

STATE: ORISSA

Agriculture Contingency Plan for District: RAYAGADA

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	Gajrat hills, Dandakaranya and Eastern Ghats hot moist sub-humid eco-sub-region. (12.1)			
	Agro-Climatic Zone (Planning Commission)	East Coast Plains and Hills Region (XI)			
	Agro Climatic Zone (NARP)	North Eastern Ghat Zone (OR-5)			
	List all the districts falling under the NARP Zone*	Baudh, Kandhamal and Rayagada			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		19 ⁰ 09' 58.67" N	83 ⁰ 25' 00.71" E	25 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Research & Technology Transfer Station, Semiliguda, Koraput-764 036			
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, At/Po: Gunupur, Dist: Rayagada-765 022			
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Central Soil and Water Conservation Research & Training Institute, Sunabeda, Koraput				
1.2	Rainfall	Normal RF (mm)	Normal rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	1082.16	56	2 nd week of June	2 nd week of September
	NE Monsoon(Oct-Dec):	167.18	9	4 th week of October	1 st week of December
	Winter (Jan- Feb)	54.6	5		
	Summer (Mar-May)	151.8	7		
	Annual	1455.74	77.9		

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	754	193	281	124	26	22	18	38	39	13

Source: Odisha Agriculture statistics 2008-09

1.4	Major Soils (common names)	Area ('000 ha)	Percentage of total (Major soils)
	Red loam soil	217.1	52.7
	Alluvial soil	104.3	25.3
	Mixed red & black soil	80.2	19.4

Source : Soil resource map of NBSS & LUP

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	152.0	166
	Area sown more than once	99.4	
	Gross cropped area	251.5	
1.6	Irrigation	Area ('000 ha)	
	Net irrigated area	40.3	
	Gross irrigated area	57.8	
	Rainfed area	98.1	
	Sources of Irrigation (Potential created)	Number	Area ('000 ha)
	Canals	i) Major/Medium	12.8
		ii) Minor	28.6
	Tanks	-	1.8
	Open wells	-	0.2
	Bore wells	395	0.4
	Lift irrigation	673	26.9
	Other Sources		15.5

Total Irrigated Area		86.4	56.8(of net cultivated area)
Pump sets	1450		
No. of Tractors	1250		
Groundwater availability and use	No. of blocks	(%) area	Quality of water
Over exploited	NIL	-	-
Critical	NIL	-	-
Semi- critical	2	40	NA
Safe	9	100	NA
Wastewater availability and use	1	10	NA
Ground water quality	Good		
*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 2008-09)

1.7	Field Crops	Total Area(*000 ha)	Irrigated(*000 ha)	Rainfed(*000 ha)
	Paddy	63.0	32.1	30.9
	Ragi	25.9	1.6	24.3
	Maize	15.1	1.6	13.5
	Arhar	20.8	-	20.8
	Sesame	15.3	1.3	14.0
	Cotton	12.7	2.0	10.7
	Horticulture crops - Fruits	Area (*000 ha)		
		Total		
	Mango	10.19		
	Guava	0.93		
	Citrus	1.07		

Banana	1.21
Litchi	0.26
Horticulture crops - Vegetables	Total
Sweet Potato	1.81
Potato	0.09
Onion	0.73
Chilli	2.03
Ginger	0.30
Medicinal and Aromatic crops	Total
Not available	-
Plantation crops	Total
Cashew	0.59
Coconut	0.43
Fodder crops	Total
Berseem	0.005
Oat	0.002
Total fodder crop area	0.007
Grazing land	21.0
Sericulture etc	-
Others (Agro-processing centre)	8 nos.
Spices	
Onion	0.73
Chilli	2.03
Ginger	0.30
Turmeric	0.12
Garlic	0.09

Source: Odisha Agriculture statistics 2008-09

1.8	Livestock		Male ('000)	Female ('000)	Total ('000)		
	Non descriptive Cattle (Local low yielding)		203.8	153.8	357.6		
	Improved cattle		-	-	-		
	Crossbred cattle		1.0	2.9	3.9		
	Non descriptive Buffaloes (Local low yielding)		57.7	53.5	111.3		
	Improved Buffaloes		0.1	0.7	0.8		
	Goat		60.3	97.8	158.2		
	Sheep		20.6	27.4	48.0		
	Others (Pig)		18.4	20.5	38.9		
Commercial dairy farms (Number)				-			
1.9	Poultry		Total No. of birds ('000)				
	Commercial		7.9				
	Backyard		487.8				
1.10	Fisheries						
	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)	
	Marine sources not available for Marine fisheries						
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		5250		32		750	
	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)			4187.09	0.25	1037.86		

Source: District statistical survey 2007-08

1.11 Production and Productivity of major crops (Source: Odisha Agriculture statistics 2008-09)

1.11	Major field crop	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Paddy	142.4	2336	-	-	5.0	2376	147.4	2338
	Maize	40.4	2762	1.4	2865	-	-	41.9	2766
	Ragi	21.3	830	0.3	1488	-	-	21.6	836
	Cotton	53.4	712	-	-	-	-	53.4	712
	Arhar	22.0	1062	-	-	-	-	22.0	1062
	Sesame	3.4	380	2.5	405	-	-	5.9	390
Major Horticultural Crops									
	Sweet Potato	7.9	8000	7.1	8768	-	-	15.1	8347.9
	Potato	-	-	1.0	11083	-	-	1.0	11083
	Chilli	0.7	828	1.0	914	-	-	1.7	877
	Onion			5.9	8192	-	-	5.9	8192
	Ginger	0.5	1933	-	-	-	-	0.5	1933
	Mango					101.9	10000	101.9	10000

Source: Odisha Agriculture statistics 2008-09

1.12	Sowing window for 5 major field crops (start & end of sowing period)	Paddy	Maize	Arhar	Cotton	Ragi
	Kharif- Rainfed	2 nd week June– 4 th week August	2 nd week June – 2 nd week July	2 nd week June – 2 nd week July	2 nd week June – 2 nd week July	1 st week July- 3 rd week July
	Kharif-Irrigated	4 th week June – 3 rd week July	2 nd week June – 2 nd week July	-	2 nd week June – 4 th week July	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	2 nd week Dec – 3 rd week Jan	4 th week Nov – 2 nd week Jan	-	-	-

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	-	-	√
	Weed Parthenium (Gajar grass)	-	√	-
	Pests and disease outbreak Fruit & shoot borer , leaf curl virus in vegetables ;Maize stem borer ; Mango hopper, Fruit flies, BLB in Paddy	√	-	-

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

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 including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks July 2 nd week	Low rainfall Shallow Red loam soils Upland	a) Paddy (MTU-1010, 1001, Lalat, Ankur) --Fallow	Moisture stress tolerant upland paddy varieties such as Kalinga-3, Heera, Pathara, JHU, Bandana, Khandagiri can be taken. Sprouted paddy seeds may be sown Upland paddy may be substituted with low water requiring crops like blackgram(Ujala,PU30) , Greengram(Durga,PDM-11 & 54), cowpea(Utkal manik), etc.	Manage weeds by application of Glyphosate@ 8ml/lit, Strengthen field bunds, use 25% more seed than normal(i.e. 25kg/acre) for direct seeded rice, withheld nitrogen fertilizer application till receipt of rainfall	For seed contact CRRRI/OUAT/ OSSC Bhubaneswar
		b) Ragi - fallow (Nirmal & local)	Ragi var. Vairabi, Chilika may be taken; Intercropping of Rag (Vairabi) + Arhar(UAS-1 or UPAS 120) in 2:1 ratio	Higher seed rate @12 kg/ per ha for direct seeded & 6 kg/ha for line sowing	
		c) Sesame local	Short duration Sesame var Prachi, Kanak (75-80 days) may be taken	Apply 20kg Sulphur/ha during last land preparation, Sow 10 kg seeds/ha mixing with 50kg sand for uniform distribution	

		d) Arhar (Laxmi, BRG-1)	Same varieties or UPAS 120 may be grown. The legume based intercropping system like Maize (Prabal,Pinnacle) +Arhar (ICPL87,UAS-1) ; Arhar + Groundnut (Devi, Smruti); Groundnut+ Greengram (TARM-1,2) , in the ratio of 2:1, 2:5 ,4:1 respectively may be practiced.	In acidic soil apply lime @ 0.15 to 0.25 LR (5q lime/PMS) mixed with FYM @ 5 t/ha in furrows at the time of sowing. Adopt Ridge and furrow method of planting	For seed contact OUAT, Bhubaneswar National Horticulture Mission in the District For seed contact CRRI/OUAT/ OSSC Bhubaneswar
		e) Maize (BIO 9681, Pinnacle, Prabal , Hishell)	Maize (Hybrids) : Ganga-5, Daccan-103, KH 510, KH 101; Maize (Composites) like Shakti-1, Navjot.	Grow vegetative barriers in unbunded uplands to check soil erosion and conserve rain water Same as of Arhar – Spacing of 60x30 should be maintained Withhold basal dose of N, Top dressing when it rains	Seeds from Cotton corporation, RKVY
		f) Kharif vegetables • Tomato (S-22) • Brinjal(Pinky,Kajal) • Cow pea(local) • Chilli (Tejasvini,Surya)	Growing of short duration vegetables like Tomato (BT-10), Brinjal(Utkal Anushree) Cowpea(Utkal Manik, UtkalGourav), Chilli(Utkal Ava)	Sow seedlings in raised bed method, Transplant at 3-4 leaf stage without delay. Devote 10 % area of a plot for construction of rain water collection	
		g) Blackgram(PU-30, Sarala)	Blackgram : TU-94-2, PU30, Sarada.		

		h) Cotton (Bunny)	Pure crop of Cotton(Bunny) or Intercropping Cotton + Blackgram(PU-30) in a ratio 1:2	<p>Sowing with first shower of rain, Mix 200gm of azotobacter & 40gm <u>T. viridae</u> culture per 10 kg of seed before sowing</p> <p>Use 25% more seeds (25 kg/ha in normal case) in case of direct sowing. Line sowing with 30x10cm</p> <p>Cotton with spacing 90x30 cm & blackgram in 30 cm row to row with Cotton</p>	
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Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 6 weeks (July 4 th week)	Low rainfall Shallow Red loam soils Upland	Paddy (MTU-1010, 1001, Lalat, Ankur) -- Fallow	Short duration moisture stress tolerant upland paddy varieties such as Kalinga-3, Heera, Pathra, JHU, Bandana, Khandagiri can be taken. Upland paddy may be substituted by suitable non-paddy crops such as: Ragi (Bhairabi); Pulses like Cowpea (UtkalManik, Maharani), Blackgram (sarala,PU-30) can be grown upto last week of July	Proper plant protection measures to avoid any germination failure due to delayed sowing. In-situ rain water conservation by contour bunding Harvesting of excess runoff water Dose of N application be reduced by 40 %	Supply of seeds through OSSC , CRRI, NFSM, RKVY, OUAT Make linkage with ATMA, NFSM, RKVY Supply of seeds through OSSC , through NFSM, RKVY, OUAT, RRTTs
		b) Ragi - fallow (Nirmal ,Godavari & local)	Ragi var. Deomali OR Crop substitution with short duration Blackgram var PU-30	Management of termites by application of chloropyriphos@ 5ml/lit.	

				Manage weeds by application of herbicides like glyphosate @ 8ml/lit Sowing Ragi with 1 st shower of rain Blackgram with higher seed rate @ 35 kg/ha.	Maize Research Institute, New Delhi may be approached for seeds Seeds may be procured from Cotton corporation, Cotton scheme of Dist. Agril. office
		c) Sesame local	Short duration Sesame Var .Uma, Prachi	Withheld nitrogen fertilizer application till receipt of rainfall The field should be free of weeds for utilization of water and nutrients by the late sown crops. Withheld nitrogen fertilizer application till receipt of rainfall	
		d) Arhar (ICPL-87, BRG-1)	Arhar may be substituted with Horsegram(var.Radhey, Anegiri-1) or Razma(PDR-90, Udaya)	Ploughing at the 1 st rainfall and sowing along the cultivator or plough, Seed rate 10 kg/ha Application of RDF with PP measures	
		Maize (BIO 9681, Pinnacle, Prabal , Hishell)	Substituting Hybrid maize with Composite var like Navjot or sweet corn Madhuri to be marketed not as seed but for vegetable purpose	Sowing of seeds in ridges with spacing 50x25cm ,Use of bulky organic matter @ 10 t/ha Thinning, Sowing of seeds in ridges with spacing 50x25cm ,Use of bulky organic matter @ 10 t/ha Thinning, Apply phorate granules 4-5nos. in leaf whorls	
		f) Kharif vegetables <ul style="list-style-type: none">• Tomato (S-22)• Brinjal(Pinky, Kajal)• Cow pea (Local)• Chilli(Tejasvini,Surya)	Short duration improved varieties Tomato(utkal shrabani,Rajani), Okra(Utkal Gourav,Arka abhaya), Cucumber (Pusa sanjog, Himani), Spinach(All Green,pusa Harit),Country bean (CO-10,pusa early prolific)	Mulching with paddy straw , Spray 1% urea in vegetables crops Transplanting older seedlings (40 day old with wider spacing than recommendation Sowing of seeds in ridges, pits with proper seed treatment to avoid mortality	
		g) Blackgram(PU-30, Sarala)	Blackgram var. LBG-17,Ujala, PU 94-2 may be selected	Broadcasting with seed rate @ 35-40 kg/ha with Rhizobium culture treatment @ 20gm/kg seed	

			Broadcasting @ 25 kg/ha, or line sowing behind the plough
		h) Cotton (Bunny)	Sow along the furrows' for moisture conservation Fertilizer@ 30:60:60 Skip 1 st top dressing & spray 2% urea

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks (August 2 nd week)*	Low rainfall Shallow Red loam soil Upland	a) Paddy (MTU-1010, 1001, Lalat, Ankur) -- Fallow	Shifting from traditional crops/varieties to short duration low water requiring crops like cowpea, blackgram, greengram by substituting rice totally. If the main crop is failed cultivation or re-sowing with fodder (Berseem, Napier) is the best option. Fodders can be harvested at any stage keeping in view sowing of the next <i>rabi</i> season crop	The recommended dose of nitrogen application should be reduced by 40 % and should be applied, as basal and full-recommended dose of P and K should be placed as basal. Furrow sowing of crops at closure plant-to-plant (10 cm) distance with wider inter-row spacing (40-50 cm) is recommended.	Supply of seeds through OSSC , through NFSM Supply of seeds OSSC , RRTTS, OUAT
		b) Ragi - fallow (Nirmal ,Godavari & local)	Ragi- Deomali	Sowing behind the plough/ Broadcasting Inoculation with azospirillum @20gm/kg	
		c) Sesame local	Sesame – Prachi, Uma, Usha	Sowing behind the plough/ Broadcasting Inoculation with azospirillum @20gm/kg ,Apply Sulphur@ 25	

				kg/ha, Seed rate 10kg/ha	
		d) Arhar (ICPL-87, BRG-1)	Arhar to be substituted with field pea (var. Rachana, Swarnarekha), Bengalgram(Radhey, Moti)	Seed rate of 60 kg/ha, Rhizobium culture treatment @ 20gm/kg seed, Spacing of 30x10 cm to maintain 30 plants/sq. mt.	
		e) Maize (BIO 9681, Pinnacle, Prabal , Hishell)	Substituting Hybrid maize with sweet corn Madhuri to be marketed for vegetable purpose	Sowing along furrows at 50x20 cm spacing, Apply N fertilizer at 21 DAS along base of plant, Construction small pond in 10% area of cropped field, Harvesting at green cob stage	
		f) Kharif vegetables <ul style="list-style-type: none">• Tomato(S-22)• Brinjal(Pinky,Kajal)• Cow pea(local)• Chilli Tejasvini, Surya	Cluster bean (Contender) / Cow pea (Utkal manik)/ Radish (Pusa desi)/Pumpkin (Pusa Biswas)	Mulching with HDPE sheets, In-situ moisture conservation , Construction of water harvesting structure, Foliar application of Urea, Application of Vermicompost in the base of plant& 2.5 t/ha.	
		g) Blackgram (PU-30, Sarala)	Blackgram (Sarala, Prasad, Ujala)/	Sowing behind the plough/ Broadcasting Inoculation with rhizobium Plough and sow the crops across the slope for moisture conservation Moisture conservation through mulching Liming @ 5 q/ha mixed with FYM @ 1.0 t/ha in furrows before sowing Broadcasting with application of rhizobium culture	

Condition					
Early season drought (normal onset)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measure	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/ crop stand etc.	Low rainfall Shallow Red loam soils Upland	a) Paddy (MTU-1010, 1001, Lalat, Ankur)-Fallow	When there is more than 50% mortality, resow the crop up to July after receipt of sufficient rain water Intercropping with green gram / Horse gram / Cow pea in a ratio 2:1 or 2:2 The field should be free of weeds for utilization of water and nutrients by the late sown crops	Ridge and furrow methods of sowing as in-situ soil moisture conservation practices. Light irrigation during evening hours, Foliar application mixed fertilizer 19:19:19 @ 1 gm /lit. If possible mulching may be practiced using locally available material.	Farm pond under NREGS, IWMP, diesel pump sets and KB pumps in tankfed areas under RKVY and NFSM. Small nursery development under NHM.
		b) Ragi - fallow (Nirmal ,Godavari & local)	No change	The crop may withstand moisture distress for this period. With hold application of any fertilizers.	Seeds from RKVY, OSSC. RRTTS of OUAT, local DDA office
		c) Maize (BIO 9681, Pinnacle, Prabal , Hishell)	Maize should be resown as germinated seeds fail to sustain	Application of Bulky organic matter, Application of pre-emergence weedicide, Limited hoeing operation to conserve moisture, life saving irrigation. Complete hoeing, weeding followed by ridging to the base of the crop Follow ridge and furrow method of sowing	Seeds from NHM, OUAT Seeds from district Agril. Office, cotton Corporation, RKVY

		d) Arhar (Luxmi)	Arhar may withstand this dry period, so no change. If at all crop fails resowing with ICPL-87 var. along the furrows with closer spacing at 45x20 cm.	Same as in case of Maize Mulching the inter row space with weeded plants Life saving irrigation	
		e) Kharif vegetables • Tomato (S-22) • Brinjal (Pinky,Kajal) • Cow pea(local) • Chilli (Tejasvini,Surya)	Cultivate vegetables-cowpea, guar, radish, runner bean, okra, cauliflower, brinjal, tomato wherever possible	Mulching with HDPE sheets or locally available material. Life saving irrigation,	
		f) Blackgram(PU-30, Sarala)	Resowing of same variety	Construction of small farm pond to conserve water Cultivate & mix the previous crop for organic matter content & moisture conservation	
		g) Cotton (Bunny, Sabita)	Resowing with closer spacing 75x45 cm.	Light irrigation during evening hours, Foliar application mixed fertilizer 19:19:19 @ 1 gm /lit. mulching may be practiced using locally available material	

Condition			Suggested Contingency Measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measure	Remarks on Implementation
At vegetative stage	Low rainfall Shallow Red loam soils Upland	Paddy (MTU-1010, 1001, Lalat, Ankur) -- Fallow	Crops should be suitably thinned out. In-situ rain water conservation, harvesting of excess runoff for re-use and ground water recharge. Conserve rainwater by increasing bund height	Wherever economically viable, mulching should be practiced in between crop rows using locally available mulch material.	Supply of seeds from OSSC, OUAT Seeds may be procured from NFSM
		b) Ragi - fallow (Nirmal, Godavari & local)	Top dressing of fertilizers may be postponed till rainfall/ foliar application of nutrients	Application of weedicide on broad leaf weeds to minimize competition for water	Seeds may be procured from NFSM, RKVY
		c) Maize (BIO 9681, Pinnacle, Prabal, Hishell)	Hoeing soil & applying to the base, Thinning for optimum plant population	Withhold 1 st top dressing till the rain resume, spray potassic fertilizer @ 2% to mitigate water stress condition	Seeds may be procured from NFSM, RKVY, ISOPOM
		d) Arhar (Luxmi, BRG-1)	Hoeing soil & applying to the base, Thinning for optimum plant population	-do-	Seeds from NHM & OUAT, ATMA, IWDP NHM OSSC, RKVY
		e) Kharif vegetables <ul style="list-style-type: none">• Tomato(S-22)• Brinjal(Pinky, Kajal)• Cow pea(local)• Chilli(Tejasvini, Surya)	Spray 2% KCl + 0.1 ppm boron to overcome drought situations. Foliar application of 2% urea at pre-flowering and flowering stage is helpful to mitigate drought, Close spacing 25 % more N as basal Top dressing of fertilizers may be	Mulching along the rows with paddy straw or polythene Conserve rainwater by increasing bund height	Cotton scheme from SMS

			postponed till rainfall		(Cotton) District Agriculture Office, Cotton Corporation
		f) Blackgram (PU-30, Sarala)	Crops should be suitably thinned out.	Spray potassic fertilizer @ 2%	
		g) Cotton (Bunny, Sabita)	In-situ rain water conservation, harvesting of excess runoff for re-use and ground water recharge.	Withhold 1 st top dressing till the rain resume Spray planofix or celmone 10 ppm (2 ml in 9 litre of water) at 45 days and 20 ppm (4 ml in 9 litre of water) 10 days later to prevent boll shedding in cotton	

Condition			Suggested Contingency Measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measure	Remarks on Implementation
At reproductive stage	Low rainfall Shallow Red loam soils Upland	Paddy (MTU-1010, 1001, Lalat, Ankur) - Fallow	Crops should be suitably thinned out, Life saving irrigation if possible. In-situ rain water conservation, harvesting of excess runoff for re-use and ground water recharge. Conserve rain water by increasing bund height Top dressing of fertilizers be postponed till rainfall/foiar application of nutrients	If fertilizers are to be applied, foliar application is recommended.	Supply of seeds through OSSC, NFSM
		b) Ragi - fallow (Nirmal ,Godavari & local)	Irrigate on ridge and irrigate every alternate furrow on rotation.	Wherever economically viable, mulching should be practiced in between crop rows using locally available mulch material	-do- OSSC, RRTTS,

		c) Maize (BIO 9681, Pinnacle, Prabal , Hishell)	Irrigate on ridge and irrigate every alternate furrow on rotation Spray 2% KCl + 0.1 ppm boron to overcome drought situations. Foliar application of 2% urea at pre- flowering and flowering stage is helpful to mitigate drought, Close spacing 25 % more N as basal	Application of weedicide on broad leaf weeds Life saving irrigation	OUAT, NHM, RKVY Cotton scheme from SMS (Cotton) District Agriculture Office, Cotton Corporation
		d) Arhar (Luxmi, BRG-1)	Light & frequent Irrigation during evening hours In-situ rain water conservation, harvesting of excess runoff for re-use and ground water recharge	Application of weedicide on broad leaf weeds to minimize competition for water ,For termite control soil drenching with chlorpyrifos 20 EC @ 4-5 ml/litre of water Spray potassic fertilizer @ 2%	
		e) Kharif vegetables • Tomato(S-22) • Brinjal(Pinky,K ajal) • Cow pea(local) • Chilli(Tejasvini,Surya)		-do-	
		f) Blackgram(PU-30, Sarala)		-do-	

		g) Cotton (Bunny, Sabita)		Spray planofix or celmone 10 ppm (2 ml in 9 litre of water) at 45 days and 20 ppm (4 ml in 9 litre of water) 10 days later to prevent boll shedding in cotton	
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Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Early withdrawal of monsoon	Low rainfall Shallow Red loam soils Upland	Rice-fallow based		Cowpea, Sunflower, Fieldbean, Horsegram, Blackgram, Linseed for month of October	Farm ponds from NREGS, RKVY Seeds from NHM, OSSC Sprinkler, Drip irrigation from NHM
		Arhar			
		Ragi			
		Maize			
		Cotton			
		Blackgram			
		Vegetables			

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	Upland tube well/ canal Irrigated red loam soils	Rice-fallow based	Taking of medium duration rice var. like Lalat, Konark, Manaswini, Surendra etc in place of long duration var. If delayed by more than one month than Non paddy crops like Sesamum, sunflower may be taken up. High value vegetables may also be taken. Take pulses like Cowpea, Blackgram, Greengram	Harvesting of kharif rice at physiological maturity will realize 80-85% of normal yield Limited & life saving irrigation	Seeds through OSSC, NFSM, NHM Intercultural implements through NHM, ATMA,
		Hybrid Maize	Take short duration pulses like Cowpea, Blackgrm, Field pea	Sprinkler irrigation	-do-
		Arhar	Adopt intercropping with Blackgram, Clipping tips to induce branching	Reduction of conveyance losses while irrigating the light textured soils. Spread a polythene sheet in the field channel before irrigating the field and then roll it back for irrigating the other field	-do-
		Cotton	No Change		-do-

Medium land Canal irrigated shallow red loam soils Upland	Rice-fallow based	Taking of medium duration rice var. like Lalat, Konark, Manaswini, Surendra etc in place of long duration var. If delayed by more than one month than Non paddy crops like Sesamum, sunflower may be taken up. High value vegetables may also be taken. Take pulses like Cowpea, Blackgram, Greengram	Limited & life saving irrigation Alternate furrow irrigation Drip irrigation Mulching, Irrigation in root zone	Seeds through OSSC, NFSM, NHM Intercultural implements through NHM, ATMA, OSSC, NFSM Intercultural implements through , ATMA, Seeds through OSSC, NFSM, NHM
	Hybrid Maize	Take short duration pulses like Cowpea, Blackgram, Field pea	Sprinkler irrigation	
	Arhar	Adopt intercropping with Blackgram, Clipping tips to induce branching Maize, vegetable (Chilli, Tomato, Brinjal, Okra, Cauliflower)	Reduction of conveyance losses while irrigating the light textured soils. Spread a polythene sheet in the field channel before irrigating the field and then roll it back for irrigating the other field	
	Cotton			

Condition	Suggested Contingency Measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows due to insufficient/delayed onset of monsoon	Upland tubewell / canal Irrigated red soils	Rice-fallow based	Rice area during rabi should be reduced. Instead, low water requiring oilseeds and pulses like groundnut, Greengram,	<ul style="list-style-type: none"> Irrigate the kharif rice with groundwater during dry spells only, if dry spell comes before release of canal water. Reduction of conveyance losses 	Seeds through OSSC, NFSM, NHM Intercultural implements through NHM, ATMA,

			Blackgram, Sunflower, Sesamum are preferred options. Prefer early duration varieties like Heera, Sneha (70-75 days) in rabi.	while irrigating the light textured soils. Spread a polythene sheet in the field channel before irrigating the field and then roll it back for irrigating the other field. <ul style="list-style-type: none"> Harvesting of kharif rice at physiological maturity will realize 80-85% of normal yield. Irrigate the rabi rice at critical stages only with groundwater. 	
	Medium land Canal irrigated Alluvial soils	Rice-fallow based Maize	Low water requiring oilseeds and pulses like Groundnut, Greengram, Blackgram, Sunflower, Sesamum	Same as above for kharif rice	Seeds through OSSC, NFSM, NHM Intercultural implements through NHM, ATMA,
	Tube well/ pond irrigated Shallow Black soils	Vegetable –fallow	High yielding varieties with short duration	Delayed raising of nursery for delayed planting Limited & life saving irrigation Alternate furrow irrigation Drip irrigation	Seeds through OSSC, NFSM, NHM Intercultural implements through NHM, ATMA,

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency Measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient ground water recharge due to low rainfall	Upland tubewell/ canal Irrigated Red soil	Rice-fallow based	Rice area during rabi should be reduced. Instead low water requiring oilseeds and pulses like Groundnut, Greengram, Blackgram,	<ul style="list-style-type: none"> Irrigate the kharif crops during dry spell with harvested rain water. Harvesting of kharif rice at physiological maturity will realize 80-85% of normal yield. About 11-37 % run-off is generated 	Seeds through OSSC, NFSM, NHM Intercultural implements through NHM, ATMA,

			Sunflower, sesamum.	<p>even by the delayed monsoon and should be stored in the farm ponds or tanks. These will recharge ground water during normal or excessive rainfall year.</p> <ul style="list-style-type: none"> • Rainwater stored in self sealing or lined ponds can be used for irrigation if there is long break in the rainfall or for pre-sowing of the <i>rabi</i> crops to ensure proper germination. 	
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2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	Suggested contingency measures			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvests
Continuous high rainfall in a short span leading to water logging				
Cotton	Provide drainage	Provide drainage	Drain water for drying Harvest at physiological maturity stage	Shifting to a safer place Dry in shade in a well ventilated space
Paddy	No substantial problem as uplands do not maintain water logging condition for long time	Provide drainage If possible	-do-	-do-
Arhar	Provide drainage	Provide drainage	Drain water for drying Harvest for vegetable purpose	Safe storage against pest & diseases
Ragi	-do-	-do-	Drain water for drying Harvest at physiological maturity stage	Shifting to a safer place Dry in shade in a well ventilated space Safe storage against pest & diseases
Maize	Provide drainage	Provide drainage	Harvest at physiological maturity	Market for vegetable

	Maintain ridge & furrow method	Maintain ridge & furrow method	stage	purpose
Horticulture				
Fruits(Mango, Citrus etc)	Provide drainage Earthing up of plant base/root zone	Provide drainage Earthing up of plant base/root zone	Provide drainage Earthing up of plant base/root zone In case of established tree, no problem	Dry the fruits, Keep at safer place, may be sold at green stage
Banana, Papaya	Raising seedlings in sunken bed method	-do-	Harvested at green stage or table purpose, No problem for marketing as it has buyers' preference	Store for ripening in closed godowns for marketing
Cucurbit vegetables	Seedling in raised nursery beds, drainage	Vines should be staked along elevated frames	Ensure drainage Harvesting at tender stages	Ensure drainage Harvesting at tender stages
Solanaceous/ cruciferous vegetables	Seedling in raised nursery beds, drainage	Provide drainage Application of hormones to induce more flowering	Provide drainage	Ensure drainage Harvesting at tender stages
Heavy rainfall with high speed winds in a short span				
Paddy	In upland condition problem is not serious Small seedlings withstand the problem	Drainage if waterlogging persists	Lodged panicles may be harvested at physiological maturity stage	Ensure drainage Keep at dry open space under roof Take steps to prevent stored grain pest
Cotton	Drainage if water logging persists Small seedlings withstand the problem	Plant protection measures against wilt & stem rotting	Harvesting of bales at physiological maturity stage	Take the bales to safer & drier place, Drying under shade
Maize	In upland condition problem is not serious Small seedlings greatly affected by waterlogging, immediately drain the water	Bundling of stalks Drainage if waterlogging persists for more than four hours	Harvesting at green cob stage	Market as vegetable purpose, may be used as fodder
Horticulture				
Brinjal	Drainage may be ensured as soon	Drainage may be ensured as	Harvesting of tender & mature	May be sold in the market

	as possible to prevent wilting, covering the root zone with soil to prevent water logging	soon as possible to prevent wilting	fruits , Spraying 5% NSKE followed by Triazophos @ 2.5 ml/lit to prevent Fruit & shoot borer	after proper grading
Cucurbits	Drainage may be ensured as soon as possible to prevent wilting/rotting	Staking through sticks to prevent lodging/spread in soil, Take steps to manage fruit fly by installing poison bait	Plucking of fruits at tender stage Staking through sticks to prevent lodging/spread in soil, Manage fruit fly by installing poison bait/trap	Both stem & fruit are marketed as vegetable purpose
Ginger	Make raised bed Drainage may be ensured as soon as possible to prevent wilting/rotting	Plant protection measures against RHIZOME ROT	Harvest at tender/premature stage of the crop	Shed dry at well ventilated place , clean the rhizomes from mud for better market price
Outbreak of pests and diseases due to unseasonal rains				
Paddy	Spray tricyclazole against blast, Chloropyriphos against stem borer, Monocrotophos against Swarming caterpillar	Spray tricyclazole against blast, Chloropyriphos against stem borer, Monocrotophos against Swarming caterpillar & leaf folder	Malathion spray against Gundhy bug	Sun drying / disinfection of gunny bags with malathion or heat treatment to manage stored grain pests
Maize	Phorate granules in the whorls & spray of Endosulfan against maize stem borer	Spraying of Dimethoate against aphid	Wrapping of cobs against bird damage	Store in clean godown, disinfection of gunny bags / storage structure with malathion
Arhar	Removal of infested tips to manage leaf webber	Hand picking & destruction of blister beetles	Spray of Ekalux against pod borer	-do-
Blackgram, Greengram	Application of Triazophos against YMV	Application of malathion against Flea beetle	Spray of Nuvan against pod borer	Disinfection of storage structure to manage stored grain pests
Cotton	Mancozeb against leaf spot disease & Imidacloprid against sucking pests	Removal of plant parts infested by bole worms, spraying of Endosulfan when 5 % of bole is affected	Spraying of Indoxacarb & Profenophos alternatively to contain Bole worm	Store in clean godown, disinfection of gunny bags / storage structure with malathion
Horticulture				

Solanaceous vegetables	Spraying malathion against hadda beetle, hand collection of egg mass Soil drenching of COC & streptocycline against wilting	Application of Neem oil & tryozophos alternatively against brinjal fruit & shoot borer/ leaf curl virus	Spraying of Profenophos against fruit borer Metalaxyl against Anthracnose	Segregation of infested fruits & destruction
Cucurbit vegetables	Spraying of Ekalux against Red pumpkin beetle, Collection & destruction of eggs/grubs, Soil drenching of COC & streptocycline against wilting	Spraying Endosulfan against leaf eating caterpillars Metalaxyl against Powdery mildew, Carbendazim against leaf spot & blight	Poison baiting with Malathion & Jaggery against fruit fly	Destruction of overripe & infested fruits

2.3 Floods

Condition	Suggested contingency measures			
	Seedling/ nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Paddy	Drainage of the Nursery bed, If not possible go for resowing	Wet seeding of sprouted seeds (@75-80 kg/ha) of medium duration varieties (Lalat (120 days), Parijat (100 days), Konark (125 days), Surendra (135 days). 50% N and 50% K ₂ O + full P may be applied as basal and rest 50% N + 50% K ₂ O as top dressing during the tillering stage. In partially damaged field gap filling may be done by redistributing the tillers. Management of pests & diseases	If flood comes during reproductive stage, emphasis should be given on forthcoming rabi crops. Supply of seeds and other agro-inputs of <i>rabi</i> crops at subsidized rate, provision of bank loan etc Wet seeding of short duration varieties (Heera (60 days), Kalinga –III (90 days)) or medium duration varieties (Lalat (120 days), Parijat (100 days), Konark (125 days), Surendra (135 days) during forthcoming rabi season. Utilization of residual soil moisture and use of recharged soil profile for growing pulses Growing of vegetables after	If flood comes during reproductive stage, , emphasis should be given on forthcoming rabi crops Supply of seeds and other agro-inputs of <i>rabi</i> crops at subsidized rate, provision of bank loan etc Wet seeding of short duration varieties (Heera (60 days), Kalinga –III (90 days)) or medium duration varieties (Lalat (120 days), Parijat (100 days), Konark (125 days), Surendra (135 days) during forthcoming rabi season. Utilization of residual soil moisture and use of recharged soil profile for growing

			receding flood water and adoption of integrated farming system to obtain more income and to compensate the loss during kharif.	pulses Growing of cucurbits after receding flood water
Maize	Drainage, If damping off then resowing	Ensure drainage, Make ridge & furrows	Ensure drainage, Make ridge & furrows	Harvest the cobs as soon as possible
Horticulture	NOT A FEATURE OF FARMING SITUATION WHERE VEGETABLE IS GROWN			
Continuous submergence for more than 2 days	NOT A FEATURE OF THE DISTRICT			
Horticulture				
Sea water inundation	NOT A FEATURE OF THE DISTRICT DUE TO DISTANCE FROM SEA MORE THAN 200 KM			

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone : NOT a feature of the District

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	<ul style="list-style-type: none"> ▪ To establish fodder bank near forest areas ▪ To store surplus crop residues in fodder banks ▪ Excess fodder in flush season can be preserved ▪ Explore availability of unconventional / alternative feed resources ▪ Organizing training programme on feeding and management of animals 	<ul style="list-style-type: none"> ▪ Utilizing fodder from perennial trees and fodder bank reserves. ▪ Transporting excess fodder from adjoining districts. ▪ Utilizing the existing crops ▪ Use of unconventional livestock feed 	<ul style="list-style-type: none"> ▪ Supplementary feeding of remaining livestock and the replacement stock
Drinking water	<ul style="list-style-type: none"> ▪ Preserving water in community tanks and ponds etc 	<ul style="list-style-type: none"> ▪ Attempt will be made to provide sanitized 	<ul style="list-style-type: none"> ▪ Availability of water

	<ul style="list-style-type: none"> ▪ wells (bore wells or dug wells) may be constructed 	drinking water	will be ensured by digging of bore well
Health and disease management	<ul style="list-style-type: none"> ▪ Livestock insurance ▪ Veterinary preparedness with vaccine and medicines. 	<ul style="list-style-type: none"> ▪ Conducting animal health camps and treating the affected animals ▪ Supplementation of mineral and vitamin mixtures 	<ul style="list-style-type: none"> ▪ Availing insurance ▪ Culling of unproductive livestock ▪ Proper disposal of dead animals
Floods			
Feed and fodder availability	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	<ul style="list-style-type: none"> ▪ Procurement of vaccines and medicines. ▪ Feeding antibiotics ▪ Procurement of litter materials 	<ul style="list-style-type: none"> ▪ Continue feeding antibiotics ▪ Prevent entrance of flood water to the shed ▪ Replace wet litter ▪ Proper disposal of dead birds if any 	<ul style="list-style-type: none"> ▪ Disinfection of the farm premises. ▪ Feeding antibiotics and deworming. ▪ Replace wet litter ▪ Disinfection of sheds. Proper disposal of dead birds if any
Cyclone	NOT PREVALENT		
Heat wave and cold wave	NOT PREVALENT		

2.5.2 Poultry

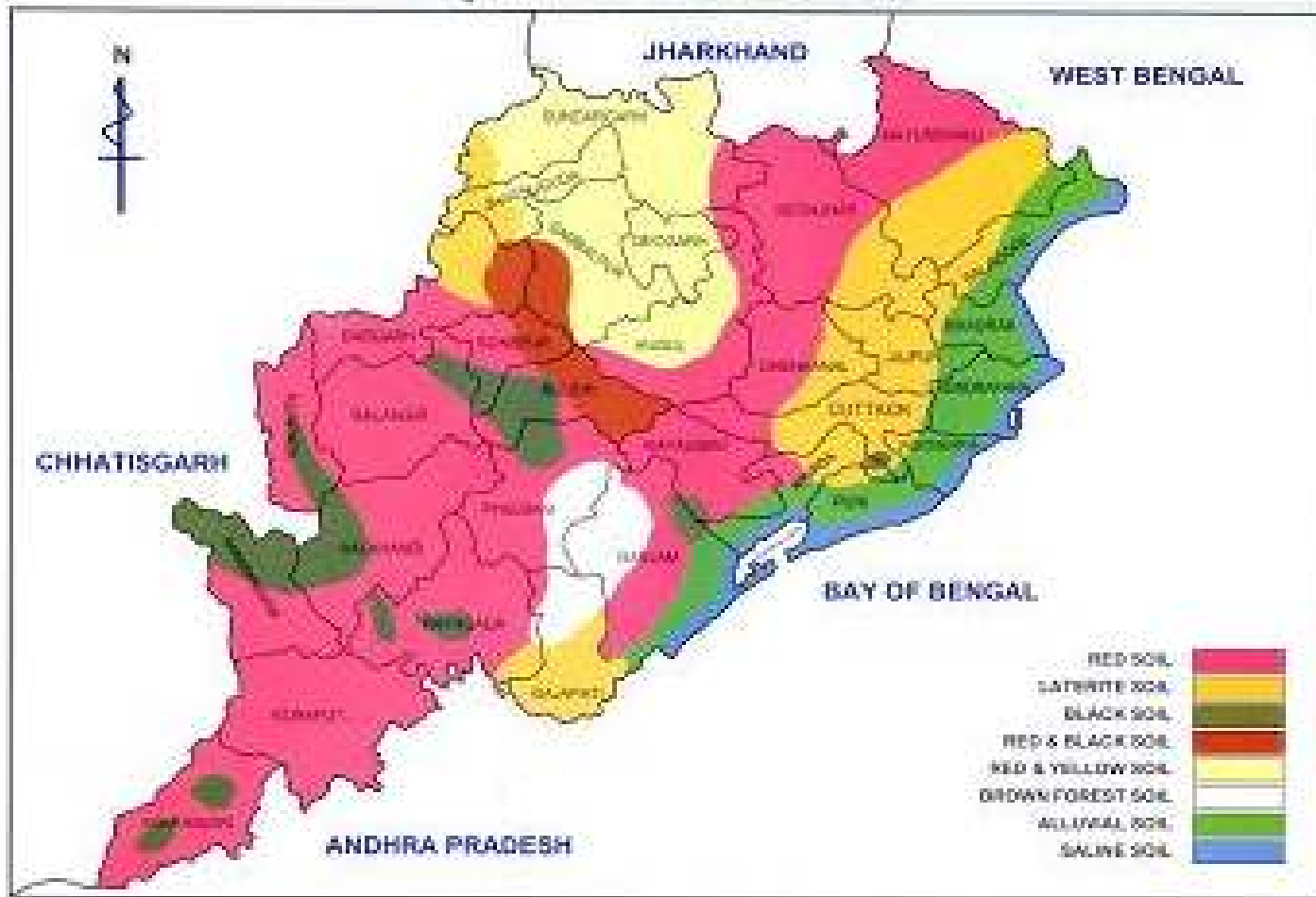
	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Shortage of feed ingredients	<ul style="list-style-type: none"> ▪ Insurance of Poultry farms ▪ Ensure procurement of feed ingredients sufficient ahead ▪ Establish feed serve bank 	<ul style="list-style-type: none"> ▪ Feed utilization from feed bank ▪ Feed supplementation will be made to the farms 	<ul style="list-style-type: none"> ▪ Availing insurance ▪ Attempt will be made for available of feed ingredient or compound feed to the farmers
Drinking water	Check water source for ensuring sufficient potable 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	<ul style="list-style-type: none"> ▪ Procurement of vaccines and medicines and anti stress agent. ▪ Feeding antibiotics ▪ Procurement of litter materials 	<ul style="list-style-type: none"> ▪ Administration of vaccines ▪ Continue feeding of anti stress agent 	Culling of affected birds
Floods			
Shortage 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 sanitized with bleaching powder or any water sanitizer
Health and disease management	<ul style="list-style-type: none"> ▪ Procurement of vaccines and medicines. ▪ Feeding antibiotics ▪ Procurement of litter materials 	<ul style="list-style-type: none"> ▪ Continue feeding antibiotics ▪ Prevent entrance of flood water to the shed ▪ Replace wet litter ▪ Proper disposal of dead birds if any 	<ul style="list-style-type: none"> ▪ Disinfection of the farm premises. ▪ Feeding antibiotics and de-worming. ▪ Replace wet litter ▪ Disinfection of sheds. disposal of dead birds
Cyclone	NOT PREVALENT		
Heat wave and cold wave	NOT PREVALENT		

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Shallow water in ponds due to insufficient rains/inflow	<ol style="list-style-type: none"> 1. Restricted release of water from reservoir. 2. Supplementary water harvest structures like pond and tanks have to be developed. 3. Renovation and maintenance of existing water harvest structures 	<ol style="list-style-type: none"> 1. Restrict lifting of water for irrigation purpose of crops 2. Catch the stock, market the produce to reduce the density of population in ponds. 	<ol style="list-style-type: none"> 1. Excavate the ponds to increase the depth. 2. Try to release water into the pond if it rains in off-season
Impact of heat & 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 waters	<ol style="list-style-type: none"> 1. Construction of humane shelter. 2. Storage of sand filled bags for emergency use. 3. Repair and maintenance of bundhs. 4. Preparedness for relief 5. Insurance coverage provision for life and property 	<ol style="list-style-type: none"> 1. Timely broadcast and telecast and other types of announcement warning about the danger level with respect to water level. 2. Evacuation of people to flood shelter areas. 3. Relief operation. 	<ol style="list-style-type: none"> 1. Relief operation will continue. 2. Care of health of affected people 3. Settlement of insurance. 4. Financial support to other people.
Water contamination & change in BOD	Take appropriate measures to check seepage into pond e.g. Raising bunds to prevent entry of water	Check the water quality & take appropriate action	<ol style="list-style-type: none"> 1. Application of lime and geolite 2. Application of Alum. 3. Application of KmnO4
Health and diseases management	Stock preventive medicines, vaccines	<ol style="list-style-type: none"> 1. Prevent influx of diseased fish from outside source, Check through nets 2. Administer medicines through random catch 3. Disinfect water by lime KMnO4 	<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	NOT PREVALENT		
Heat wave and cold wave	NOT PREVALENT		

Annexure – I (A)

Fig. SOIL TYPE OF ORISSA



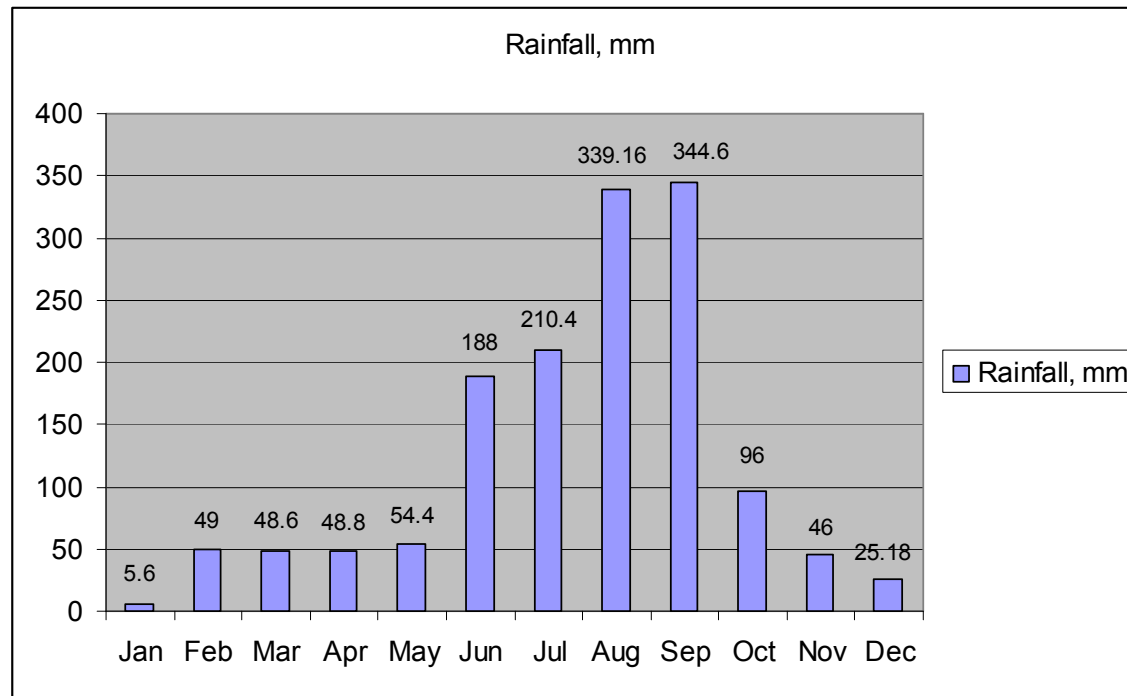
Annexure I (B) : Location map of district within State



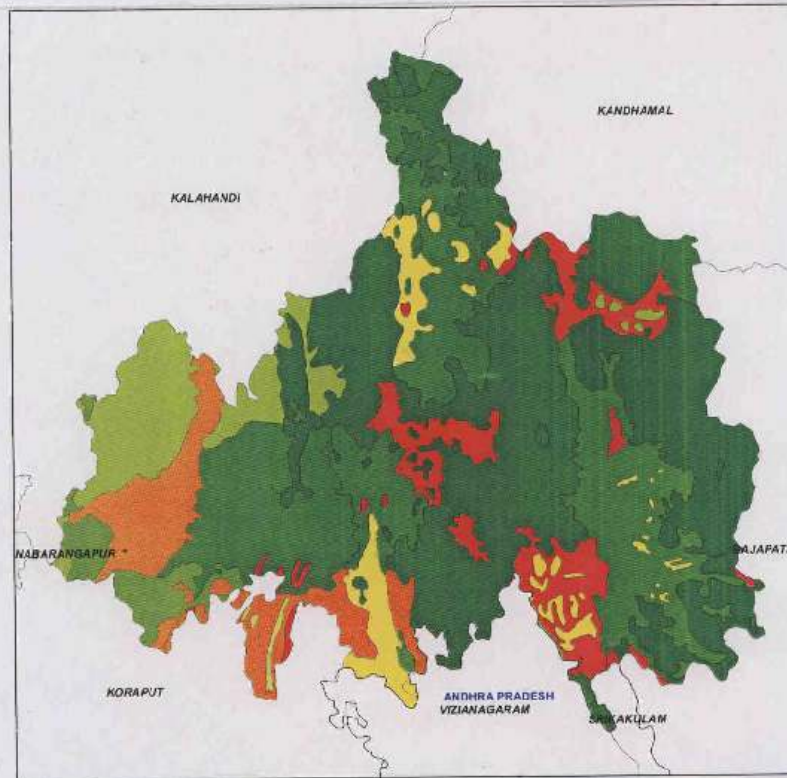
Annexure 2: (A) Block wise Mean annual rainfall distribution in
RAYAGADA DISTRICT



Annexure 2: (B) Average annual rainfall distribution in
RAYAGADA DISTRICT



SOIL MAP OF RAYAGADA



Legend

- State Boundary
- District Boundary



SOIL MAP

2

0 4 8 16 24 32 40

Scale : KM

Maps Composed by MHC

