

State: ODISHA
Agriculture Contingency Plan for District: KENDRAPARA

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Eastern Coastal Plain, Hot Subhumid To Semi-Arid Eco-Region (18.4)		
	Agro-Climatic Zone (Planning Commission)	East Coast Plains And Hills Region (XI)		
	Agro Climatic Zone (NARP)	East And South Eastern Coastal Plain Zone (OR-4)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Puri, Kendrapara, Jagatsinghpur, Khurda, Nayagarh, Parts of Cuttack, Parts of Ganjam		
	Geographic coordinates of district headquarters Deogarh town	Latitude	Longitude	Altitude
		38 ^o 57' 33.80''N	95 ^o 15' 55.74''E	13 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	JRS, Kendrapara 754211		
	Mention the KVK located in the district with address	At- Jajanga, P.O- Kapaleswar, Dist.-Kendrapara, PIN: 754211, Odisha		
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	K.V.K Campus , Jajanga, P.O- Kapaleswar, Dist.-Kendrapara, Odisha. PIN: 754211,			

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):	1361.7	60.3	2 nd week of June	4 th week of September
	NE Monsoon(Oct-Dec):	95.9	6.3		
	Winter (Jan- March)	61.7	4.3	-	-
	Summer (Apr-May)	63.2	4.9	-	-
	Annual	1582.5	75.8	-	-

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable land	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)	264	166	25	49	8	6	5	5	8	14

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)	Percent (%) of total
	1. Alluvial soils	142	74.65
	2. Saline soils	32.35	17.00
	3. Black soils	15.85	8.35

(Data source: Soil Resource Maps of NBSS & LUP)

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	144	186
	Area sown more than once	124	
	Gross cropped area	268	
	Net irrigated area	67.04	

1.6	Irrigation	Area ('000 ha)		
	Rainfed area	76.96		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	3	46.150	68.84
	Tanks	1654	1.120	1.67

	Open wells	3614	1.800	2.68
	Bore wells	3438	3.245	4.84
	Lift irrigation schemes	1378	10.371	15.47
	Other sources (please specify)		4.350	6.49
	Total Irrigated Area		67.04	45.6%
	Pump sets	4313	█	█
	No. of Tractors	492	█	█
	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	Nil		
	Critical	Nil		
	Semi- critical	Nil		
	Safe	9	100%	
	Wastewater availability and use			
	Ground water quality	Ground water is affected with Nitrate>45mg/l and Iron>1.0 mg/l		
*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 2005-09 e.g., 2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			Rabi			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
Paddy	-	138	138	135.3	-	135.3	5.02	278.32	
Greengram	-			34.86		34.86		34.86	
Blackgram	-			37.93		37.93		37.93	
Groundnut	-			10.66		10.66		10.66	
Jute	-	3.31	3.31	-	-	-	-	3.31	
Sunflower				0.30		0.30		0.30	

	Horticulture crops - Fruits	Total Area ('000 ha)
	Mango	1.137
	Banana	0.254
	Guava	0.069
	Papaya	0.014
	Sapota	0.08
	Horticulture crops - Vegetables	Total
	Brinjal	6.108
	Tomato	4.354
	Chilli	3.67
	Cabbage	1.7
	Cauliflower	1.64
	Okra	1.93
	Potato	1.2
	Sweetpotato	0.23
	Plantation crops	Total
	Coconut	2.084
	Arecanut	0.22
	Eg., industrial pulpwood crops etc.	
	Fodder crops	Total
	Vertiver	4.53
	Total fodder crop area	
	Grazing land	8
	Sericulture etc	

	Horticulture crops - Fruits	Total Area ('000 ha)
	Others (specify)	

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Non descriptive Cattle (local low yielding)	25000	125000	150000			
	Improved cattle	10085	50000	60085			
	Crossbred cattle	24568	52860	77428			
	Non descriptive Buffaloes (local low yielding)	3760	8004	11,764			
	Descript Buffaloes	2080	6228	8308			
	Goat	15480	6520	22000			
	Sheep	8220	8797	17017			
	Others (Camel, Pig, Yak etc.)			2134(Pig)			
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial	208	45.8				
	Backyard		94.8				
1.10	Fisheries (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Storage facilities (Ice plants etc.)		
			Mechanized	Non-mechanized		Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)
		1858-	265-	1998	203	1134	-
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		1540		-		928	
	B. Culture						
			Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)		
	i) Brackish water (Data Source: MPEDA/ Fisheries Department)		1492.50-	1.43-	2138.5-		
ii) Fresh water (Data Source: Fisheries Department)		1576.50	3.43	5418.5			
Others		-	-	-			

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

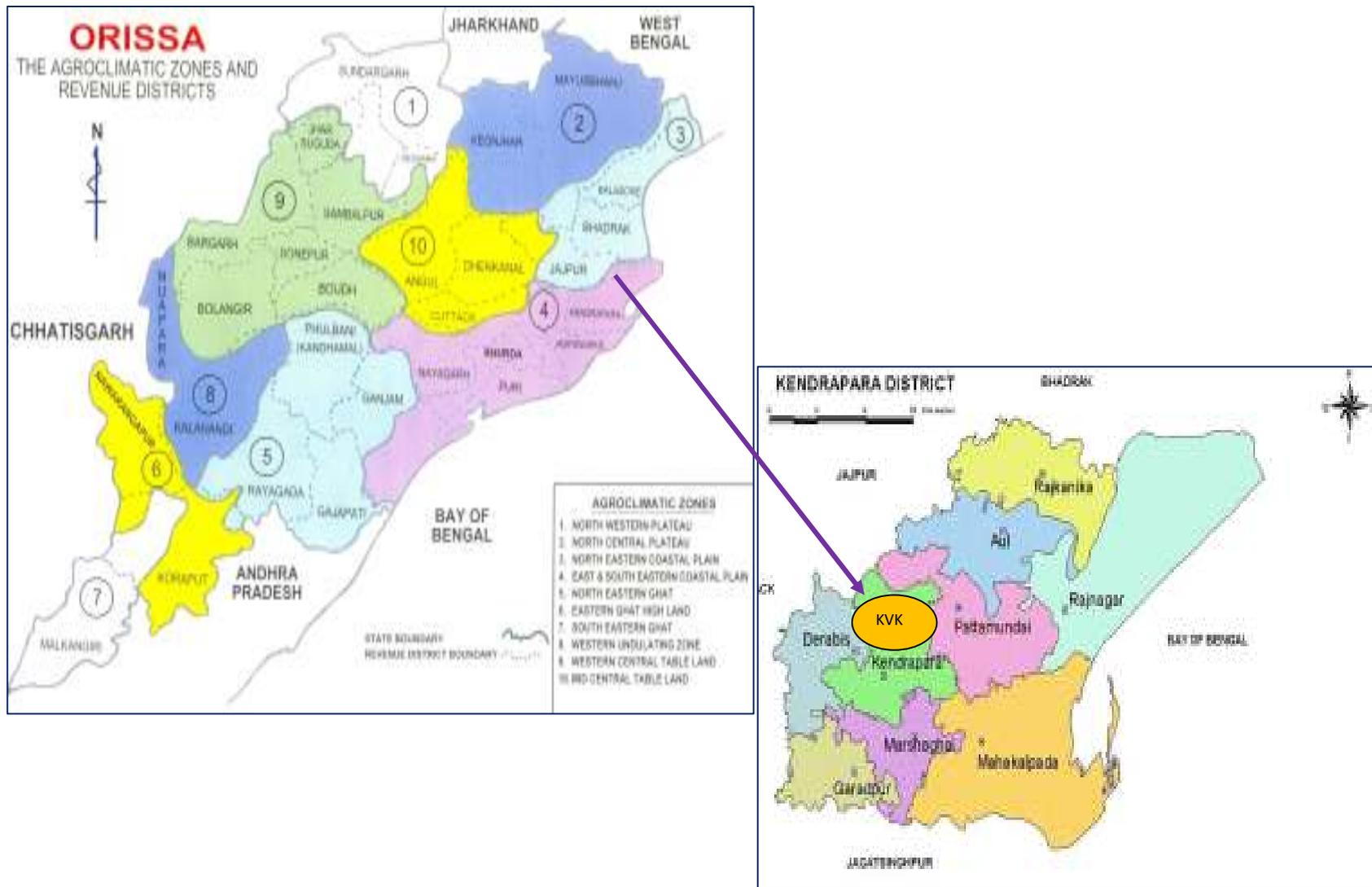
1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)							
Major Field crops (Crops to be identified based on total acreage)										
	Rice	191.09	2067	190.10	2097	9.78	2906	200.87	2356.6	
	Greengram			14.54	417			14.54	417	
	Blackgram			37.93	507			37.93	507	
	Groundnut			24.42	2291			24.42	2291	
	jute	34.48	1875					34.48	1875	
Major Horticultural crops (Crops to be identified based on total acreage)										
	Brinjal			88566	145			88566	145	
	Tomato			57821	132			57821	132	
	Chili			3106	8.4			3106	8.4	
	Cabbage			47056	276			47056	276	
	Cauliflower			23373	141			23373	141	
	Okra			16850	87			16850	87	

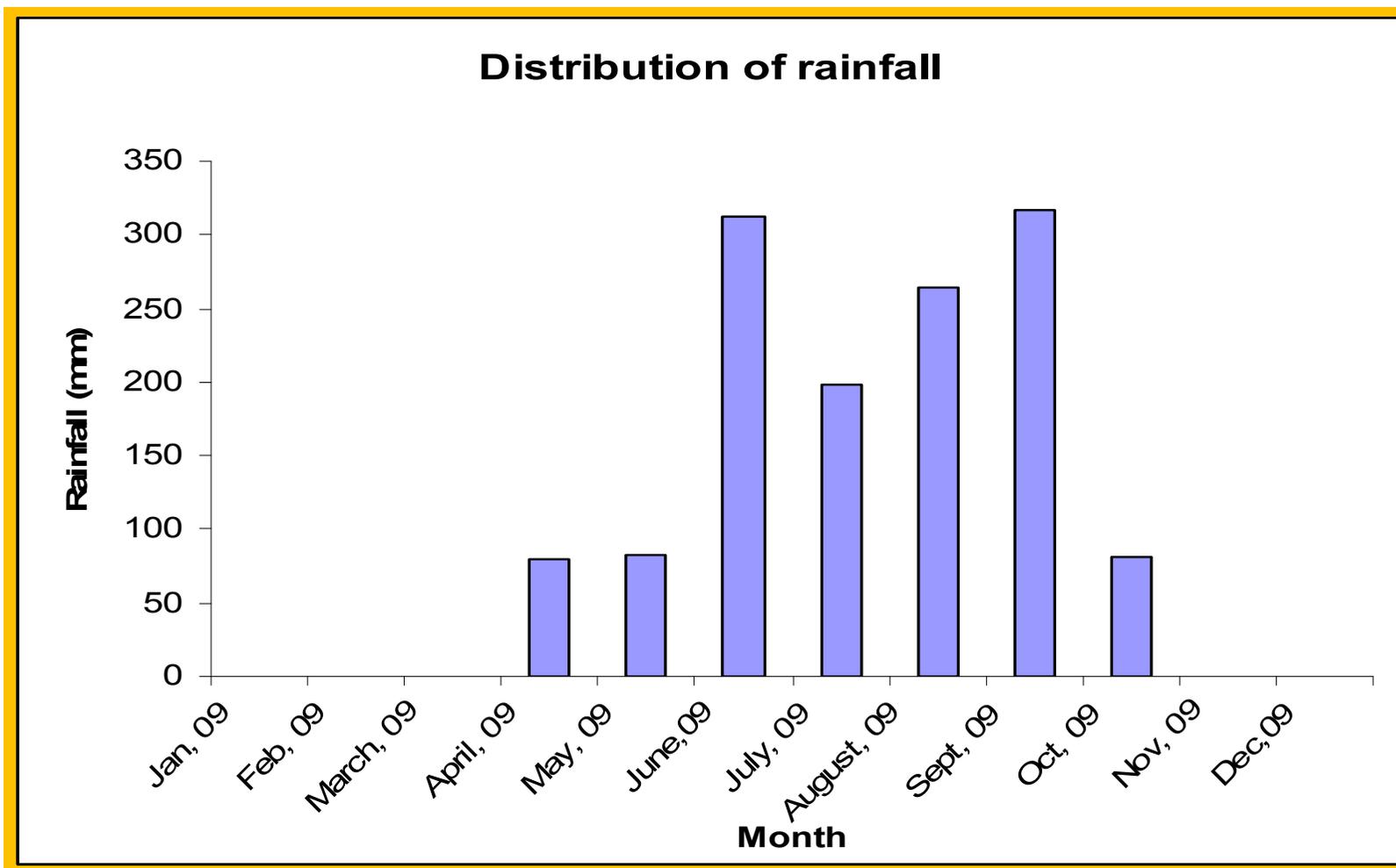
1.12	Sowing window for 5 major field crops	Rice	Green gram	Black gram	Groundnut	jute
	Khariif- Rainfed	June – July	-	-	-	April - May
	Khariif-Irrigated	-	-	--	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	Dec- Jan	Nov-Dec	Nov-Dec	Nov-Dec	-

	What is the major contingency the district is prone to	Regular	Occasional	None
	Drought	√	June-Aug (long dry spell)	
	Flood	√		
	Cyclone			√
	Hail storm			√
	Heat wave			√
	Cold wave			√
	Frost			√
	Sea water inundation			√
	Pest and diseases (specify)	Leaf folder in paddy Tikka disease in groundnut YMV in greengram & blackgram Pod borer in greengram & blackgram BLB in paddy False smut of paddy Gundhi bug in paddy	Black headed caterpillar in greengram & blackgram (January) BPH in paddy (October)	

1.14	Include Digital maps of the district for district	Location map of district within state	Enclosed: yes
		District map with farming situation	Enclosed: yes
		Soil fertility map	Enclosed: Yes
		Soil textural class classification	Enclosed: Yes
		Mean annual rainfall(mm)	Enclosed: Yes

Location map of Kendrapara district within Odisha State





2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming Situation	Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 2 weeks (June 4 th week)	Rainfed Alluvial	Upland Rice/Pulse/ Groundnut	No Change	Resowing of short duration of paddy incase of failure of earlier sown paddy. Intercrop upland rice with blackgram /greengram/ groundnut. In case of medium and low land sprouted seed nursery raised should be done Sowing of crop should be done at the time of next shower of following draught In-situ moisture conservation should be followed. Seed soaking with Calcium chloride solution (0.25%) for 20 hrs. before sowing improve drought resistance in plants.	Source seed -. CRRRI, OUAT. The cost of the material may be met from RKVY.
	Coastal water logged	Jute - rice Rice	No Change	Direct seeding of sprouted paddy seed, if seedlings are not available or raised earlier. Gap filling of paddy if the damage is partial Life saving irrigation for jute at critical stages.	

	Costal alluvial saline	Rice- Mustard Rice-groundnut, Jute-Rice	No Change	Resowing of short duration paddy incase of failure of earlier sown paddy crop. In case of medium and low land, sprouted seed nursery raised should be done. Two foliar spraying of Urea 2% at 10 days interval in between 45-60 days crop growth stage of jute. Seed soaking with calcium chloride solution (0.25%) for 20 hrs. before sowing improves drought resistance in plants.	
Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Crop / Cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (July 2 nd week)	Rainfed Alluvial	Rice- blackgram/ greengram/ groundnut	Varietal substitution of drought tolerant varieties. Rice- Select vars. like Khandagiri, Heera, Kalinga-III, Vandana etc for Upland Greengram-PDM-11, PDM-54 Blackgram-PU-19, PU-30 Groundnut-Smriti, Devi, JL-24	Addition of FYM to soil during land preparation. Resowing of short duration of paddy incase of failure of earlier sown paddy crop. Life saving irrigation to the crops at critical stages. Seed soaking with calcium chloride solution 0.25% for 20 hrs. before sowing improves drought resistance	Source of seed - CRRRI, OUAT. The cost of the material may be met from RKVY.
	Coastal water logged	Jute-Rice Rice	Jute-Rice cropping system may be taken. Jute Var. JRC-212, KC-1, JRC-4444, Paddy Var. Swarna, Sub-1, CR-1014, Durga, Sarala	Jute to be sown in April. Paddy may be planted after jute by 15 th August after receiving rainfall. Gap filling of paddy if the damage is partial	

	Costal alluvial saline	Rice/Mustard Rice - groundnut Jute – rice	Paddy Var. like CSR-10, Sonamani and Lunishree may be planted in medium low land. After rice Toria/mustard (TS-29, PT-303, Barun) may be grown. Jute Var. JRC-212, KC-1, JRC-4444 may be grown. Groundnut Var. Smruti, Devi, JL-24 may be grown	Resowing of short duration of paddy incase of failure of earlier sown paddy crop In case of medium and low land transplanting to be completed by 1 st week of August.. Two foliar spraying urea 2% at 10 days interval in between 45-60 days crop growth stage of jute.	
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Condition	Major Farming situation	Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 6 weeks (July 4 th week)	Rainfed Alluvial	Rice-blackgram/ Groundnut Greengram, Rice -Vegetable	Upland rice should be substituted by short duration vegetable, pulse and oilseed crops Blackgram, PU-19, PU-30 Greengram–PDM-11,PDM-54, Groundnut Var. Smruti, Devi, JL-24 Cowpea: Utkal Mani Brinjal: Blue star, Utkal Tarini Ladies finger: Utkal Gourav	Addition of recommended dose of FYM at final land preparation. Sowing of upland crops after getting first shower of rain following drought. In-situ moisture conservation through hoeing/intercultural operation, weeding. Seed soaking with calcium chloride solution (0.25%) for 20 hrs. before sowing improved drought resistance.	Source of seed - CRRI, OUAT. The cost of the material may be met from RKVY.

	Coastal water logged	Rice- blackgram/ greengram	Paddy Var. like Swarna sub-1, MTU-1010, Lalat and Konark for medium land and paddy crop to be planted by 15 th August.	Close the drainage channel, checking seepage loss. With hold top dressing till receipt of rainfall. Adopt closer spacing while transplanting	
	Coastal alluvial saline	Rice- Mustard rice-groundnut, jute-rice	In case of medium and low land paddy varieties like Lunishree, CSR-10 and Sonamani may be planted by 15 th August. Jute Varieties like JRC-212, KC-1, and JRC-4444 which are grown earlier may be harvested after which paddy will be transplanted. After harvest of paddy Toria/mustard (TS-29, PT-303, Barun) may be sown. Groundnut var. like Smruti, Devi and JL-24 may also be grown	Close the drainage hole, check seepage loss. With hole top dressing till receipt of rainfall. Adopt closer spacing while transplanting. Supplemental irrigation may be given for mustard at critical stages.	Source of seed - CRRI, OUAT. The cost of the material may be met from RKVY.
Condition				Suggested Contingency measures	
Early season drought (delayed onset)	Major Farming situation	Crop / Cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation

<p>Delay by 8 weeks</p> <p>August 2nd week</p>	<p>Rainfed Alluvial</p>	<p>Rice- blackgram/greengram rice/vegetable</p>	<p>In uplands paddy should be substituted by short duration pulses(Greengram-PDM-11, PDM-54), Blackgram (PU-19 P-30) and vegetables like cowpea (Utkal Manik), Brinjal (blue star), Ladies finger (Utkal gourav) should be grown.</p>	<p>Addition of recommended dose of FYM at final land preparation.</p> <p>Sowing of upland crops after getting first shower of rain following drought.</p> <p>In-situ moisture conservation through hoeing /interculture, weeding.</p> <p>Seed soaking with calcium chloride solution 0.25%) for 20 hrs. before sowing improved drought resistance.</p>	<p>Source of seed - CRRI, OUAT. The cost of the material may be met from RKVY.</p>
	<p>Costal water logged</p>	<p>Jute-rice Rice</p>	<p>Rice varieties like Swarna sub-1, Lalat, Konark MTU-1010 should be planted by 15th August in medium land after jute</p>	<p>Close the drainage channel.</p> <p>Check seepage loss. Withhold top dressing till receipt of rainfall.</p> <p>Adopt close spacing while transplanting.</p>	

	Costal alluvial saline	Jute-Mustard Rice-groundnut Jute-rice	<p>Jute crop should be harvested after which land should be puddled for transplanting paddy.</p> <p>In case of medium and low lands plant varieties like CSR-10, Lunishree and Sonamani Planting should be completed by 15th August.</p> <p>After harvest of paddy toria/mustard (PT-303, TS-29, Barun may be grown. Groundnut var. like Smruti, Devi and JL-24 may also be grown.</p>	<p>Close the drainage hole.</p> <p>Check the seepage loss.</p> <p>Withhold topdressing till receipt of rainfall.</p> <p>Adopt closer spacing while transplanting.</p> <p>Need based plant protection measures should be taken up.</p> <p>Supplemental irrigation may be given to mustard at critical stages.</p>	
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Condition	Major Farming situation	crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Early season drought (Normal onset)					
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Rainfed Alluvial	Rice-pulse, Rice-groundnut	In upland when there is more than 50% mortality resown the crop up to July after receipt of sufficient rain water. If mortality is less than 50% the crops may be gap field. Short duration paddy varieties like Sneha, Heeera, Kalinga-3, Vandana, Jogesh, Sidhant may be grown. After rice short duration blackgram (PU-19. PU-30 or greengram PDM-11, PDM-54 and groundnut Smruti and Devi may be grown. Remove the weeds and follow plant protection against blast.	Complete hoeing and weeding followed by ridging to the base of the crop rows at 20 after sowing for in-situ moisture conservation.	Cost of the material may be meet from ungoing scheme like RKVY, NFSM, etc

	Costal water logged	Jute - rice Rice-pulse	<p>Raise community nursery of rice for transplanting at reliable water source to same time and avoid further delay. Apply life saving irrigation to maintain nursery seedlings in good health and take plant protection measures.</p> <p>Sprouted seeds may be direct seeded or fresh seedlings of medium duration group may be planted after receiving rainwater.</p> <p>For Jute crop life saving irrigation may be given when needed. After harvest of rice short duration blackgram and greengram may be grown.</p> <p>Apply life saving irrigation to maintain nursery seedling in good health and take plant protection measures.</p>	<p>Addition of recommended dose of FYM during land preparation.</p> <p>Close the drainage channel to check of the loss of water.</p> <p>Maintain proper water level in nursery field</p>	
	Costal alluvial saline	Jute-rice Rice-Mustard	<p>For jute crop life saving irrigation may be given when needed. Weeding also to be done to conserve moisture.</p> <p>For rice, when there is more than 50% mortality re-sow the crop up to July after receipt of sufficient rain water. If mortality is less than 50% the crops may be gap field. For medium and low land if rice population is less than 50% re-sow the crop. Select medium duration varieties(125 days) sprouted seeds may be direct seeded or fresh seedlings of early varieties may be raised for transplanting.</p> <p>If rice population is more than 50% carryout weeding, close the drainage holes for checking loss of water, provide life saving irrigation when needed.</p>	Use FYM /green leafs manure	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At vegetative stage August-September	Rainfed Alluvial	Rice-pulse, rice-groundnut	<p>Skip <i>beushaning</i>, if rice is more than 45 days old and water is not available. Uprooting weed from the main field without waiting for rainfall. Strengthen the field bunds and close the whole to check seepage loss of water. Fertiliser application could be delayed till receipt of rainfall.</p> <p>In-situ moisture conservation and rain water harvesting technique to be followed to minimize the excess runoff.</p> <p>Use water bodies for life saving irrigation to minimize crop losses.</p>	<p>In-situ moisture conservation.</p> <p>Practice mulching with organic mulches to extend the period of moisture availability</p>	Cost of the material may be meet from ongoing scheme like RKVY, NFSM etc
	Coastal water logged	Rice-pulse	<p>Uprooting weed from the main field the field without waiting for rainfall provides irrigation through recycling of harvested rain water. Go for gap filling using seedling of same age or clonal tillers to have uniform distribution of plant. Apply potassic fertilizer where ever soil moisture allows or wet up to the receipt of rain falls.</p> <p>Aged seedlings of 45 days old can be planted in case of medium duration rice. Close drainage channel and reduce run off losses. Take plant protection measures against blast and other diseases.</p>	Strengthen field bunds and close drainage hole	
	Coastal alluvial saline	Rice-mustard	<p>Weeding to be done to conserve moisture. If mortality is less than 50% the crops may be gap field. For medium and low land if rice population is less than 50% gap filling may be done. Select medium duration varieties (125 days). If rice population is more than 50% carryout weeding, close the drainage holes for checking loss of water, provide life saving irrigation when needed. After harvest of rice mustard varieties like Varun may be</p>	Strengthen field bunds and close drainage hole	

			grown.		
Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At reproductive stage September- October	Rainfed Alluvial	Rice-pulse/ rice-groundnut	Close the drainage holes and check the seepage loss in the medium land rice regularly. The crops should be irrigated with conserved water at critical stages. Pre-rabi and rabi crop (Pulse and oilseeds crop) may be sown with residual moisture. Rice may be harvest at physiological maturity stage. Appropriate plant protection measure may be taken up to minimize the crop loses.	-	Cost of the material may be meet from ongoing scheme like RKVY, NFSM etc.
	Coastal water logged	Rice-pulse	Provide protective irrigation through recycling of harvested rain water. Close drainage channels and reduce run off losses. Take plant protection measures against blast. Rice crop to be harvested at physiological maturity stage.	-	
	Coastal alluvial saline	Rrice-mustard	Close drainage holes and check the seepage loss of water. The crops should be irrigated with conserved rain water. Weeding to be done to conserve moisture. Provide life saving irrigation when needed. Rice crop may be harvested at physiological maturity stage after which Toria/Mustard crop may be grown.	-	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
October-November	Rainfed Alluvial	Rice-pulse/groundnut	Insect/pests and diseases appear more frequently under drought situation for which requires constant vigilance and timely control measures. Sowing of rabi crops as per availability of residual moisture	With residual moisture condition rabi crops like green gram, blackgram can be taken. Utilize water of ponds and reservers for growing cowpea, okra and chilli.	Source of seed from CRRI, OUAT the cost of the material may met from RKVY, NFSM etc.
	Coastal water logged	Rice-pulse	Insect/pests and diseases appear more frequently under drought situation for which requires constant vigilance and timely control measures. Harvest the rice at physiological maturity stage and sow rabi crop with residual moisture.	With residual moisture condition rabi crops like green gram, blackgram can be taken.	
	3. Coastal alluvial saline	Rice-mustard	Insect/pests and diseases appear more frequently under drought situation for which requires constant vigilance and timely control measures. Harvest rice at physiological maturity stage and shown rabi crops with residual moisture	With residual moisture condition rabi crops like green gram, blackgram can be taken up. Utilize the water of pond and reserves for growing cowpea, okra and chilli.	

2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Coastal irrigated alluvial	Rice	Groundnut, Blackgram, Green gram, potato	Irrigation for sowing or transplanting of the crops and saving of the already sown/transplanted crops is uppermost consideration of the contingency measures.	Source of seed from CRRI, OUAT the cost of the material may met from RKVY, NFSM etc.
	Coastal irrigated alluvial	Groundnut	Blackgram, green gram	Irrigation at critical crop growth stages like flowering and pod formation to be preferred	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Coastal irrigated alluvial	Rice Groundnut	Blackgram, greengram Blackgram, greengram	Residual soil moisture utilization is the main remedy under this situation Irrigation at critical crop growth stages like flowering and pod formation to be preferred	Source of seed from CRRRI, OUAT the cost of the material may met from RKVY, NFSM etc.

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Coastal irrigated alluvial	Groundnut	Short duration groundnut varieties Blackgram/ Green gram-TARM-1	Paddy straw mulching close spacing intercropping with green gram Greengram mosaic resistant varieties to be grown.	
		Potato	Groundnut	Short duration groundnut varieties. AK-12-24, smruti etc.	
		Vegetable	Blackgram/ Green gram	Green gram mosaic resistant varieties to be grown.	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Coastal irrigated alluvial	Potato	Groundnut	Short duration groundnut varieties	Promotion of subsidiary income and employment generating activities to be encouraged through gainful implementation of NREGA, RKVY, NFSM and other schemes
		Vegetable	Blackgram/ Green gram	Greengram mosaic resistant varieties to be grown	

2.2 Un- timely (unseasonal) rains

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Rice	Drainage at tillering for 8-10 days	Efforts for early draining of water from the field will save the crop damages	Completely drain the water from the field 15days before harvesting period.	Well designed storage Bins are required to protect the grain against storage pest
Green gram	Surface drainage		Surface drainage	
Black gram	Surface drainage		Surface drainage	
Ground nut	Surface drainage		Surface drainage	
Jute	Damage		Surface drainage	
Horticulture				
Brinjal	Drainage of water from the field	Drain the water as early as possible as flowering stage is critical to water logging	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 liters of water	
Tomato	Immediate drainage of water is needed as it is highly susceptible to water logging	Immediate drainage of water	Drainage of water, drenching of soil base with streptocycline @ 2gm in 10 liters of water	
Chilli	Immediate drainage of water is needed as it is highly susceptible to water logging	Immediate drainage of water	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 l liters of water	
Cabbage	Drainage	Immediate drainage of water	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 liters of water	

Cauliflower	Drainage and soil drenching with suitable plant protection chemical	Immediate drainage of water	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 l liters of water	
Heavy rainfall with high speed winds in a short span²				
Rice	Drainage at tillering stage for 8-10 days	Efforts for early drainage of water from the filled will save the crop damage	Completely drain the water from the field 15 days before harvesting period	Well designed storage Bins as required to protect the grain against storage pest
Green gram	Surface drainage	Drainage	Surface drainage	
Black gram	Surface drainage	Surface drainage	Surface drainage	
Ground nut	Surface drainage	Surface drainage	Surface drainage	
Jute	Drainage	Drainage	Drainage	
Horticulture				
Brinjal	Drainage of water from the field	Drain the water as early as possible as flowering stage is critical to water logging	Drainage of water, drenching of soil base with streptocycline @ 2gm in 10 liters of water	
Tomato	Immediate drainage of water is needed as it is highly susceptible to water logging	Immediate drainage of water	Drainage of water, drenching of soil base with streptocycline @ 2gm in 10 liters of water	
Chilli	Immediate drainage of water is needed as it is highly susceptible to water logging	Immediate drainage of water	Drainage of water, drenching of soil base with streptocycline @ 2gm in 10 liters of water	
Cabbage	Drainage	Immediate drainage of water	Drainage of water, drenching of soil base with streptocycline @ 2gm in 10 liters of water	
Outbreak of pests and diseases due to unseasonal rains				
Rice	For control of swarming caterpillar , spray the crop with chloropyriphos @2ml/lit. of	For control of gundhi bug spray the crop with carbaryl@1kg/acre in 200 liters	For control of false smut disease spray the crop with carbendazim+ Mancozeb. For	Well designed storage Bins as required to t protect the grain against

	water. For brown spot, Blast spray the crop with tricyclazole @2gm/lit. of water.	of water. For BPH spray the crop with imidacloprid@50ml/acre. for control of BLB spray the crop with 0.1% plantomycin along with 0.2% copper oxychloride.	control of cut worm spray the crop with cypermethrin@1ml/lit of water.	storage pest
Greengram	Aphid,Spray the crop with rogor@2ml/lit of water	. YMV,spray the crop with rogor@2ml/lit of water	Powdery mildew spray the crop with Sulphur (0.2%) or Kerathane (0.1%)	
Blackgram	-Do-	-Do-	-Do-	
Groundnut	Aphid,leaf miner,spray the crop with monocrotophos@2ml/lit of Water.	Aphid,leaf minor,spray the crop with monocrotophos@2ml/lit of Water	Spray 0.25% of Dithane M-45 for reducing the incidence of Tikka leaf spot disease.	
Jute	Semilooper , caterpillar,spray the crop with endosulfan @2ml/lit of water	Wilting, spray the basal portion of the plant with <u>carbendazim@0.15%</u>	Wilting, spray the basal portion of the plant with carbendazim@0.15%	
Horticulture				
Brinjal	Stem & fruit borer, spray the crop with cartap hydrochloride@2gm/lit of water	Wilting, spray the base of the plant with <u>streptocycline@0.015%+ copper oxy chloride@0.2%</u> in1lit. of water..	Stem & fruit borer , spray the crop with malathion@1ml/lit of water	
Tomato	Aphid,jassid & white fly,spray the crop rogor@2ml/lit. of water.	Fruit borer, spray the crop with carbaryl@2kg/ha. Wilting, spray the base of the plant with <u>streptocycline@0.015%+ copper oxy chloride@0.2%</u> in1lit. of water..	Wilting, spray the base of the plant with <u>streptocycline@0.015%+ copper oxy chloride@0.2%</u> in1lit. of water..	
Chilli	Thrips,spray the crop with Abamectin @400ml/acre	Bacterial wilt, spray <u>streptocycline@0.015%+ copper oxy chloride@0.2%</u> in1lit. of water..	Bacterial wilt, spray <u>streptocycline@0.015%+ copper oxy chloride@0.2%</u> in1lit. of water..	

Cabbage	DBM,spray the crop with endosulphin @2ml/lit of water	Bacterial wilt, spray the crop streptocycline@ 0.015%+ copper oxy chloride@0.2% in 1 lit. of water..	For head borer, Spray the crop with cypermethrin@1ml/lit of water	
Cauliflower	-Do-	-Do-	-Do-	

2.3 FLOODS

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Rice	Maintaining nursery of over aged rice seedlings of 45 days to 60 days duration	Growing water logging resistant varieties like Durga, Sarala, Varshadhan and Hanseswari	Removal of stand from the field in case of stand deposition and planning for alternate crops like sweet potato under zero tillage	Spraying plant growth hormones that prevent premature germination of rice seeds
Greengram	drainage	drainage	drainage	Do-
Blackgram	drainage	drainage	drainage	Do-
Horticulture				
Brinjal	Drainage of water from the field	Drain the water as early as possible as flowering stage is critical to water logging	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 liters of water	-
Tomato	Immediate drainage of water is needed as it is highly susceptible to waterlogging	Immediate drainage of water	Do-	*
Chilli	Do-	Do-	Do-	-
Continuous submergence for more than 2 days				
Rice	Drainage and soil drenching with suitable plant protection chemical	Immediate drainage of water	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 liters of water plan for rabi crop sowing	Spraying plant growth hormones that prevent premature germination of rice seeds
Greengram	Drainage	Drainage	Drainage	Do-
Blackgram	Drainage	Drainage	Drainage	Do-
Horticulture				
Brinjal	Drainage of water from the field	Drain the water as early as possible as flowering stage is critical to water logging	Drainage of water, drenching of crop base with streptocycline @ 2gm in 10 liters of water	25
Tomato	Immediate drainage of	Immediate drainage of	Drainage of water, drenching of crop	

	water is needed as it is highly susceptible to water logging	water	base with streptocycline @ 2gm in 10 liters of water	
Chilli	Do-	Do-	Do-	
Sea water intrusion				
Rice	Growing salt tolerant rice varieties like Lunishree, CSR-10	-	-	-

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
Cyclone	Not applicable			
Hail storm	Not applicable			
Heat wave	Not applicable.			
Cold wave	Not applicable			
Frost	Not applicable			
Sea water intrusion	Not applicable			
Pests and disease outbreak	Already covered in above table			

2.5 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	<p>Encourage perennial fodder production on field bunds and waste lands.</p> <p>Village pasture (grazing) lands should be developed for fodder production.</p> <p>On boundaries of agricultural field trees or shrubs like Sesbania, Subabul, Neem etc should be planted.</p> <p>It is essential to establish fodder bank near forest areas. Provision is also necessary to store surplus crop residues in fodder banks, which can be made available during draught.</p> <p>Excess fodder in flush season can be preserved as hay / silage.</p> <p>Explore the possibilities of availability of unconventional / alternative feed resources during draught.</p> <p>Organizing training programme of persons connected with A.H. on feeding and management of animals during draught.</p>	<p>Utilizing fodder from perennial trees and fodder bank reserves.</p> <p>Transporting excess fodder from adjoining districts.</p> <p>Utilizing the existing crops which fail to grow adequately due to failure of monsoon for feeding of animals.</p> <p>Use of unconventional livestock feed such as sugar cane top, sugar cane bagasse, banana plant Crop residues such as cassiadora water hyacinth and other like tree pods and seeds etc. Improving poor quality roughages by ammonia treatment, urea treatment. Utilization of the fodder stored in silos.</p>	<p>Supplementary feeding of remaining livestock and the replacement stock. Availing Insurance for live-stock.</p>
Drinking water	<p>Preserving water in community tanks and ponds etc for drinking purpose by excavation and sanitization of these resources. In addition, wells (bore wells or dug wells) may be constructed ahead of possible</p>	<p>Using persevered water in the tanks for drinking. Wherever ground water resources are available priority should be given for drinking purpose.</p>	<p>Clean drinking water</p>

	event of draught.		
Health and disease management	Veterinary preparedness with vaccine and medicines.	Conducting animal health camps and treating the affected animals Supplementation of mineral and vitamin mixtures	Proper disposal of dead animals Availing insurance
Floods			
Feed and fodder availability	Storage of feed. Establish fodder bank near forest areas. Excess fodder in flush season can be preserved as hay/silage.	Priorities animals as suckling animals, suckling animals along with their nursing mothers, producing and working animals, sick and old animals, adult open and non-producing animals as the feed and water may be in short supply. Procured feeds and fodders should be fed to all animals on the order of priority of animals. Straws and stovers that got soaked during floods need not be thrown away out right. They can be fed to animals as long as rotting or fungal growth has not set in. Partial drying choffing and sprinkling concentrate mixture can improve intake and utility. Utilise fodder from perennial trees.	Provision of supplementary feeding (concentrate / Roughage) with vitamin & minerals.
Drinking water	Large elevated community water tank in every panchyat and sanitation of these water resources.	Drinking water be made available to the animals in any kind of clean container available with the farmer. Water sources of temples are the ideal sources for drinking of the animals during drought.	Provision of clean drinking water. Vaccination of the cattle should be made.
Health and disease management	Keep the emergency service kit (first Aid Requisites) ready always containing Cotton wool, Bandages, Surgical gauze, old cotton sheets, Rubber tubing (for	The team should be well equipped with contingent items like bandages, tourniquet ropes, controlling rope, splints, slings,	Prompt and appropriate attention to injuries by providing necessary

	<p>torniquet), Surgical scissors – Curved and made of stainless steel, Forceps, Splints or Split bamboos (for fractures), Clinical thermometers – two or three, Disinfectants – potassium permanganate, Dettol, Savlon, Tannic acid powder (for poisons) and Jelly (for burns) Antibiotic eye drops, Epsom salts, copper sulphate, Treacle, oil of turpentine (for bloat), Obstetric ropes, chains and hooks, Tincture of iodine, tincture of Benzoin Co.(for wounds), Cotton rope, halters (for restraint), Trocar and canola (for bloat), Pocket Knife (for cutting, strangulating ropes etc.) Training to the farmers for taking care of the animals during flood.</p>	<p>poles and ropes to lift animals. Drugs including painkillers, antiseptics, antibiotics, anti-venom and anti-shock drugs etc. should be adequately available with them.</p> <p>Keep the animals loose in paddock (sheltered or unsheltered) rather keeping them tethered. Campaign and mass vaccination.</p>	<p>medicines to the livestock owners.</p> <p>Vaccination campaign against common endemic diseases of the areas (like H.S. B.Q, Anthrax etc.) must be taken up urgently. Necessary steps should be taken for the control of non-specific digestive and respiratory infections in consultation of local veterinary personals.</p> <p>Improving shed hygiene especially in the farmers household through cleaning and disinfection. Proper disposal of dead animals.</p>
Cyclone			
Feed and fodder availability	Storage of feed	<p>Use of locally available feed, storing of concentrates, encouraging them to store dry feeds, community feed godown for storing govt. supplied feeds.</p> <p>Priorities animals as suckling animals, suckling animals along with their nursing mothers, producing and working animals, sick and old animals, adult open and non-producing animals as the feed and water may be in short supply.</p> <p>Procured feeds and fodders should be fed to all animals on the order of priority of animals.</p>	<p>Use of locally available feed.</p> <p>Provision of supplementary feeding (concentrate / Roughage) with vitamin & minerals.</p>

		Straws and stovers that got soaked during floods need not be thrown away out right. They can be fed to animals as long as rotting or fungal growth has not set in. Partial drying choffing and sprinkling concentrate mixture can improve intake and utility.	
Drinking water	Large elevated community water tank in every panchyat	Chlorination of drinking water. Drinking water be made available to the animals in any kind of clean container available with the farmer.	Chlorination of drinking water . Provision of clean drinking water.
Health and disease management	Use of preventives like vaccination, deforming of animals. Keep the emergency service kit (first Aid Requisites) ready always containing Cotton wool, Bandages, Surgical gauze, old cotton sheets, Rubber tubing (for tourniquet), Surgical scissors – Curved and made of stainless steel, Forceps, Splints or Split bamboos (for fractures), Clinical thermometers – two or three, Disinfectants – potassium permanganate, Acriflvin, Dettol, Savlon, Tannic acid powder (for poisons) and Jelly (for burns) Antibiotic eye drops, Epsom salts, copper sulphate, Treacle, oil of turpentine (for bloat), Obstetric ropes, chains and hooks, Tincture of iodine, tincture of Benzoin Co.(for wounds), Cotton rope, halters(for restraint), Trocar and canola (for bloat), Pocket Knife (for cutting, strangulating ropes etc.)	Vaccination, fast aid treatment. The team should be well equipped with contingent items like bandages, tourniquet ropes, controlling rope, splints, slings, poles and ropes to lift animals. Drugs including painkillers, antiseptics, antibiotics, anti-venom and anti-shock drugs etc. should be adequately available with them. Keep the animals loose in paddock (sheltered or unsheltered) rather keeping them tethered.	Conducing health camp at regular interval against diarrhea. Prompt and appropriate attention to injuries by providing necessary medicines to the livestock owners. Vaccination campaign against common endemic diseases of the areas (like H.S. B.Q, Anthrax etc.) must be taken up urgently. Necessary steps should be taken for the control of non-specific digestive and respiratory infections in consultation of local veterinary personal. Improving shed hygiene especially in the farmers household through cleaning

			and disinfection
Heat wave and cold wave			
Shelter/environment management	Community shelter home . Proper sheltering / housing white painting outside the roof and black painting inside the roof.	Plantation around the shed Creating water bodies within the shed. Provision of cool drinking water.	Washing / wallowing / sprinkling/ splashing / showering
Health and disease management	Creating awareness regarding preventions of heat stroke	Protection of dry / milch cows/ buffaloes/ breeding bulls and teasers against thermal stress. Grazing should be done early in the morning and in the afternoon.	Conducting health camp

2.3.1 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Storage of feed ingredients	Ensure procurement of feed ingredients sufficient ahead	Feed supplementation will be made to the farms	Attempt will be made for available of feed ingredient or compound feed to the farmers
Drinking water	Check water source for ensuring sufficient portable water during draught	Attempt will be made to provide sanitized drinking water	Availability of water will be ensured by digging of bore well
Health and disease management	Procurement of vaccines and medicines and antistress agent. Feeding antibiotics Procurement of litter materials	Continue feeding of antistress agent	-
Floods			
Storage of feed ingredients	Ensure procurement of feed ingredients / compound feed sufficient ahead as feed supply to the farm will hamper due to submergence of the connecting roads	Supply the compound feed to the poultry farm under submerged area	Supply will continued till the situation is under control

Drinking water	Protect the water sources from submergence.	Attempt will be made to provide sanitized drinking water	Water sources will be sanitized with bleaching powder or any water sanitizer
Health and disease management	Procurement of vaccines and medicines. Feeding antibiotics Procurement of litter materials	Continue feeding antibiotics Prevent entrance of flood water to the shed Replace wet litter Proper disposal of dead birds if any	Disinfection of the farm premises. Feeding antibiotics And deworming. Replace wet litter Disinfection of sheds. Proper disposal of dead birds if any
cyclone			
Storage of feed ingredients	Procurement of feed	Supply the compound feed to the poultry farm under cyclone affected area	Supply will continue till the situation is under control
Drinking water	Protect water resources from submergence and contamination.	Attempt will be made to provide sanitized drinking water	Water sources will be sanitized with bleaching powder or any water sanitizer
Health and disease management	Procurement of medicine and vaccine	Vaccination of birds against different diseases Provision should be made for available of sanitized water	Water sources will be sanitized with bleaching powder or any water sanitizer
Heat wave			
Shelter/environment management	Pruning of big trees in the farm. Putting curtains on open sides of the shed. Procurement of electrical accessories Providing shed to poultry houses. Providing proper ventilation.	Attempt will be made for cooling of poultry shed by adapting different cooling methods Thickness of litter should be reduced Ventilation to the house should be increased by providing ceiling fans and exhaust fan	Provision should be made to ensure proper ventilation to the house
Health and disease management	Procurement of Antistress drugs	Supplementation of antistress drug	Vaccination of birds against RD
Cold wave			
Shelter/environment management	Procurement of curtains to cover open sides of the shed. Heating arrangement kept ready	Close the open sides of the shed by curtain in such a way that ventilation should not be hampered. Provide heat if necessary depending on the temperature and age of the birds	Remove the curtains. Discontinue heating.
Health and disease management	Procurement of Antistress drugs and vaccine	Feeding of antistress drugs in drinking water Vaccination with fowl pox	Vaccination against IBD and RD

^aBased on forewarning wherever available

2.3.2 Fisheries

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
Drought			
Shallow water in ponds due to insufficient rains/inflows	<ol style="list-style-type: none"> 1. Restricted release of water from reservoir. 2. Supplementary water harvest structures like pond and tanks has to be developed. 3. Renovation and maintenance of existing water harvest structures. 	-	-
Impact of heat and salt load build up in ponds/change in water quality	<ol style="list-style-type: none"> 1. Prepare to release water into the habitat. 	<ol style="list-style-type: none"> 1. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat. 	<ol style="list-style-type: none"> 1. Monitoring the water quality and health of aquatic organisms.
Floods			
Inundation with flood water	<ol style="list-style-type: none"> 1. Strengthening and increase in dyke height. 2. This should be constructed with inlet and out let facility. 	<ol style="list-style-type: none"> 1. Net enclosure should be provided over the dyke to prevent the escape of fish from pond. 	<ol style="list-style-type: none"> 1. Repairing and strengthening of dyke if required.
Water contamination and changes in BOD	<ol style="list-style-type: none"> 1. Application of lime. 	-	<ol style="list-style-type: none"> 1. Application of lime and geolite. 2. Application of Alum. 3. Application of KMnO₄
Health and disease management	<ol style="list-style-type: none"> 1. Application of lime 	-	<ol style="list-style-type: none"> 1. Application of lime and KMnO₄. 2. Assessment of the health status of fish and accordingly control measure should be taken. 3. Control on transport of brooders and seeds.
cyclone			Stocking, Yearling culture
Over flow/ flooding of ponds	<ol style="list-style-type: none"> 1. Strengthening and increase in dyke height. 2. This should be constructed with inlet and out let facility. 	<ol style="list-style-type: none"> 1. Net enclosure should be provided over the dyke to prevent the escape of fish from pond. 	<ol style="list-style-type: none"> 1. Repairing and strengthening of dyke if required.

Change in fresh/ brackish water ratio			
Health and disease management	-	-	<ol style="list-style-type: none"> 1. Application of lime and KMnO₄. 2. Assessment of the health status of fish and accordingly control measure should be taken. 3. Control on transport of brooders and seeds.
Heat wave and cold wave			
Management of pond environment	<ol style="list-style-type: none"> 1. During hot waves adequate water depth should be maintained. 	<ol style="list-style-type: none"> 1. During hot waves mixing of water with fresh water should be done. 2. The culture system should be provided with aeration to avoid oxygen depletion due to high temperature during hot waves. 3. Partial harvesting can be done to avoid loss. 	-
Health and disease management	<ol style="list-style-type: none"> 1. Application of lime and turmeric. 	<ol style="list-style-type: none"> 1. Feeding should be stopped. 2. If cold waves persists EUS outbreak takes place 	<ol style="list-style-type: none"> 1. Application of CIFAXto contro EUS disease in fish.