi, Kanchan) Upland rice- Brown Goda Pigeonpea- Aghani (local) | Interculture Weeding Thinning, | - | Rain water harvesting structure should made through watershed programme / MNREGA |
| | Midland sandy loam soils | Rice IR- 64, IR – 36, Lalat | Foliar application of Urea (2%) | Weeding Life saving | Farm ponds Check dams Rain water harvesting |

| | | | | | |
|--|-------------------------------|--------------------------------|--|--|--|
| | Lowland sandy clay loam soils | Rice MTU- 7029, 1001, Kanak | | irrigation through well, ponds check dams | |
|--|-------------------------------|--------------------------------|--|--|--|

| Condition | Major Farming situation | Normal Crop/cropping system | Suggested Contingency measures | | |
|---|-------------------------------|--|--|---|---|
| | | | Crop management | Rabi Crop planning | Remarks on Implementation |
| Terminal drought (Early withdrawal of monsoon) | | | | | |
| Reproductive stage | Upland red sandy soils | Upland rice Groundnut+ Pigeonpea Maize Maize + Pigeonpea Bhindi + Maize Vegetable Cow pea Maize- Local (Sathi, Kanchan) Upland rice- Brown Goda Pigeonpea- Aghani (local) | Upland rice harvested for strow purpose Harvested at physiological maturity stage | Life saving irrigation at critical stage of crop Plan to sow Niger/ Horse gram/ early toria and potato Life saving irrigation of vegetables | 1. Farm ponds through watershed management programme 2-5 % modul for rain water harvesting through watershed management & NNREGA programme |
| | Midland sandy loam soils | Rice IR- 64, IR – 36, Lalat | Crop harvested at pre mature stage for fodder and animals Life saving irrigation | Field preparation for early rabi pulses like chick pea (P- 256,PL- 406)/ toria/ Lentil / mustard (Shicani, PusaAgrani) Linseed / (Shubhra, T- 397) | Farm ponds Check dams Rain water harvesting |
| | Lowland sandy clay loam soils | Rice MTU- 7029, 1001, Kanak | Life saving irrigation Crop harvested at physiological maturity | Early sowing of wheat oilseed- mustard Pulses- chick pea Intercropping Wheat+ Mustard | |

2.1.2 Drought - Irrigated situation- Not applicable

| 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 | | | |
|--|--|-----------------|---------------------|--------------|
| | Vegetative stage | Flowering stage | Crop maturity stage | Post harvest |
| Continuous high rainfall in a short span leading to water logging | | | | |
| Pigeonpea | Ridge making | Draining | | |
| Black gram | Ridge making | Draining | | |
| Rice | Bund making | Draining | Draining | |
| Horticulture | | | | |
| Cucurbits | Staking | Draining | Draining | |
| Vegetables | Sowing on ridge | | | |
| Outbreak of pests and diseases due to unseasonal rains | | | | |
| Pulses | Leaf hoper/Caterpillar Control- Monocrotophos @ 1 ml/lit | | | |

| | | | | |
|---------------------|--|---|---|--|
| Maize | Stem borer Control- Phorate 10G@ 20 kg/ha | Sheath blight Control- Hexaconazole 1.0 lit in 500 lit water/ha | | |
| Rice | | Blast diseases Control- Tricyclazole (0.05 %) | False Smut Control- Propiconazole 0.1 % or Copper oxy chloride -50 (2 kg/ha) | |
| Horticulture | | | | |
| French bean | Rust disease Control- Mancozeb 2.5 kg/ ha | | | |

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

| Extreme event type | Suggested contingency measure | | | |
|--------------------|--|--|---|---------------------------------------|
| | Seedling / nursery stage | Vegetative stage | Reproductive stage | At harvest |
| Hailstorm | Not applicable | | | |
| Heat Wave | | | | |
| Wheat | Life saving irrigation | Life saving irrigation | Life saving irrigation (Terminal heat) | |
| Cold wave | | | | |
| Wheat | Irrigation Balanced fertilizer application Foliar spray of nutrients | Light irrigation Mulching with crop residue \ weeds Fertilizer application | Irrigation, fertilizer application | |
| Vegetables | Raising of seedling in Poly house, re sowing if damaged | Light irrigation Mulching with crop residue \ weeds Disease and pest control, care for chilling injury or replanting | Quick harvesting | Grading, quick disposal for marketing |
| Pigeonpea | | Light irrigation Mulching with crop residue \ | | |

| | | | | |
|-----------------------------------|--|--|--|---|
| | | weeds | | |
| Frost | | | | |
| Wheat | | Light irrigation Mulching with crop residue \ weeds | | |
| Pigeonpea | Exposure of crop to smoke by burning waste material during night time | Exposure of crop to smoke by burning waste material during night time, Light sprinkler irrigation | Exposure of crop to smoke by burning waste material during night time, Light sprinkler irrigation | Exposure of crop to smoke by burning waste material during night time |
| Tomato & Potato | | Earthing up, Irrigation, | | Harvest in dry weather |
| Horticultural crops (fruit crops) | Light frequent irrigation may be practiced wherever irrigation facilities are available, mulching, thatching and creating smoke screens and lighting of fire is also practiced where irrigation facilities are not available | | | |
| 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 | <p>1. Reserve feed/ fodder bank at community level</p> <p>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.</p> | <p>Harvest and use all the failed crop (Maize, Rice, Wheat, Horse gram etc) material as fodder.</p> <p>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.</p> <p>Aquatic plants like lotus, water hyacinth, duckweed may be fed to livestock mixing with straw.</p> | <p>Short duration fodder crops of Sorghum / Bajra / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, GaintBajra, 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.</p> |

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| | <p>Rice/ wheat straw: 250 t</p> <p>Urea molasses mineral bricks (UMMB): and complete feed block (CFB) 50-100 t</p> <p>Dried grass collected from forest: 20-25 t</p> <p>Concentrates: 20-50 t</p> <p>Minerals and vitamin supplements mixture:1-5 t</p> <p>2. Preparation and storage of straw and dried grass/ grass hay/ fallen leaves at household level</p> <p>Preserve the fodder in the form of hay from Berseem, cowpea, oat & other grasses. Large farmers may prepare silage from</p> <p>(a) Maize- harvesting at dough stage.</p> <p>(b) Jowar - at flowering stage.</p> <p>(c) Oat</p> <p>(d) Hybrid Napier – 40-45 day old.</p> <p>(e) Water hyacinth mixing with Rice straw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacinth.</p> <p>Bales of hay and other dry fodder should be stored and covered with asbestos sheet or polythene sheet.</p> <p>3, Creation of permanent fodder seed banks in all drought prone areas.</p> <p>2. Establishment of silvi-pastoral system and cultivation of fodder tress</p> <p>Establishment of silvi-pastoral system in CPRs with <i>Stylosanathushamata</i> and <i>Cenchrusciliaris</i> as grass with <i>Leucaenaleucocephala</i> as tree component. Fodder trees may be planted around the</p> | <p>During drought, sorghum may accumulate HCN, which is toxic to livestock. Care may be taken in feeding of stunted grown Sorghum fodder.</p> <p>Available feed and fodder should be collected from CPRs/ forest and stall fed in order to reduce the energy requirements of the animals</p> <p>Mild drought : Hay/straw should be transported to the needy areas</p> <p>Moderate drought: Hay/ straw and vitamin & minerals mixture should be transported to the needy areas</p> <p>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).</p> <p>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.</p> <p>Available kitchen waste should be mixed with dry fodder while feeding.</p> <p>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 immediately after return from grazing.</p> <p>Washing of animals may be done at least twice a day.</p> | <p>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.</p> <p>Concentrates supplementation should be provided to all lactating indigenous, crossbred and buffaloes</p> <p>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.</p> |
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| <p>house, wasteland etc. Recently, Chaya tree (<i>Cnidoacolus aconitifolius</i>) has been introduced in IGFR, Jhansi which has high protein value, may be introduced in drought prone regions.</p> <p>3. Management of CPRs</p> <p>Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production</p> <p>4. Short duration and low water requiring fodder cultivation</p> <p>Increase area under short duration fodder crops of sorghum/bajra/maize (UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti) and cowpea.</p> <p>5. Feeding management</p> <p>Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality crop cutters.</p> <p>Establishment of backyard production of Azolla for feeding dairy animals.</p> <p>Establishment of back yard cultivation of para grass/ hybrid Napier with drain water from bath room/washing area</p> <p>Avoid feed wastage by offering chaffed fodder and less quantity feed for 4 times a day.</p> <p>Avoid wastage of maize stover.</p> <p>Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon. If excess grasses are collected, dried grass may be stored.</p> | <p>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.</p> <p>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.</p> <p>Arrangements should be made for mobilization of small ruminants across the districts where no drought exits</p> <p>Unproductive livestock should to be culled during severe drought</p> <p>Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals)</p> <p>Subsidized loans (5-10 crores) should be provided to the livestock keepers.</p> | |
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| | Proper drying, bailing and densification of harvested grass. | | |
| Cyclone | <p>Harvest all the possible wetted grain (rice/wheat/maize etc) and use as animal feed after drying.</p> <p>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.</p> <p>Don't allow the animals for grazing in case of early fore warning (EFW)</p> <p>In case of EFW, shift the animals to safer places.</p> <p>Identification of animals may be done.</p> <p>Keep animals untied in the shed in case of EFW.</p> | <p>Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers.</p> <p>Diarrhea out break may happen, arrangement should be made to mitigate the problem</p> <p>Protect the animals from heavy rains and thunder storms</p> <p>In severe cases un-tether or let loose the animals</p> <p>Arrange transportation of highly productive animals to safer place</p> <p>Spraying of fly repellants in animal sheds</p> | <p>Repair of animal shed</p> <p>Deworm the animals through mass camps</p> <p>Vaccinate against possible out breaks</p> <p>Proper disposal of the dead animals / carcasses by burning / burying with lime/ bleaching powder in pit</p> <p>Bleach / chlorinate (0.1%) drinking water or water resources</p> <p>Collect drowned crop material, dry it and store for future use</p> <p>Sowing of above mention short duration fodder crops in unsown and water logged areas</p> <p>Application of urea (20-25kg/ha) in the CPR's to enhance the bio mass production.</p> <p>After cyclone, for livelihood improvement of highly affected areas, backyard poultry, pig, goat etc may be distributed for immediate income generation.</p> |
| Floods | NA | NA | NA |
| Heat & Cold wave | <p>Arrangement for protection from heat wave</p> <p>i) Plantation around the shed</p> <p>ii) Water sprinklers / foggers in the shed or frequent washing of animals.</p> <p>iii) Application of white reflector paint on the roof or putting rice straw on the roof of the shed.</p> | <p>Allow the animals early in the morning or late in the evening for grazing during heat waves</p> <p>Allow for grazing between 10AM to 3PM during cold waves</p> <p>Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves</p> <p>Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves. Molasses may be added in the</p> | <p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p> |

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| | 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) | concentrate feed during heat waves. Put on the foggers / sprinklers and frequent washing of animals during heat waves and heaters during cold waves In severe cases, vitamin 'C' and electrolytes should be added in H ₂ O 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. Report the location, identification and disposition of livestock and poultry to authorities handling the disaster. | Conducting psahusibir, 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 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) | Restrict wallowing of animals in water bodies/resources | Specify the options (place and area) for establishment of drinking water |

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| | use only as drinking water for animals) Identification of water resources | | reserves. |
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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 | | | Convergence /linkages with ongoing programs, if any |
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| | 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, Culling of weak birds | Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds | Supplementation to all | |
| 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 lime 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 | Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed | |

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| | | ammonia accumulation due to dampness | 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, bajraetc, 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 lime 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 | Routine practices are followed | |

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| | | mid day | | |
| 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 Arrangement for brooding Assure supply of continuous electricity | Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening | Routine practices are followed | |
| 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 | |

^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 | | | |

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| 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 | (i) Collection of naturally bred | (i) Repairing of damaged pond |

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| | ponds. (ii) Construction of ponds in upland areas (ii) Arrangement for shifting of inputs, crafts and gears. | fish seed from flood water. (ii) Stocking of seed in nursery ponds constructed in upland area. (iii) Further raising of dykes by putting sand bags/fencing dykes with nylon nets. | dykes. (ii) Removal of unwanted fishes from ponds. (iii) Sale large sized fishes. |
| (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, hutsetc) | Arrangement, repairing and shifting of equipments,crafts and gears to safer place. | | Restoration of infrastucturalfacility 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 | | | |

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| 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/hutsetc) | | | |
| (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 | | | |

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| (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, hutsetc) | | | |
| (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/hutsetc) | | | |
| (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 | | | |