

STATE: ORISSA
Contingency Plan for District: ANGUL

1.0 District Agriculture profile				
1.1	Agro-Climatic/ Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Gujurat Hills, Dandakaranya & Eastern Ghats hot moist sub-humid eco-subregion (12.1)		
	Agro-Climatic Region (Planning Commission)	Eastern Plateau & Hill region (VII)		
	Agro Climatic Zone (NARP)*	Mid central table land zone (OR-10)		
	List all the districts falling under the NARP Zone	Angul, Dhenkanal, parts of Cuttack, & Jajpur		
	Geographical coordinates of district	Latitude	Longitude	Altitude
		20 ⁰ 49'52.00' N	85 ⁰ 05'50.00" E	440 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RRTTS, Mahisapat, Dhenkanal		
	Mention the KVK located in the district	Kishi Vigyan Kendra, Panchamahala, P.O.- Hularisingha, Dist. :- Angul.-759132 (ODISHA)		
1.2	Rainfall	Average (mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	Summer (Jan-March)	64.0	2 nd week January	1 st week of February
	Pre-monsoon (Apr-May)	80.1	3 rd week May	4 th week of May
	Monsoon (June-Sep)	1147.8	2 nd week of June	4 th week of September
	Post-monsoon (Oct-Dec)	110.0	2 nd week October	3 rd week of November
	Annual	1401.9	-	-

* If a district falls in two NARP zones, mention the zone in which more than 50% area falls *Source: Orissa Agriculture statistics 2008-09*

1.3	Land use pattern of the district (latest statistics)	Geographical area ('000 ha.)	Cultivable area ('000 ha.)	Forest area ('000 ha.)	Land under non-agricultural use ('000 ha.)	Permanent pastures ('000 ha.)	Cultivable wasteland ('000 ha.)	Land under Misc. trees and groves	Barren and uncultivable land ('000 ha.)	Current fallows ('000 ha.)	Other fallows ('000 ha.)
	Area ('000 ha)	638.0	191.0	272.0	48.0	36.0	19.0	23.0	7.0	25.0	17.0

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Red loam	70.496	32.2
	Clay & heavy clay soil	62.24	28.4
	Medium textured red loam	34.69	15.8
	Black Soil	29.10	13.3
	River valley alluvial	17.21	7.9
	Others (specify):	5.26	2.4
Source – SREP, ATMA , ANGUL , 2007-08			

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	191	168
	Area sown more than once	130	
	Gross cropped area	321	

Source: Orissa Agriculture statistics 2008-09

1.6	Irrigation	Area ('000 ha)	Percent (%)	
	Net irrigated area	42.93		
	Gross irrigated area	70.54		
	Rainfed area	250.46		
	Source of irrigation	Number	Area ('000 ha)	% area
	Canals	--	22.62	49.4
	Tanks	--		
	Open wells	--		
	Bore wells	--	8.77	19.2
	Lift irrigation	--		
	Other sources	--	14.38	31.4
	Total	--	45.77	100.0
	Pumpsets	--	--	--
	Micro-irrigation	--	--	--
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	--	--	--
	Critical	--	--	--
Semi-critical	2	25	--	
Safe	6	75	--	
Wastewater availability and use				

*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%

Source – SREP, ATMA , ANGUL , 2007-08

1.7 Area under major field crops & horticulture etc.

1.7	Field crops	Total area('000 ha)	Irrigated('000 ha)	Rainfed('000 ha)
	Paddy	98.9	32.05	75.5
	Sesamum	43.63	0.4	36.0
	Black Gram	33.51	0.67	31.3
	Green Gram	30.63	1.14	27.9
	Groundnut	9.67	1.96	6.2
	Redgram	9.57	0.9	8.6
	Toria/Mustard	5.47	0.29	3.6
	Maize	4.27	1.14	2.9
	Cowpea	1.94	0.1	1.7
	Gram	1.68	0.4	1.4
	Sunflower	0.28	0.28	0.2
	Sugarcane	0.24	0.24	0.2

Source: Orissa Agriculture statistics 2008-09

	Horticulture crops- Fruits	Total area('000 ha)
	Mango	9.97
	Citrus	1.64
	Banana	1.55
	Litchi	0.53
	Guava	0.50
	Sapota	0.06
	Pineapple	0.03
	Papaya	0.02
	Others	3.05
	Horticulture crops- Vegetables	Total area('000 ha)

	Chilli	4.5
	Tomato	4.4
	Brinjal	4.3
	Onion	2.8
	Okra	2.8
	Cauliflower	1.8
	Coriander	1.6
	Cabbage	1.3
	Garlic	1.2
	Pea	0.2
	Medicinal and Aromatic crops	Total area
		-
	Plantation crops	Total area
		-
	Fodder crops	Total area
	--	--
	Total fodder crop area	
	Grazing land	8000 ha.

*If break-up data (irrigated, rainfed) is not available, give total area (Source – SREP, ATMA, ANGUL, 2007-08)

1.8	Livestock	Number ('000)
	Cattle	733.9
	Buffaloes	21.3
	Commercial dairy farms	-
	Goat	270.5
	Sheep	63.6
	Others (Pig)	3.32

1.9	Poultry			
	Commercial	24885		
	Backyard	81391		
1.10	Inland Fisheries	Area (ha)	Yield (t/ha)	Production (tones)
	Fresh water			5416.2

(Source – SREP, ATMA, ANGUL, 2007-08)

1.11	Production and Productivity of major crops	Kharif		Rabi		Summer		Total	
	Major field crop	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	201.5	2023	--	--	1.61	2075	203.11	2054
	Sesamum	14.6	465	4.0	365	--	--	19.1	437
	Black Gram	11.7	462	3.4	407	--	--	15.0	448
	Green Gram	8.2	421	4.2	377	--	--	12.4	405
	Groundnut	10.9	1465	4.2	1802	--	--	14.9	1543
	Redgram	8.1	851	--	--	--	--	8.1	851
	Toria /Mustard	--	--	1.85	338	--	--	1.85	338
	Maize	3.4	905	0.8	1453	--	--	4.2	973
	Horse Gram	--	--	6.5	410	--	--	6.5	410
	Cowpea	1.3	675	--	--	--	--	1.3	675
	Gram	--	--	0.8	469	--	--	0.8	469
	Sunflower	--	--	0.22	798	--	--	0.22	798
	<i>Sugarcane</i>	13.9	57727 (Cane)	--	--	--	--	13.9	57727

Source: Orissa Agriculture statistics 2008-09

Major Horticultural crops(fruits)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
Mango	-	-	2.0	8650	-	-	2.0	8650
Citrus	-	-	0.3	3125	-	-	0.3	3125
Banana	-	-	4.6	9100	-	-	4.6	9100
Litchi	94.7	11035	82.2	14596	-	-	176.9	12446
Guava	0.2	1769	-	-	-	-	0.2	1769
Sapota	0.26	4679					0.26	4679
Pineapple	0.33	11750					0.33	11750
Papaya	0.4	8568	0.6	7500	-	-	1.0	7923
<i>Source: Orissa Agriculture statistics 2008-09</i>								
Major Horticultural crops(vegetables)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
Chilli	1.62	827	2.35	900	-	-	3.97	869
Tomato	7.4	8994	39.0	18892	12.8	12113	59.2	13333
Brinjal	12.4	13704	38.5	21892	13.9	9425	64.8	15007
Onion	-	-	28.52	9903	-	-	28.52	9903
Okra	11.9	11728	3.8	6406	8.7	7957	24.4	8697
Cauliflower	2.8	9844	14.1	21424	9.3	11482	26.2	14250
Coriander	--	--	0.8	497	--	--	0.8	497
Cabbage	--	--	36.5	28061	--	--	36.5	28061
Garlic	-	-	4.3	3492	-	-	4.3	3492
Pea	--	--	1.9	8539	-	--	1.9	8539

. (Source – SREP, ATMA, ANGUL , 2007-08). *Source: Orissa Agriculture statistics 2008-09*

1.12	Sowing window for 5 major crops (start and end of sowing period)	Rice	Sesamum	Blackgram	Greengram	Groundnut
	Khharif-Rainfed	2 nd week June to 2 nd week July	2 nd week June to 1 st week July	2 nd week June to 1 st week July	2 nd week June to 1 st week July	2 nd week June to 1 st week July
	Khharif-Irrigated	1 st week July	Last week June	--	--	--
	Rabi-Rainfed	--	--	--	--	--
	Rabi-Irrigated	2 nd week Dec to 1 st week Jan	1 st week Jan to 1 st week Feb	2 nd week Nov to 1 st week Dec.	2 nd week Nov to 1 st week January	Lat week Dec to 2 nd week January

(Source – SREP, ATMA , ANGUL , 2007-08)

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Sporadic	None
	Drought	-	✓(June-July)	-
	Flood	--	--- ✓(Aug-Sept)	-
	Cyclone	--	-- ✓(Sept- Oct)	-
	Hail storm	-		-
	Heat wave	✓(April-May)		-
	Cold wave	- ✓(Nov,-Dec)	-	-
	Frost	-	-	-
	Sea water inundation	-	-	-
	Pests and diseases (specify)	Stem borer, BPH, Leaf folder in rice Tikka in G.Nut , YMV in Moong & Biri , Okra , Pod borer in pulses, Fruit & shoot borer in brinjal thrips in onion & chilli , wilting in solanaceous vegetables.	Swarming caterpillar, Gundhi bug . blast , sheathblight , BLB in rice. in rice , aphid in pulses & G.nut , mite in vegetables , Purple blotch in onion.	

. (Source – SREP, ATMA , ANGUL , 2007-08)

1.14	Include Digital maps of the district for	Location map of district with in States as Annexure 1	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

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 2 weeks June last week	Red loam soil , Medium rainfall	(Upland) Rice-	Grow early maturing drought resistant variety Kaling-III,Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	ISOPOM, OSSC, NFSM,
		Sesamum-	Prachi, Uma		
		Blackgram-	Sarala , Prasad		
		Greengram-	PDM-54,K 851		
		Groundnut	Smruti,JL-24		
	(Medium land) Rice- Greengram/Blackgram/Vegetable i.e Rice-	Manaswini,Pratikshya	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed furrows 	NFSM, OSSC	

		Tomato-	Utkal Kumari, Utkal Urbashi	<ul style="list-style-type: none"> • Adopt line planting & provide life saving irrigation in vegetables • Mulching vegetables to conserve soil moisture 	
		Brinjal-	Utkal Tarini, Utkal		
		Chilli-	Anushree Utkal Rashmi, Utkal Ava		
		(Low land) Rice-	Ramachandi, Upahar	<ul style="list-style-type: none"> • Gully plugging • Maintenance of bond • Apply FYM in seed furrows 	
	Black soil , medium rainfall.	(Upland) Rice-	Grow early maturing drought resistant variety Kaling-III, Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	NFSM, OSSC
		Sesamum-	Prachi, Uma		
		Blackgram-	Sarala , Prasad		
		Greengram-	PDM-54, K 851		
		Groundnut-	Smruti, JL-24		
		(Medium land) Rice- Greengram/Blackgram/ Vegetable i.e Rice-	Manaswini, Pratikshya	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed furrows • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture 	NFSM, OSSC
Tomato-		Utkal Kumari, Utkal			
Brinjal-	Urbashi, Utkal Tarini, Utkal Anushree				

		Chilli-	Utkal Rashmi, Utkal Ava	<ul style="list-style-type: none"> Gully plugging Maintenance of bond Apply FYM in seed furrows 	
		(Low land) Rice	Ramachandi, Upahar		

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)	Red loam soil ,Medium rainfall	(Upland) Rice-	Grow early maturing drought resistant variety Kaling-III,Sidhanta	<ul style="list-style-type: none"> Sowing should be delayed to last week of June Closer row and plant spacing In-situ rainwater conservation Sow across the slope Weed control and unbunded uplands converted to bonded uplands Apply FYM in seed furrows 	NFSM, OSSC
		Sesamum-	Prachi, Uma		
		Blackgram-	Sarala , Prasad		
		Greengram-	PDM-54,K 851		
		Groundnut-	Smruti,JL-24		
		(Medium land) Rice- Greengram/Blackgram/ Vegetable i.e Rice-	Manaswini,Pratikshya	<ul style="list-style-type: none"> Sowing should be delayed to last week of June Closer row and plant spacing In-situ rainwater conservation Apply FYM in seed 	NFSM, OSSC
		Tomato-	Utkal Kumari, Utkal Urbashi		

				<p>furrows</p> <ul style="list-style-type: none"> • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture • Gully plugging • Maintenance of bond <p>Apply FYM in seed furrows</p>			
		Brinjal-	Utkal Tarini, Utkal Anushree				
		Chilli-	Utkal Rashmi, Utkal Ava				
		(Low land) Rice	Ramachandi, Upahar				
Black soil , medium rainfall	(Upland) Rice-	Grow early maturing drought resistant variety Kaling-III, Sidhanta Prachi, Uma		<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	ISOPOM, OSSC, NFSM,		
	Sesamum-						
	Blackgram-	Sarala , Prasad					
	Greengram-	PDM-54, K 851					
	Groundnut-	Smruti, JL-24					
	(Medium land) Rice- Greengram/Blackgram/ Vegetable i.e Rice-	Manaswini, Pratikshya				<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed 	NFSM, OSSC
	Tomato-		Utkal Kumari, Utkal				

		Brinjal-	Urbashi Utkal Tarini, Utkal Anushree	furrows <ul style="list-style-type: none"> • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture • Gully plugging • Maintenance of bond Apply FYM in seed furrows	
		Chilli-	Utkal Rashmi, Utkal Ava		
		(Low land) Rice	Ramachandi, Upahar		

Condition	Suggested Contingency Measures				
Early season drought (Normal onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
lay by 6 weeks (Last week of July)	Red loam soil ,Medium rainfall	(Upland) Rice	Grow early maturing drought resistant variety Kaling-III,Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	ISOPOM, OSSC, NFSM,
		Sesamum	Prachi, Uma		
		Blackgram	Sarala , Prasad		
		Greengram	PDM-54,K 851		
		Groundnut	Smruti,JL-24		
		(Medium land) Rice Greengram/Blackgram/Vegetable i.e		<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing 	NFSM,OSSC

		Rice-	Manaswini,Pratikshya	<ul style="list-style-type: none"> • In-situ rainwater conservation • Apply FYM in seed furrows • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture 	
		Tomato-	Utkal Kumari, Utkal		
		Brinjal-	Urbashi Utkal Tarini, Utkal Anushree		
		Chilli	Utkal Rashmi, Utkal Ava		
		(Low land) Rice	Ramachandi, Upahar		
Black soil , medium rainfall.	(Upland)	Rice-	Grow early maturing drought resistant variety Kaling-III,Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	ISOPOM, OSSC, NFSM,
		Sesamum-	Prachi, Uma		
		Blackgram-	Sarala , Prasad		
		Greengram-	PDM-54,K 851		
		Groundnut-	Smruti,JL-24		
	(Medium land)	Rice- Greengram/Blackgram/Vegetable i.e Rice-	Manaswini,Pratikshya	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed furrows • Adopt line planting & provide life saving irrigation in 	NFSM,OSSC
		Tomato-	Utkal Kumari, Utkal Urbashi		

		Brinjal	Utkal Tarini, Utkal Anushree	vegetables <ul style="list-style-type: none"> • Mulching in vegetables to conserve soil moisture 	
		Chilli	Utkal Rashmi, Utkal Ava		
		(Low land) Rice	Ramachandi, Upahar	<ul style="list-style-type: none"> • Sowing should be delayed to Last week of July • Rice Sprouted seeds can be sown in the lines by seed drill. • Transplant aged seedlings & 3-4 plants /hill • Closer row and plant spacing • Increase the height of bund. • Raise community nursery of rice for transplanting at a reliable water source to save time for further delay. Gap fill the crop by clonal propagation 	

Condition	Suggested Contingency Measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (Normal onset) Delay by 8 weeks (2 nd week of August)	Red loam soil , medium rainfall	(Upland) Rice	Grow early maturing drought resistant variety Kaling-III, Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope 	ISOPOM, OSSC, NFSM,
		Sesamum-	Prachi, Uma		

		Blackgram-	Sarala , Prasad	<ul style="list-style-type: none"> • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	
		Greengram-	PDM-54,K 851		
		Groundnut-	Smruti,JL-24		
		(Medium land) Rice- Greengram/Blackgram/Vegetable i.e Rice- Tomato- Brinjal- Chilli-	Manaswini,Pratikshya Utkal Kumari, Utkal Urbashi Utkal Tarini, Utkal Anushree Utkal Rashmi, Utkal Ava	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed furrows • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture 	NFSM,OSSC
		(Low land) Rice	Ramachandi, Upahar		
		(Upland) Rice-	Grow early maturing drought resistant variety Kaling-III,Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	ISOPOM, OSSC, NFSM,
		Sesamum-	Prachi, Uma		
		Blackgram-	Sarala , Prasad		
		Greengram-	PDM-54,K 851		
		Groundnut-	Smruti,JL-24		

		(Medium land) Rice- Greengram/Blackgram/Vegetable i.e Rice-	Manaswini,Pratikshya	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed furrows • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture <ul style="list-style-type: none"> • Gully plugging • Maintenance of bond Apply FYM in seed furrows	NFSM,OSSC
	Tomato-	Utkal Kumari, Utkal Urbashi			
	Brinjal-	Utkal Tarini, Utkal Anushree			
	Chilli-	Utkal Rashmi, Utkal Ava			
	(Low land) Rice	Ramachandi, Upahar			
	Black soil with medium rainfall.	(Upland) Rice-	Grow early maturing drought resistant variety Kaling-III,Sidhanta	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Sow across the slope • Weed control and unbunded uplands converted to bonded uplands • Apply FYM in seed furrows 	ISOPOM, OSSC, NFSM,
	Sesamum-	Prachi, Uma			
	Blackgram-	Sarala , Prasad			
	Greengram-	PDM-54,K 851			
	Groundnut-	Smruti,JL-24			

		(Medium land) Rice- Greengram/Blackgram/Vegetable i.e Rice-	Manaswini,Pratikshya	<ul style="list-style-type: none"> • Sowing should be delayed to last week of June • Closer row and plant spacing • In-situ rainwater conservation • Apply FYM in seed furrows • Adopt line planting & provide life saving irrigation in vegetables • Mulching in vegetables to conserve soil moisture • Gully plugging • Maintenance of bond Apply FYM in seed furrows	NFSM,OSSC
		Tomato-	Utkal Kumari, Utkal Urbashi		
		Brinjal-	Utkal Tarini, Utkal Anushree		
		Chilli	Utkal Rashmi, Utkal Ava		
		(Low land) Rice	Ramachandi, Upahar		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	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.	Red loam soil , medium rainfall.	(Upland) Rice	Re-sow the crop (<10-15 days duration) up to July after receipt of sufficient rain fall	Practice mulching with organics to extend the period of moisture availability Apply life saving irrigation by creating WHS	ISOPOM, OSSC, NFSM,
		Greengram	when there is more than 50 % mortality , raise non-paddy crops like Green gram (K-851, PDM -54,		
		Blackgram	Black gram (Pant U-30 , Ujala), Complete hoeing and weeding in Groundnut fields		
		Groundnut			

		Cowpea	Provide dust mulch to Cowpea (Pusa barsati , Utkal manic) Top dress the crop with 'N' after receiving the rain.		
	(Medium Land)	Rice-Green gram/ Black gram/Vegetables i.e.Tomato, Brinjal, Chilli	<p>Sprouted seeds may be direct seeded or thresh seedlings of early varieties (< 125 days) may be raised for transplanting.</p> <p>If the rice population is more than 50% area of weeding and adjust plant population by removing & redistributing the hills and clonal propagation by Khelua method.</p> <p>Raise community nursery of rice for transplanting at a reliable water source.</p> <p>If the mortality is < 50% the crop may be gap filled or Cultivate vegetable like Tomato, Brinjal, Chilli</p> <p>Sow the seeds at 5-6 Cm. depth by punji method (6-8 seeds at one point) at a spacing of 20 X 10 cm. and cover it with a mixture of FYM: SSP (10 :1) to avoid seedling mortality due to moisture stress .</p> <p>Use seed rate of 100-120 kg/ha. To maintain 40-60 plants / Mtr. Sqr.</p>	<p>Close the drainage holes and check the seepage loss in direct sown medium land rice regularly</p> <p>Practice mulching with organics to extend the period of moisture availability</p> <p>Apply life saving irrigation by creating WHS</p>	NFSM,OSSC
	(Lowland)	Rice	<p>Sprouted seeds may be direct seeded or thresh seedlings of early varieties (< 125 days) may be raised for transplanting.</p> <p>If the rice population is more than 50% area of weeding and adjust plant population by removing & redistributing the hills and clonal propagation by Khelua method.</p> <p>Raise community nursery of rice for transplanting at a reliable water source.</p> <p>Sow the seeds at 5-6 Cm. depth by punji method (6-8 seeds at one point) at a spacing of 20 X 10 cm. and cover it with a mixture of FYM: SSP (10:1) to avoid</p>	<p>Close the drainage holes and check the seepage loss in direct sown medium land rice regularly</p> <p>Apply life saving irrigation by creating WHS</p>	NFSM, OSSC

			seedling mortality due to moisture stress. Use seed rate of 100-120 kg/ha. To maintain 40-60 plants / m ²		
Black Soil, medium rainfall	(Upland) Rice		Re-sow the crop (<10-15 days duration) up to July after receipt of sufficient rain fall	Practice mulching with organics to extend the period of moisture availability Apply life saving irrigation by creating WHS	ISOPOM, OSSC, NFSM,
	Greengram		when there is more than 50 % mortality , raise non-paddy crops like Green gram (K-851, PDM -54,		
	Blackgram		Black gram (Pant U-30 , Ujala),		
	Groundnut Cowpea		Complete hoeing and weeding in Groundnut fields Provide dust mulch to Cowpea (Pusa barsati , Utkal manic) Top dress the crop with 'N' after receiving the rain.		
	(Medium Land) Rice- Greengram/Black gram/Vegetable (Tomato,Brinjal, Chilli)		Sprouted seeds may be direct seeded or thresh seedlings of early varieties (< 125 days) may be raised for transplanting. If the rice population is more than 50% area of weeding and adjust plant population by removing & redistributing the hills and clonal propagation by Khelua method. Raise community nursery of rice for transplanting at a reliable water source. If the mortality is < 50% the crop may be gap filled or Cultivate vegetable like Tomato, Brinjal, Chilli Sow the seeds at 5-6 Cm. depth by punji method (6-8 seeds at one point) at a spacing of 20 X 10 cm. and cover it with a mixture of FYM: SSP (10:1) to avoid seedling mortality due to moisture stress. Use seed rate of 100-120 kg/ha. To maintain 40-60 plants / Mtr. Sqr.	Close the drainage holes and check the seepage loss in direct sown medium land rice regularly Practice mulching with organics to extend the period of moisture availability Apply life saving irrigation by creating WHS	NFSM,OSSC

		(Lowland) Rice	<p>Sprouted seeds may be direct seeded or thresh seedlings of early varieties (< 125 days) may be raised for transplanting.</p> <p>If the rice population is more than 50% area of weeding and adjust plant population by removing & redistributing the hills and clonal propagation by Khelua method.</p> <p>Raise community nursery of rice for transplanting at a reliable water source.</p> <p>Sow the seeds at 5-6 Cm. depth by punji method (6-8 seeds at one point) at a spacing of 20 X 10 cm. and cover it with a mixture of FYM: SSP (10:1) to avoid seedling mortality due to moisture stress.</p> <p>Use seed rate of 100-120 kg/ha. To maintain 40-60 plants / m²</p>	<p>Close the drainage holes and check the seepage loss in direct sown medium land rice regularly</p> <p>Apply life saving irrigation by creating WHS</p>	NFSM, OSSC

Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	Red loam soil , medium rainfall	(Upland) Groundnut	<ul style="list-style-type: none"> ➤ Weeding groundnut after 45 days of sowing disturbs the pegging process under such a situation prune the weeds with the help of sickle. ➤ Apply post emergence spray of quizalofop ethyl 5% EC @ 0.05 kg/ha in 500 liter of water (2ml/ltr of water) at 20-25 days after sowing to control grassy weeds in groundnut. ➤ Spray 2% KCl + 0.1 ppm boron to crop to overcome drought situations. 	Complete hoeing and weeding in non paddy crop fields to provide dust mulch.	ISOPOM, OSSC, NFSM,
		Green gram	<ul style="list-style-type: none"> ➤ Foliar application of 2% urea at preflowering and flowering stage of greengram is helpful to mitigate drought. ➤ Top dress the crops after receipt of rain. ➤ Spray 2.5% urea + 1% KCl. 		
		(Medium Land) Rice- Greengram/Blackgram/Vegetable (Tomato,Brinjal, Chilli)	<ul style="list-style-type: none"> ➤ Do not practice beushing (blind cultivation) in rice, if the crop is more than 45 days old. ➤ Weed out the field without waiting for rainfall. ➤ Go for gap filling using seedling of same age or clonal tillers to 	Strengthen the field bunds and close the holes to check seepage loss Practice mulching with organics to extend period of moisture availability. <ul style="list-style-type: none"> ➤ Close the drainage holes and check the seepage loss 	NFSM, OSSC

		(Low Land) Rice	<p>have a uniform distribution of plant.</p> <ul style="list-style-type: none"> ➤ Withhold N fertilizer application up to receipt of rainfall. ➤ Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield. ➤ Remove the weeds and follow plant protection measures against blast in the nursery. ➤ Follow close transplanting using 5-7 seedlings/ hill. ➤ Apply 50% recommended nitrogen, at the time of transplanting. ➤ Apply life saving irrigation to maintain the nursery seedlings in good health. ➤ 25% extra seeds should be sown in 25% area and gap filled the extra plants as per necessity. 	<p>in direct sown medium land rice regularly.</p> <ul style="list-style-type: none"> ➤ Pulverize the main rice field in dry conditions, if it is not ploughed earlier to save time in final puddling. ➤ Use tractor/ power tiller / tractor mounted rotavator for speedy land preparation / puddling to cover to more area with less time. ➤ Provide protective irrigation through recycling of harvested rain water ➤ Do not top dress nitrogen in nursery 	
	Black soil, medium rainfall	(Upland) Groundnut	<ul style="list-style-type: none"> ➤ Weeding groundnut after 45 days of sowing disturbs the pegging process under such a situation prune the weeds with the help of sickle. ➤ Apply post emergence spray of quizalofop ethyle 5% EC @ 0.05 kg/ha in 500 liter of water (2ml/ltr of water) at 20-25 days after sowing to control grassy weeds in groundnut. ➤ Spray 2% KCI + 0.1 ppm boron 	<ul style="list-style-type: none"> ➤ Complete hoeing and weeding in non paddy crop fields to provide dust mulch. ➤ Practice mulching with organics to extend period of moisture availability. ➤ Close the drainage holes and check the 	ISOPOM, OSSC, NFSM,

			to crop to overcome drought situations.	seepage loss in direct sown medium land rice regularly.	
		Greengram	<ul style="list-style-type: none"> ➤ Foliar application of 2% urea at preflowering and flowering stage of greengram is helpful to mitigate drought. ➤ Top dress the crops after receipt of rain. ➤ Spray 2.5% urea + 1% KCL. 		
		(Medium Land) Rice- Greengram/Blackgram/Vegetable (Tomato, Brinjal, Chilli)	<ul style="list-style-type: none"> ➤ Do not practice beushing (blind cultivation) in rice, if the crop is more than 45 days old. ➤ Weed out the field without waiting for rainfall. ➤ Go for gap filling using seedling of same age or clonal tillers to have a uniform distribution of plant. 	<ul style="list-style-type: none"> ➤ Strengthen the field bunds and close the holes to check seepage loss ➤ Pulverize the main rice field in dry conditions, if it is not ploughed earlier to save time in final puddling. 	NFSM, OSSC
		(Lowland) Rice	<ul style="list-style-type: none"> ➤ Withhold N fertilizer application upto receipt of rainfall. ➤ Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield. ➤ Remove the weeds and follow plant protection measures against blast in the nursery. ➤ Follow close transplanting using 5-7 seedlings/ hill. ➤ Apply 50% recommended nitrogen, at the time of transplanting. ➤ Apply life saving irrigation to 	<ul style="list-style-type: none"> ➤ Use tractor/ power tiller / tractor mounted rotavator for speedy land preparation / puddling to cover to more area with less time. ➤ Provide protective irrigation through recycling of harvested rain water ➤ Do not top dress nitrogen in nursery 	NFSM, OSSC

			<p>maintain the nursery seedlings in good health.</p> <ul style="list-style-type: none"> ➤ 25% extra seeds should be sown in 25% area and gap filled the extra plants as per necessity. 		
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Condition	Suggested Contingency measures				
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	Red loam soil , medium rainfall	(Upland) Greengram Groundnut	<p>Provide protective irrigation through recycling of harvested rain water</p> <p>Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops.</p> <p>Crops like, green gram may be harvested for fodder purpose to avoid their failure as grain crops</p> <p>When the soil becomes hard it is difficult to uproot groundnut from the field Sprinkle water from water harvesting structures/ nallahs to soften the soil</p> <p>Under situation of complete failure of Kharif crop dismantle it. In such situation or where land is remaining fallow, sow (dibble) the pre-rabi crops. The ideal pre-rabi crops with residual moisture condition are horse gram, black gram and sesame sweet potato in uplands.</p> <p>Pre-position inputs, particularly seeds for rabi crop.</p>	Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops	ISOPOM, OSSC, NFSM,
		(Medium Land) Rice- Greengram/Blackgram/Vegetable (Tomato, Brinjal, Chilli)	<p>Provide protective irrigation through recycling of harvested rain water</p> <p>Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops.</p> <p>Ready for pre-rabi & rabi crops.</p>		NFSM, OSSC

			The ideal pre-rabi crops with residual moisture condition are , blackgram and sesame, toria in well drained medium lands. Pre position inputs, particularly seeds for rabi crop.		
		(Low Land) Rice	Provide protective irrigation through recycling of harvested rain water Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops. Ready for pre-rabi & rabi crops. Pre position inputs, particularly seeds for rabi crop.	Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops	NFSM, OSSC
	Black soil ,medium rainfall	(Upland) Greengram Groundnut	- Provide protective irrigation through recycling of harvested rain water Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops. Crops like cowpea, maize, green gram may be harvested for fodder purpose to avoid their failure as grain crops When the soil becomes hard it is difficult to uproot groundnut from the field Sprinkle water from water harvesting structures/ nallahs to soften the soil Under situation of complete failure of kharif crop dismantle it. In such situation or where land is remaining fallow, sow (dibble) the pre-rabi crops. The ideal pre-rabi crops with residual moisture condition are, blackgram and sesame sweet potato in uplands. Pre-position inputs, particularly seeds for rabi crop.	Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops	ISOPOM, OSSC, NFSM,
		(Medium Land) Rice- Greengram/Blackgram/Vegetable (Tomato,Brinjal, Chilli)	Provide protective irrigation through recycling of harvested rain water Provide irrigation at critical stages such as flowering, grain filling, etc. in alternate furrows in wide spaced crops. Ready for pre-rabi & rabi crops. Pre position inputs, particularly seeds for rabi crop.		NFSM,OSSC

		(Low Land) Rice			
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Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Red loam soil , medium rainfall	(Upland) Greengram Blackgram Sesamum	Provide protective irrigation recycling of harvested rain water. Provide irrigation at critical stages such as flowering, grain filling etc. in alternate furrows in wide spaced crops. Crops like cowpea, maize, greengram may be harvested for fodder purpose to avoid their failure as grain crops. When the soil becomes hard it is difficult to uproot groundnut from the field sprinkle water from water harvesting structures/ nallahs to soften the soil. Under situation of complete failure of kharif crop dismantle it. In such situation or where land is remaining fallow, sow (dibble) the pre-rabi crops The ideal pre-rabi crops with residual moisture condition are horsegram, castor, niger, blackgram and sesame in	Early sowing of rabi crops like Green gram, Black gram.	ISOPOM, OSSC, NFSM,

			uplands and well drained medium lands. Pre position inputs, particularly seeds for rabi crop.		
		(Medium Land) Rice- Greengram/Blackgram/Vegetable (Tomato, Brinjal, Chilli)	Harvesting of kharif rice at physiological maturity will realize 80-85% of normal yield Provide protective irrigation recycling of harvested rain water. Provide irrigation at critical stages such as flowering, grain filling etc. in alternate furrows in wide spaced crops.	Check surface run off in the low lying areas. Provide protective irrigation through recycling of harvested rain water. Early sowing of rabi crops like Green gram, Black gram, Horsegram.	NFSM, OSSC
		(Low Land) Rice	Crops like cowpea, maize, greengram may be harvested for fodder purpose to avoid their failure as grain crops. When the soil becomes hard it is difficult to uproot groundnut from the field sprinkle water from water harvesting structures/ nallahs to soften the soil.	Check surface run off in the low lying areas. Provide protective irrigation through recycling of harvested rain water. Early sowing of rabi crops like Green gram, Black gram, Horsegram.	
	Black soil, medium rainfall	(Upland) Groundnut	Under situation of complete failure of kharif crop dismantle it. In such situation or where land is remaining fallow, sow (dibble) the pre-rabi crops	Early sowing of rabi crops like Green gram, Black gram, Horsegram.	ISOPOM, OSSC, NFSM,
		(Medium Land) Rice- Greengram/Blackgram/Vegetable (Tomato, Brinjal, Chilli)	The ideal pre-rabi crops with residual moisture condition are horsegram, castor, niger, blackgram and sesame in uplands and well drained medium lands. Pre position inputs, particularly seeds for rabi crop.	Check surface run off in the low lying areas. Provide protective irrigation through recycling of harvested rain water. Early sowing of rabi crops like Green gram, Black gram, Horsegram.	NFSM, OSSC
		(Low Land) Rice			

2.1.2 Drought - Irrigated situation

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Canal irrigated medium land	Rice – Pulse/ G. Nut/ Vegetable.	Grow short duration Rice variety:Bandana, Sidhanta	Do not practice beushing (blind cultivation) in rice, if the crop is more than 45 days old. Weed out the field without waiting for rainfall.	NFSM
		Rice –Rice.	Grow short duration Rice variety:Bandana, Sidhanta	Raise community nursery of rice for transplanting at a reliable water source. Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield. Irrigation for sowing or transplanting of the crops and saving of the already sown/transplanted crops is uppermost consideration of the contingency measures.	NHM
	Canal irrigated Low land	Rice – Pulse/ G. Nut/ Vegetable.	Low water requiring oilseeds and pulses like groundnut, green gram, black gram, sunflower, sesamum	Rain water harvesting and recycling of harvested water. Irrigate the kharif rice with groundwater during dry spells only, if dry spell comes before release of canal water. Reduction of conveyance losses while irrigating the light textured soils.	NFSM
		Rice – Rice.	Low water requiring oilseeds and pulses like groundnut, green gram, black gram, sunflower, sesamum		ISOPOM

Condition	Suggested Contingency measures					
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation	
Limited release of water in canals due to low rainfall	Canal irrigated medium land	Rice – Pulse/ G. Nut/ Vegetable.	Low water requiring short duration varieties of Rice (Sidhanta), Groundnut (Smruti), Greengram ((K 851), Blackgram (Prasad) and Brinjal(U.Tarini)	Bushining the crop with canal water. Weed out the field without waiting for release of water. Raise community nursery of rice for transplanting at a reliable water source Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield. Check water conveyance loss.	NFSM, NHM	
		Rice – Rice		Plastic mulching, Skip row irrigation		
	Canal irrigated Low land	Rice – Pulse/ G. Nut/ Vegetable.	Low water requiring short duration varieties of Rice(Sidhanta), Groundnut(Smruti), Green gram((K 851), Blackgram(Prasad) and Brinjal(U.Tarini)	Beushining the crop with canal water. Weed out the field without waiting for release of water. Raise community nursery of rice for transplanting at a reliable water source Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield. Check water conveyance loss.		NFSM
		Rice – Rice				

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	Canal irrigated medium land	Rice – Pulse/ G. Nut/ Vegetable.	Low water requiring short duration varieties of Rice(Sidhanta), Groundnut(Smriti), Greengram((K 851), Blackgram(Prasad) and Brinjal(U.Tarini)	<p>Do not practice beushing (blind cultivation) in rice, if the crop is more than 45 days old.</p> <p>Weed out the field without waiting for canal water.</p> <p>Raise community nursery of rice for transplanting at a reliable water source.</p>	NFSM , ISOPOM
	Canal irrigated Low land	Rice – Rice		<p>Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield.</p> <p>Utilize other source of water like groundwater, WHS, Pond etc.</p> <p>Apply life saving irrigation at critical stages of crop growth.</p>	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal 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	Tank fed medium land	Rice – Pulse/ G. Nut/ Vegetable	Low water requiring short duration varieties of Rice(Sidhanta), Groundnut(Smruti), Greengram((K 851), Blackgram(Prasad) and Brinjal(U.Tarini)	Do not practice beushing (blind cultivation) in rice, if the crop is more than 45 days old.	NFSM , ISOPOM
	Tank fed Low land	Rice -Rice		<p>Weed out the field without waiting for rainfall .</p> <p>Raise community nursery of rice for transplanting at a reliable water source.</p> <p>Grow low duty crops.</p> <p>Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield.</p> <p>Utilize other source of water like groundwater, WHS</p> <p>Reduction of conveyance loss in canals .</p> <p>Recycling of harvested rain water</p> <p>Harvest the crop at physiological maturity.</p>	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agonomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Tank fed medium land	Rice – Pulse/ G. Nut/ Vegetable	Low water requiring short duration varieties of Rice (Sidhanta), Groundnut(Smruti), Greengram((K 851), Blackgram(Prasad) and Brinjal(U.Tarini)	<p>Do not practice beushing (blind cultivation) in rice, if the crop is more than 45 days old. Weed out the field without waiting for rainfall.</p> <p>Raise community nursery of rice for transplanting at a reliable water source.</p> <p>Seedlings up to 45 and 60-70 days old can be transplanted in case of medium and late duration rice varieties, respectively without much reduction in yield</p> <p>Spray anti transpirants to non-paddy crops</p> <p>Apply irrigation water in alternate furrows..</p> <p>Harvest at physiological maturity</p> <p>Irrigate at critical stage.</p> <p>Recycling of rain water harvesting.</p> <p>Utilize water from ponds, WHS for life saving irrigation.</p>	NFSM , ISOPOM
	Tank fed Low land	Rice – Rice			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Any other condition (specify) Integration of government social schemes with contingency measures.	For all cropping situations it is applicable.	NA	NA	NA	Promotion of subsidiary income and employment generating activities to be encouraged through gainful implementation of NREGA, RKVY , NFSM BRGF and other schemes.

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Paddy	Well drainage			Drying
Groundnut				
Sesamum				
Maize				
Arhar)				
Horticulture				
Mango	Drainage system should be developed			Keeping fruits in a well ventilated drier place
Cashew nut				
Banana				

Citrus			
Guava			
Heavy rainfall with high speed winds in a short span			
Paddy	Well drainage with basal application of P, K ZN, B.	Well drainage	Drying
Sesamum			
Green gram			
Black gram			
Groundnut			
Horticulture			
Mango	Drainage system should be developed		Keeping fruits in a well ventilated drier place
Citrus			
Banana			
Litchi			
Guava			
Outbreak of pests and diseases due to unseasonal rains			
Paddy: Insect: swarming caterpillar , BPH Disease : Sheath blight	Application of spark, Quinalphos 1 gm / ltr of water Sheathblight 1gm/1 ltr. of water and adoption of need based pest management practices	Thiomethoxam 1gm/4 ltr of water. & adoption of need based pest management practices.	Adoption of need based pest management practices.
Groundnut: Disease: Tikka disease.	Adoption of need based pest management practices.	Saaf/ sanchar 1 gm/ 1ltr. Of water and adoption of need based pest management practices.	
Sesamum : Disease :-Phyllody	Imidacloprid 1ml./ 4 ltr. Of water and adoption of need based pest management practices.	Adoption of need based pest management practices.	
Greengram Disease-YMV	Adoption of need based pest management practices.		

Black gram.				management practices.
Horticulture				
Mango				
Cashew nut				
Banana				
Citrus				
Guava				

2.3 Floods

Condition	Suggested contingency measures			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation¹				
Paddy	Well drainage		Water spraying	Drainage
Groundnut				
Sesamum				
Maize				
Arhar				
Horticulture				
Mango	Drainage system should be developed			Keeping fruits in a well ventilated drier place
Cashewnut				
Banana				

Citrus			
Guava			
Continuous submergence for more than 2 days			
Paddy	Well drainage	Water spraying	Drainage
Groundnut			
Sesamum			
Maize			
Arhar			
Horticulture			
Mango	Drainage system should be developed		Keeping fruits in a well ventilated drier place
Cashewnut			
Banana			
Citrus			
Guava			

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

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave				
Paddy	Frequent Irrigation			NA
Groundnut				
Sesamum				
Maize				
Arhar				
Horticulture				
Mango	Watering through Rose cane	Pitcher irrigation	Pitcher irrigation with water Spraying	Harvest mature fruits and keep them in well ventilated place
Cashewnut				
Banana				
Citrus				
Guava				
Horticulture				
Mango	Provision of Smoke			
Cashewnut				
Banana				
Citrus				
Guava				

Hailstorm			
Paddy	Immediate harvest and drying		
Groundnut			
Sesamum			
Maize			
Arhar			
Horticulture			
Mango	Immediate harvest and drying		
Cashewnut			
Banana			
Citrus			
Guava			
Cyclone			
Paddy	Immediate harvest and drying		
Groundnut			
Sesamum			
Maize			
Arhar			
Horticulture			
Mango	Shift the planting material to safer shed place	Staking in case of smaller plants	Immediately harvest the mature fruits
Cashewnut			
Banana			

Citrus			
Guava			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

Drought	Suggested contingency measures		
	Before the event	During the event	After the event
	Livestock insurance		<ul style="list-style-type: none"> • Availing insurance
Feed and fodder availability	<ul style="list-style-type: none"> • Encourage perennial fodder production on river beds and tank bed on community basis. • Village gauchar (grazing) lands should be developed for fodder production. • On boundaries of agricultural field trees or shrubs like Sesbania, Subabul, Neem etc should be planted. • 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. • Excess fodder in flush season can be preserved as hay / silage. • Explore the possibilities of availability of unconventional / alternative feed 	<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 which fail to grow adequately due to failure of monsoon for feeding of animals. • Use of unconventional livestock feed such as sugar cane top, sugar cane bagasse, banana plant Crop residues such as cassiatora water hyacinth and other like tree pods and seeds etc. Improving poor quality roughages by ammonia treatment, urea treatment, urea molasses mineral block etc and feeding them. 	<ul style="list-style-type: none"> • Supplementary feeding of remaining livestock and the replacement stock.

	<p>resources during draught.</p> <ul style="list-style-type: none"> Organizing training programme of persons connected with A.H. on feeding and management of animals during draught. 		
Drinking water	<ul style="list-style-type: none"> 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 event of draught. 	<ul style="list-style-type: none"> Water sources of Temples, Churches, Gurdwaras, Jain temples and Maszids are generally ideal sources during draught. 	<ul style="list-style-type: none"> Culling of unproductive livestock
Health and disease management	<p>Veterinary preparedness with vaccine and medicines.</p>	<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"> Proper disposal of dead animals
Floods			
Feed and fodder availability	<ul style="list-style-type: none"> Keeping track of weather forecast and prior information through radio and TV Etc. 	<ul style="list-style-type: none"> Procured feeds and fodders should be fed to all animals on the order of priority of animals. Straws and stover 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. 	<ul style="list-style-type: none"> Provision of supplementary feeding (concentrate / Roughage) with vitamin & minerals.
Drinking water	<ul style="list-style-type: none"> Drinking water be made available to the animals in any kind of clean container available with the farmer. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Provision of clean drinking water.

Health and disease management	<ul style="list-style-type: none"> • Temporary relief camps on spots can be set up at short notice to provide shelter to animals on roads, railway line embankments, other earthen embankments, low hillocks, upland etc. • Variation of livestock before onset of rainy season 	<ul style="list-style-type: none"> • There should be one veterinarian with 3 to 4 village to work with the help of local volunteers. • 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. 	<ul style="list-style-type: none"> • 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 personals. • Improving shed hygiene especially in the farmers household through cleaning and disinfection
Cyclone			
Feed and fodder availability	<ul style="list-style-type: none"> • Training to the farmers about care of their animals when catastrophe strikes, so that they are prepared for the situation. Preparation and distribution of leaflets or booklets in simple local language for care of livestock in disaster. 	<ul style="list-style-type: none"> • Procured feeds and fodders should be fed to all animals on the order of priority of animals. • Straws and stover 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. 	<ul style="list-style-type: none"> • Provision of supplementary feeding (concentrate / Roughage) with vitamin & minerals.
Drinking water	-	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Provision of clean drinking water.

		<p>as the feed and water may be in short supply.</p> <ul style="list-style-type: none"> • Drinking water be made available to the animals in any kind of clean container available with the farmer. 	
Health and disease management	<ul style="list-style-type: none"> • Prior construction of animal shelters in disaster prone areas. • 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.) • Temporary camps may be started to herd or flocks animals of 25-50 animals in each group. Inside the camp the animals can be just left free within the paddock/ barricades created with wooden pole. • If no trees or sheds are available shelter the animals under a tent / tarpaulins held aloft by supporting poles or temporary sheds with coconut leaf roof. 	<ul style="list-style-type: none"> • Keep the animals loose in paddock (sheltered or unsheltered) rather keeping them tethered. • Releasing animals from the unnatural and harmful position or situation, stopping bleeding, binding broken limbs, administering painkillers, anti-poison and anti-shock drugs, sedating difficult animals and even performing euthanasia on hopelessly injured and suffering animals with the consent of their owners. 	<ul style="list-style-type: none"> • 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 personals. • Improving shed hygiene especially in the farmers household through cleaning and disinfection

Heat wave and cold wave			
Shelter/environment management	<ol style="list-style-type: none"> 1. Green cover (trees plantation, landscaping) 2. Cooling devices: fans, wet curtains or panels, air cooler if possible. 	<ol style="list-style-type: none"> 1. Proper sheltering / housing white painting outside the roof and black painting inside the roof. 2. Washing / wallowing / sprinkling/ splashing / showering 3. Provision of cool drinking water (in earthen pitches) 	<ol style="list-style-type: none"> 1. Feeding Green fodder/ silage/ hay 2. Provision for night feeding 3. Grazing only if green pastures/ grass lands available 4. Graze early in the morning and late in the afternoon

2.5.2 Poultry

Drought	Suggested contingency measures		
	Before the event	During the event	After the event
Shortage 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			
Shortage of feed ingredients	Ensure procurement of feed ingredients / compound feed sufficient ahead as feed supply	Supply the compound feed to the poultry	Supply will continued till the

	to the farm will hamper due to submergence of the connecting roads	farm under submerged area	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	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			
Shortage of feed ingredients	Procurement of feed	Supply the compound feed to the poultry farm under cyclone affected area	Supply will continued till the situation is under control
Drinking water	-	Attempt will be made to provide sanitized drinking water	Water sources will 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 sanitized with bleaching powder or any water sanitizer
Heat wave and cold 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 Anti stress drugs	Supplementation of anti stress drug	Vaccination of birds against RD
Cold Waves			
Health and disease management	Procurement of Anti stress drugs and vaccine	Feeding of anti stress drugs in drinking water Vaccination with fowl pox	Vaccination against IBD and RD
Shelter and 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.

2.5.3. Fisheries/ Aquaculture:

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
A. Capture			
Inland			
(i) Shallow water depth due to insufficient rains/ inflow	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.	-	-
(ii) Changes in water quality	1. Prepare to release water into the habitat.	1. Mixing of water from the water harvest structure like ponds and tanks into the fish habitat.	1. Monitoring the water quality and health of aquatic organisms.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/ inflow	1. Building deep ditches in culture ponds for shelter of the fish to over come high temperature	1. Recharge the ponds with bore well water or water from other sources. 2. Partial harvesting of the stock to reduce stocking density. 3. Artificial shelter by putting aquatic floating weeds in 1/3 rd area.	-
(ii) Impact of salt load build up in ponds/ change	1. Application of organic manure in culture system	1. Recharge the ponds with bore well water or water from other	1. Application of organic manure in culture system

in water quality		sources	
2) Floods			
A. Capture			
Inland			
(ii) No. of boats / nets damaged	The boats has to be secured safely to river/ reservoir banks. Non operation of fixed bag nets in streams and rivers. Insurance coverage for nets and boats.	Checking of the safety of the boats / nets. An inventory logbook with name of crewmembers should be maintained. Number of crew and load should be much below the marked tonnage.	Maintenance of the boats and nets. Assessment and settlement of insurance.
(iii) No. of houses damaged	Insurance coverage for houses.	-	Settlement of insurance.
(iv) Loss of stock	-		Assessment of stock (fish population) and replenishment if stock is depleted. Habitat restoration for the stock remaining.
(v) Changes in water quality			Application of lime in tanks. Application of fertilizer.
(v) Health and diseases			Observation of the health status of fish and accordingly control measure should be taken. Control on transport of brooders and seeds
B. Aquaculture			
(i) Inundation with flood	Strengthening and increase in dyke height The should be constructed with inlet and out	Net enclosure should be provided over the dyke to prevent the escape	Repairing and strengthening of dyke if required.

water	let facility.	of fish from pond.	
(ii) Water contamination and changes in water quality	Application of lime.	-	Application of lime and geolite. Application of Alum. Application of KmnO4
(iii) Health and diseases	Application of lime		Application of lime and KmnO4. Assessment of the health status of fish and accordingly control measure should be taken. Control on transport of brooders and seeds.
(iv) Loss of stock and inputs (feed, chemicals etc)	Strengthening and increase in dyke height. Before flood the stock should be harvested and sold in flood prone areas. Transport of feed and chemicals to safer place. Purchase of feeds and chemicals on weekly or fortnightly basis. Insurance coverage for stock.	Net enclosure should be provided over the dyke to prevent the escape of fish from pond. Water should be diverted from the main stream. Sand bags can be used for protection of dykes. Storing of feed and chemicals to safer place.	Stock assessment and restocking with advanced fingerlings or yearling if required. Repairing of dykes. Assessment of quality of feed and fertilizer. Assessment and settlement of insurance.
(v) Infrastructure damage (pumps, aerators, huts etc.)	Construction of flood shelter for pumps, aerators etc.	-	Repairing of pumps, aerators if required. Repairing of damaged hut.
Cyclone/ Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	Repeated broadcast and telecast of warning. Sea venture should be avoided Insurance coverage for lives of fishermen.	Provision of relief. . Evacuation of people to safer areas.	Assessment and settlement of insurance.

(ii) Av. No. of boats / nets damaged	The boats has to be secured safely to river/ reservoir banks. Insurance coverage for nets and boats.	Checking of the safety of the boats / nets. An inventory logbook with name of crewmembers should be maintained.	Maintenance of the boats and nets. Assessment and settlement of insurance
(iii) Avg.No. of houses damaged	Insurance coverage for houses.	-	Settlement of insurance.
Inland			
B. Aquaculture			
(i) Over flow/ flooding of ponds	Strengthening and increase in dyke height. The should be constructed with inlet and out let facility.	Net enclosure should be provided over the dyke to prevent the escape of fish from pond.	Repairing and strengthening of dyke if required.
(ii) Changes in water quality (fresh water / brackish water ratio)	-		
(iii) Health and diseases	-		Application of lime and KmnO4. Assessment of the health status of fish and accordingly control measure should be taken. Control on transport of brooders and seeds.
(iv) Loss of stock and inputs (feed, chemicals ets)	Strengthening and increase in dyke height. Transport of feed and chemicals to safer place. Insurance coverage for stock.	Net enclosure should be provided over the dyke to prevent the escape of fish from pond. Storing of feed and chemicals to safer place.	Stock assessment and restocking with advanced fingerlings or yearling if required. Repairing of dykes. Assessment of quality of feed and chemicals. Assessment and settlement of insurance.
(v) Infrastructure damage (pumps, aerators,	-		Repairing of pumps, aerators if required. Repairing of damaged hut.

shelters/ huts etc.)			
Heat Wave and Cold Wave			
A. Capture			
Marine	-	During hot waves night fishing should be done.	-
Inland		During hot waves preservation by cold chain should be increased.	
B. Aquaculture			
(i) Change in pond environment	During hot waves adequate water depth should be maintained.	During hot waves mixing of water with fresh water should be done. The culture system should be provided with aeration to avoid oxygen depletion due to high temperature during hot waves. Partial harvesting can be done to avoid loss of crop.	-
(ii) Health and disease management	Application of lime and turmeric.	Feeding should be stopped. If cold waves persists EUS outbreak takes place	Application of CIFAXto contro EUS disease in fish.

ANNEXURE - I
LOCATION MAP OF ANGUL DISTRICT :



ANNEXURE – II

Rainfall in mm of Angul District

MONTH	RAINFALL (mm)-2005-06	RAINFALL (mm)-2006-07	RAINFALL (mm)-2007-08
April	12.6	19.9	37.1
May	43.3	88.0	59.8
June	311.6	160.3	225.8
July	676.2	290.4	240.3
August	174.6	566.8	225.2
September	194.6	170.2	389.4
October	245.2	22.1	27.6
November	6.0	6.7	-
December	-	-	-
January	-	-	48.4
February	-	-	3.9
March	23.0	-	4.1