

State: KARNATAKA

Agriculture Contingency Plan for District: DHARWAD

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	North Sahyadris and Western Karnataka Plateau , hot dry sub humid ecosubregion (6.4)			
	Agro-Climatic Region (Planning Commission)	Southern Plateau and Hills Region (X)			
	Agro Climatic Zone (NARP)	Northern Transitional Zone (KA-8)			
	List all the districts or part thereof falling under the NARP Zone	Dharwad , Belgaum, Haveri and Gadag			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		15° 15 ' to 15° 35' N	75° 00' to 75° 20' E	768 .0 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Main Agricultural Research Station, University of Agricultural Sciences, Dharwad-580 005			
Mention the KVK located in the district	Krishi Vigyan Kendra, Dharwad -580 005				
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June 15 th –oct 15 th):	478		1 st week of June	2 nd week of October
	NE Monsoon (Oct 15 th –Dec 31st):	159		3 rd week of October	2 nd week of November
	Winter (Jan- Febraury)	14		-	-
	Summer (Mar -May)	134		-	-
	Annual	786	58	-	-

1.3	Land use pattern of the district (latest statistics)	Geographical area (000 ha)	Forest area	Land under non-agricultural use	Net sown area	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	427.3	35.2	21.7	3.6	2.7	0.2	4.0	34.6	6.8	427.3

1.4	Major Soils (common names like shallow red soils etc.,)	Area ('000 ha)	Percent (%) of total
	Medium to deep black soil	170	39.9
	Red sandy loam soil /Shallow red soil	123	28.9
	Sandy soil	65	15.2
	Sandy loam	69	16.1
	Others (specify):		
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	308.2	163.8
	Area sown more than once	196.7	
	Gross cropped area	504.8	

Source: Agricultural Census 2005-06, Directorate of Economics & Statistics

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	51.3		
	Gross irrigated area	63.2		
	Rainfed area	256.9		
	Sources of Irrigation (DSO)	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		25.0	63.2
	Tanks		0.1	0.2
	Open wells		--	-
	Bore wells		14.2	35.9
	Lift irrigation		2.0	-
	Micro-irrigation		4.2	-
	Other sources		0.2	0.7
	Total Irrigated Area		45.7	100.0
	Pump sets		13940	
	No. of Tractors		4520	
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(% area)	
	Over exploited	-		
	Critical	-		
	Semi- critical	-		
Safe	-			
Wastewater availability and use	-			
Ground water quality	-			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				
Source : Dharwad district at a glance 2008-09				

1.7 Area under major field crops & horticulture etc. (2008-09)

1.7 Major Field Crops cultivated		Area ('000 ha)					
		<i>Kharif</i>		<i>Rabi</i>		Summer	Total
		<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>	-	-
1	Cotton	0.1	10.0	0.8	60.3	-	71.2
2	Chilli	-	51.0	-	-	0.4	51.4
3	Bengal gram	-	-	12.5	37.0	-	49.5
4	Sorghum	-	11.6	3.2	33.3	-	48.1
5	Maize	18.5	20.1	2.3	0.5	0.4	41.8
6	Groundnut	0.1	40.3	-	-	0.7	41.1
7	Wheat	-	-	9.6	28.7	-	38.3
8	Paddy	3.5	29.2	-	-	0.1	32.8
9	Soybean	0.01	27.5	-	-	-	27.5
10	Green gram	0.02	13.5	-	-	-	13.5
	Horticulture crops - Fruits	Total area					
1	Mango	4.9					
2	Sapota	1.6					
3	Guava	0.6					
4	Banana	0.3					
5							
	Horticultural crops - Vegetables	Total area					
1	Onion	27					
2	Potato	1.3					
3	Tomato	0.4					
4	Brinjal	0.5					
5							
	Medicinal and Aromatic crops	Total area					

Source : Directorate of Economics and Statistics
(Final Estimates of Area, Production and Average yield of Principal crops in Karnataka for 2008-09)

	Plantation crops	Total area
1	Coconut	0.4
2	Arecanut	0.01
3	Black pepper	0.01
	Fodder crops	Total area
	Total fodder crop area	
	Grazing land	
	Sericulture etc	
	Others (Specify)	

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	112.4	66.0	178.5
	Crossbred cattle	6.7	34.6	41.3
	Non descriptive Buffaloes (local low yielding)	-	-	100.0
	Graded Buffaloes	-	-	
	Goat			72.4
	Sheep			57.1
	Others (Pig + Dogs + Rabbit)			5.39
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. of birds (number)	
	Commercial		391705	
	Backyard			
1.10	Fisheries (Data source: Chief Planning Officer)			
	A. Capture -			
	i) Marine (Data Source:	No. of	Boats	Nets

Fisheries Department)	fishermen	Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	etc.)
	NA					
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds	No. of Reservoirs		No. of village tanks		
	14	1		579		
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)	4.2	3.0		12.6	
	Others					

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

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
1	Maize	103.46	2682.0	8.22	3032.8	1.15	3223.3	112.8	2687.0	-
2	Paddy	61.01	1866.4	0	0	0.522	3873.0	61.5	1873.0	
3	Bengal gram	0.0	0.0	25.24	513.0	0.0	0.0	25.2	513.0	
4	Groundnut	24.93	617.0	0	0	0.75	1227.2	25.7	625.0	
5	Cotton	10714 bale	514.0	31949.0	254.0	0	0	42663 bale	326.0	
6	Wheat	0	0	27.6	718.0	0	0	27.6	718.0	
7	Greengram	3.4	254.0	0	0	0	0	3.4	254.0	
8	Jowar	8.8	754.0	24.78	678.0	0	0	33.6	696.0	
9	Soybean	17.4	634.0	0	0	0	0	17.4	634.0	
Major Horticultural crops (Crops to be identified based on total acreage)										
Fruits										
1	Citrus							26,897.70	21.93	-
2	Mango							6,408.70	08.23	
3	Pomegranate							4,037.00	08.20	
4	Sapota							4,326.70	12.72	
5	Papaya							11,273.30	63.68	
Vegetables										
1	Green Chillies	*	*	*	*	*	*	45,279.00	13.00	
2	Onion	39,880.00	20.99	4,136.00	22.00	6,734.00	26.00	50,750.00	21.62	
3	Tomato	3,749.00	23.00	4,536.00	54.00	1,276.00	22.00	9,561.00	31.35	
4	Brinjal	*	*	*	*	*	*	8,092.00	28.00	
5	Beans	*	*	*	*	*	*	1,800.00	12.00	
Spice and Plantation crops										

1	Coconut	-	-	-	-	-	-	520.00	20.00	-
2	Dry Chillies	*	*	*	*	*	*	2,850.00	01.40	
3	Fenugreek	*	*	*	*	*	*	2,216.00	08.0	
4	Coriander	*	*	*	*	*	*	177.00	0.70	
5	Tamarind	-	-	-	-	-	-	1,856.00	16.00	
Flowers										
1	Marigold	*	*	*	*	*	*	738.00	9.00	-
2	Jasmine	-	-	-	-	-	-	576.00	8.00	
3	Rose	-	-	-	-	-	-	216.00	3.00	
4	Chrysanthemum	*	*	*	*	*	*	930.00	15.00	
5	Crossandra	-	-	-	-	-	-	210.00	05.00	

Source: **Directorate of Economics and Statistics**
(Final Estimates of Area, Production and Average yield of Principal crops in Karnataka)

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Maize	Paddy	Bengalgram	Rabi Sorghum	Soybean	Groundnut	Cotton
	KhariF- Rainfed	1 st week of June to 4 th week of July	1 st week of May to 4 th week of June	-	-	1 st week of June to 1 st week of July	1 st week of June to 4 th week of July	1 st week of May to 2 nd week of July
	KhariF-Irrigated	1 st week of 1 st week of June to 4 th week of August	-	-	-	-	-	1 st week of July to 4 th week of September
	Rabi- Rainfed	-	-	1 st week of October to 4 th week of November	1 st week to 4 th week of October	-	-	
	Rabi-Irrigated	1 st week of September to 4 th week of October		1 st week of October to 4 th week of November	-	-	-	

1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought	---	√	
	Flood	---	√	
	Cyclone	---	---	√
	Hail storm	---	---	√
	Heat wave	---	---	√
	Cold wave	---	---	√
	Frost	---	---	√
	Pests and diseases (specify)	√	-	
	Sea water intrusion	-	-	√
	Others	-	-	

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



AGROCLIMATIC ZONES OF KARNATAKA

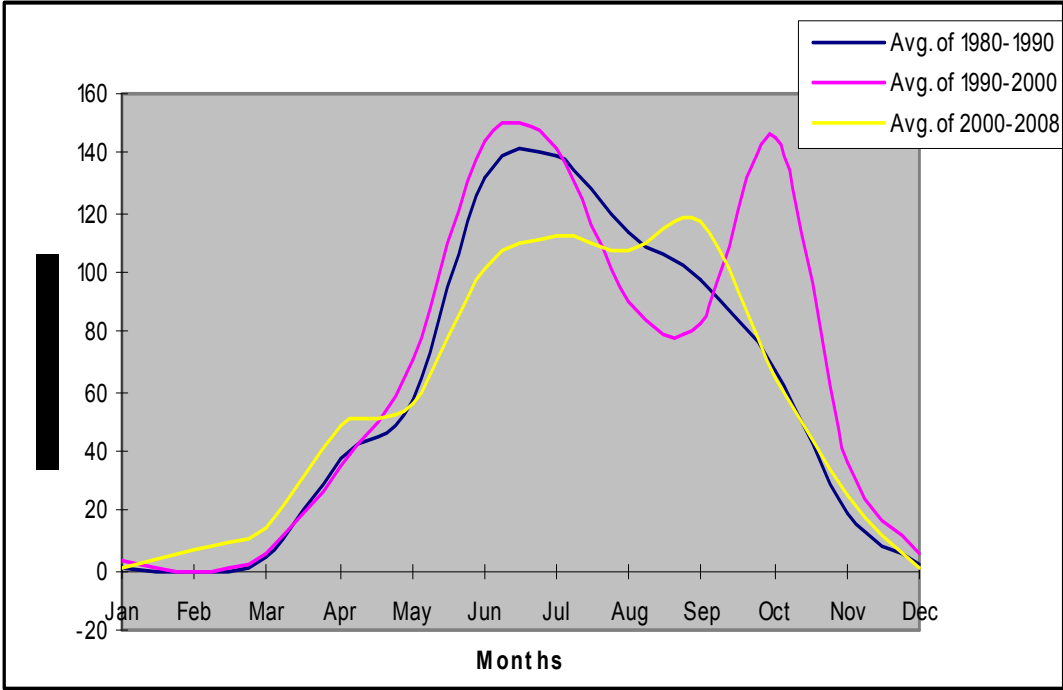


Fig. : Rainfall pattern of Main Agricultural Research Station, Dharwad (1980-2008)

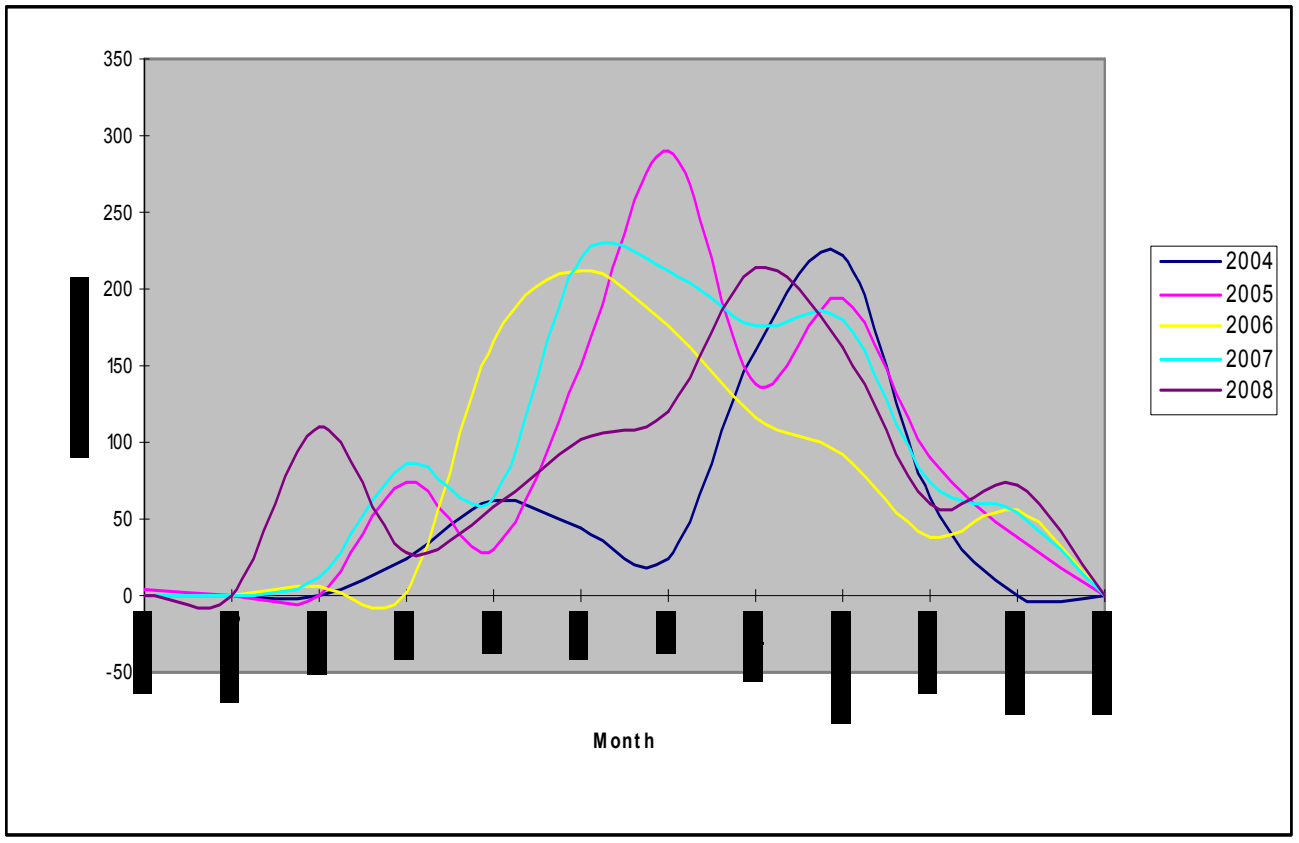
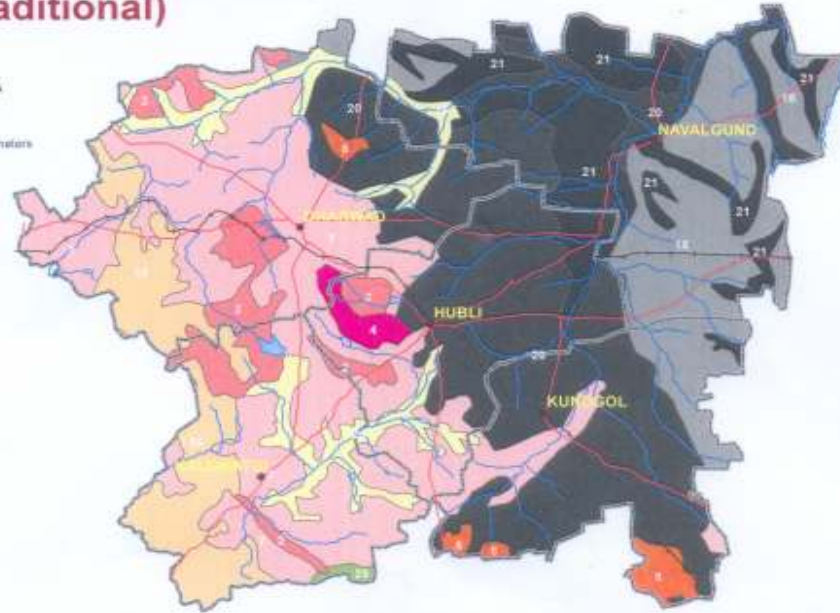


Fig : Month wise rain fall distribution pattern of MARS, Dharwad(2004-2008)

**KARNATAKA
DHARWAD DISTRICT
SOILS (Traditional)**



Soil Units	Area in ha (Per cent)
2, Very shallow, red gravelly loam soils	20,710 (4.86)
4, Shallow, red loamy soils (gravelly in patches)	3,826 (0.90)
7, Medium deep, red clayey soils	1,12,106 (26.30)
8, Medium deep, red gravelly clay soils	6,037 (1.42)
16, Deep, laterite gravelly clay soils	33,601 (7.88)
18, Medium deep, black clayey soils	55,430 (13.01)
20, Deep, black clayey soils	1,26,243 (29.62)
21, Deep, black calcareous clayey soils	44,979 (10.55)
26, Deep, alluvial black clayey soils	22,338 (5.24)
29, Medium deep, forest brown clayey soils (gravelly in patches)	939 (0.22)

Key : Depth Classes

- Very Shallow : <25 cm
- Shallow : 25 - 50 cm
- Medium deep : 50-100 cm
- Deep : >100 cm

Reference

- Rail
- Road
- Stream
- Tanks
- Taluk boundary

Note : Area extent is approximate (calculated)
Soil (Traditional) unit nos are as per
Source : Shiva Prasad et al (1998), Soils of Karnataka for optimizing land use NBSS Publ. 47

Source: NBSS & LUP

GIS Lab, NBSS&LUP, Bangalore

2.0 Strategies for w

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (June 3 rd week)	Medium to deep black soils	Maize - Chickpea	Maize + Red gram and no other change in cropping system as the farmers has already decided and kept the inputs ready	No change	KSDA KSSC UASD
		Soybean - Rabi Jowar			
Groundnut – Rabi Jowar / Wheat					
Green gram-Rabi Jowar / Wheat					
Chilli + desi Cotton + Onion					
		Hy. Cotton(Bt).			
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram / Avare	No change	-do-	Seed source : KSDA KSSC UASD

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (Specify month) July 1 week	Medium to deep black soil	Maize - Chickpea	Avoid green gram –rabi Jowar Cropping sequence. Continued upto July 15 th Maize + Redgram (4:2) Groundnut + Redgram (4:2)	Ridges and furrows method of sowing.	Seed source : KSDA KSSC UASD In place of GPBD 4 use JL 24
		Soybean - Rabi Jowar			
		Groundnut – Rabi Jowar / Wheat			
		Green gram-Rabi Jowar/ Wheat			
		Chilli + desi Cotton + Onion			

		Hy. Cotton (Bt).			
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram / Avare	No change	Normal	Seed source : KSDA KSSC

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 6 weeks July 3 rd week	Medium to deep black soil	Maize- Chickpea	Avoid green gram, groundnut and soybean based on cropping systems Sunflower hybrids- chickpea	Reduce Bt cotton spacing to 60 cm x 60 cm · Seed pelleting	Seed source : KSDA KSSC UASD CAUTION: Cotton sowing beyond June 15th leads to reduction in yield.
		Soybean- Rabi Jowar			
Groundnut - R. Jowar / Wheat					
Green gram-Rabi Jowar/ Wheat					
Chilli + desi Cotton + Onion					
		Hy. Cotton(Bt).			
	Rainfed drilled paddy situation	Paddy - Greengram / Black greengram / Avare.	Go for short duration varieties, viz; Amrut, MGD-101, MTU-1001 in low lands. Go for Sun hemp and fodder Maize in mid lands.	Normal	Seed source : KSDA KSSC UASD

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					

Delay by 8 weeks August 1st week	Medium to deep black soil	Maize- Chickpea	Avoid green gram, groundnut and soybean based on cropping systems	Adopt 60 x 60 cm spacing for Bt cotton Seed palletting Compartment bunding	Seed source : KSDA KSSC
		Soybean- Rabi Jowar			
		Groundnut – Rabi Jowar / Wheat			
		Green gram-Rabi Jowar/ Wheat	Sunflower hybrids-chickpea		
		Chilli + desi Cotton + Onion	Fallow-Rabi sorghum		
	Hy. Cotton (Bt).	Field bean Little millet			
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram/ Avare	Go for short duration varieties, viz; Amrut, MGD-101, MTU-1001 in low lands. Sunhemp and fodder Maize in mid lands.	Normal	Seed source : KSDA KSSC UASD

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Medium to deep black soil	Maize- Chickpea	Thinning and gap filling Re-sowing	Conservation furrows, Frequent intercultivation mulching	Supply of implements through RKVY Seed source : KSDA KSSC UASD
		Soybean- Rabi Jowar			
		Groundnut- Rabi Jowar / Wheat			
		Green gram -Rabi Jowar/ Wheat			
		Chilli + desi Cotton + Onion Hy. Cotton(Bt).			
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram/ field bean		Intercultivation and withholding of fertilizer application till dry spell is over	-

Condition			Suggested Contingency measures		
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	Medium to deep black soil	Maize - Chickpea	Thinning of alternate rows. Spraying of anti- transpirants Weed control	Surface mulching. Foliar application of N & K (2 %), protective irrigation if available.	
		Soybean - R. Jowar			
		Groundnut – Rabi Jowar / Wheat			
		Green gram -Rabi Jowar/ Wheat			
		Chilli + desi Cotton + Onion			
	Hy. Cotton(Bt).				
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram/ field bean	Weed control	Intercultivation. Foliar application of N & K	

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
	Medium to deep	Maize - Chickpea	Foliar application of N & K (Intercultivation Compartment	Farm pond through

At flowering/ fruiting stage	black soil	Soybean- Rabi Jowar	2%), Harvesting Maize for fodder purpose	Intercultivation Compartment bunding in early harvested crop	INSM
		Groundnut- R. Jowar / Wheat	Go for early rabi sowing	Intercultivation Compartment bunding in early harvested crop	
		Green gram-Rabi Jowar/ Wheat	Protective irrigation	Intercultivation Compartment bunding in early harvested crop	
		Chilli + desi Cotton + Onion	Plant protection measures for sucking/defoliators/cutworms	-	
		Hy. Cotton(Bt).		-	
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram/ field bean	Foliar application of N & K		
Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
	Medium to deep black soil	Maize- Chickpea	Harvesting early at physiological maturity and plan for early rabi cropping. In case of maize, go for green cob/ fodder purpose	Rabi Sorghum Chickpea Wheat	Farm pond Threshing implants through RKVY
		Soybean- Rabi Jowar		Safflower Wheat + Safflower/ Chickpea(4:2) Rabi Sorghum + Chickpea / Linseed(mixed cropping)	

		Groundnut- R. Jowar / Wheat		Rabi Sorghum Chickpea Wheat safflower	
		Green gram-Rabi Jowar/ Wheat		Rabi Sorghum Chickpea Wheat safflower	
		Chilli + desi Cotton + Onion		-	
		Hy. Cotton (Bt).			
	Rainfed drilled paddy situation	Paddy - Green gram / Black green gram/ field bean	Harvesting early at physiological maturity	Green gram Black gram Field bean	

2.1.2 Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Canal irrigated black soil	Maize - Chickpea	Sunflower-Chickpea	Alternate furrow irrigation Mulching Ridges and furrows	
		Maize- Wheat	Sunflower-Wheat		
		Hy. Cotton (Bt).	Maize- Chickpea Maize- Wheat Hy. Cotton (Bt.)		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Canal irrigated black soil	Maize - Chickpea	Sunflower-Chickpea Green gram- R. Jowar/ Wheat/Chickpea/Safflower	Alternate furrow irrigation Mulching	
		Maize- Wheat	Sunflower / Chickpea	Deep Intercultivation Foliar application of N & K	
		Hy. Cotton (Bt).	No change	-do-	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			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 black soil	Maize - Chickpea	Chilli + Onion+ Jayadhar Cotton Sunflower-Safflower/Chickpea	Early sowing Intercultivation	
		Maize- Wheat	Fallow-Sunflower/ Chickpea/ Safflower/R.Sorghum	-do-	
		Hy. Cotton (Bt)	Fallow-Sunflower/ Chickpea/ Safflower/R.Sorghum		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Drill sown paddy	Paddy	Maize Paddy + Sorghum / Mai	Go in for mixed cropping	The component crops will give sustainable yield in total

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Medium deep black Soils,	Maize	Groundnut	Use of sprinjlers, Adopt ridges-furrow method of irrigation	
	Loamy/laterite soils	paddy	Maize		

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Any other condition (specify)					

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

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Maize	Drain out excess water Top dress the crop with N & K Intercultivation & weeding Plant protection measures Spraying of growth retardants	Drain out excess water Top dress the crop with N & K. Hormonal spray for retention of flower in Hy. Cotton. Staking in maize& paddy. Plant protection measures, particularly use of fungicides in cotton, chillies.	Drain out excess water. Harvest at physiological maturity. Proper drying. Spraying of fungicides to protect quality of grain. Prophylactic against store grain pests. Staking in maize& paddy. De-top maize	Proper drying and storage of grains
Soybean				
Green gram				
Groundnut				
Paddy				
Hy. Cotton				
Chilli + Cotton				
Horticulture -Fruits				
Citrus	-do-	Providing drainage trench (1.5 cu. ft) across the slope	-do-	-
Mango		Providing drainage trench (1.5 cu. ft) across the slope and spray of 10 ppm NAA		Storing in Cold storage
Pomegranate		Providing drainage trench (1.5 cu. ft) across the slope		-
Sapota		-do-		-

Papaya				
Vegetable crops				
Green Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray	-	-
Onion	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	2000 ppm of MH spray 15 days before the harvest to control sprouting in storage	Store in well ventilated structure
Tomato	-do-	Application of 10 ppm NAA spray		
Brinjal		Application of 10 ppm NAA spray		
Beans		Application of 10 ppm NAA spray		
Spice and Plantation Crops				
Coconut	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Dry Chillies	-do-	Application of 10 ppm NAA spray		
Fenugreek		Providing drainage trench (1.5 cu. ft) across the slope		
Coriander		-do-		
Tamarind		-do-		
Flowers				
Marigold	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Jasmine	-do-	-do-		
Rose				
Chrysanthemum				
Crossandra				

Heavy rainfall with high speed winds in a short span²	Drain out excess water Top dress the crop with N & K Intercultivation & weeding Plant protection measures	Drain out excess water Top dress the crop with N & K. Hormonal spray for retention of flower in Hy. Cotton. Staking in maize& paddy. Plant protection measures- particularly use of fungicides in cotton, chillies.	Drain out excess water. Harvest at physiological maturity. Proper drying. Spraying of fungicides to protect quality of grain. Prophylactic against store grain pests. Staking in maize& paddy De-top maize	Proper drying and storage of grains
Maize	Plant protection measures Spraying of growth retardants	Staking in maize& paddy. Plant protection measures- particularly use of fungicides in cotton, chillies.	Prophylactic against store grain pests. Staking in maize& paddy De-top maize	
Soybean				
Green gram				
Groundnut				
Paddy				
Horticulture Fruits				
Citrus	Providing drainage trench (1.5 cu. ft) across the slope and providing support with locally available material at the initial stage of the crop	-do-	-do-	Storing in Cold storage
Mango	-do-	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	-
Pomegranate		Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	-do-	Storing in Cold storage
Sapota		Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	-do-	-
Papaya		Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	-do-	-
Vegetable crops				
Green Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray	-	-
Onion	-do-	Providing drainage trench (1.5 cu. ft) across the slope	2000 ppm of MH spray 15 days before the harvest to control sprouting in storage	Store in well ventilated structure
Tomato		Application of 10 ppm NAA spray	-	
Brinjal		Application of 10 ppm NAA spray	-	

Beans	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	-	
Spice and Plantation Crops				
Coconut	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	-	
Dry Chillies	-do-	Application of 10 ppm NAA spray		
Fenugreek	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Coriander	-do-	Providing drainage trench (1.5 cu. ft) across the slope		
Tamarind	-do-	Providing drainage trench (1.5 cu. ft) across the slope		
Flowers				
Marigold	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	-	
Jasmine	-do-	-do-	-	
Rose	-do-	-do-	-	
Chrysanthemum	-do-	-do-	-	
Crossandra	-do-	-do-	-	
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Outbreak of pests and diseases due to unseasonal rains				
Maize		Plant Protection measures for TLB (Mancozeb 2.5g/l)	PP measures for Stalk rot/rust//TLB by spraying Hexaconazole @ 0.1 %	-

Hy cotton		Plant Protection measures for Mirid bug (acephate 1g/l) particularly use of fungicides in cotton, chillies.	PP measures for Reddening (MgSO ₄ 1% 10g/l)/Mirid bug (acephate 1g/l)	
Soybean	PP measures for Defoliators	PP measures for rust by spraying Hexaconazole @ 0.1 %	PP measures for rust by spraying Hexaconazole @ 0.1 %	
Green gram	PP measures for Anthracnose, Powdery mildew	PP measures for Defoliators Spray Monocrotophos (0.1%)1.0 ml/lit	For Powdery mildew control spray (Mancozeb 2.5g/l)	
Groundnut / Rabi Sorghum/Chickpea/Wheat	PP measures for Seedling rot/wilt/defoliators	Plant Protection for Seedling rot /wilt (Captan 2g/kg seed treatment) /defoliators (Quinalphos@ 2ml/l)	PP measures for LLS/wilt (Chlorothaloni 0.2 %)	
Horticulture Fruits				
Citrus				
Citrus canker	Pruning of dried and dead twigs for better aeration and sunlight Spraying of COC 0.2 % + Streptomycine sulphate 0.5 g/l. of water	Spraying of COC 0.2 % + Streptomycine sulphate 0.5 g/l. of water	Spraying of COC 0.2 % + Streptomycine sulphate 0.5 g/l. of water	Removal of the disease affected fruits form the produce and pack in well ventilated package
Leaf minor	Spraying of NSKE (5.0 %) + imidacloprid 0.5 ml/l	Spraying of NSKE (5.0 %) + imidacloprid 0.5 ml/l	-	
Mango	Powder mildew: Spraying of hexaconazole @ 1.0 ml/l Mango hoppers : Spraying of carbaryl @ 4.0 g/l	Powder mildew: Spraying of hexaconazole @ 1.0 ml/l Spraying of carbaryl @ 4.0 g/l	Powder mildew: Spraying of hexaconazole @ 1.0 ml/l Mango hoppers : Spraying of carbaryl @ 4.0 g/l	

Pomegranate	Wilt: Spraying of Chlorpyrifos 0.2 % + Propiconazole 0.2 %+ Bioagents (<i>P. Fluroescens</i> , <i>T. harzianum</i>) Bacterial blight: Schedules of spraying consisting of UAS, Dharwad package -	Wilt: Spraying of Chlorpyrifos 0.2 % + Propiconazole 0.2 %+ Bioagents (<i>P. Fluroescens</i> , <i>T. harzianum</i>) Bacterial blight: Schedules of spraying consisting of UAS, Dharwad package Anar Butterfly : Application of NSKE 5 % + spraying of cypremethrin/ imidacloprid 0.05 % Bacterial blight: Schedules of spraying consisting of UAS, Dharwad package Anar Butterfly : Application of NSKE 5 % + spraying of cypremethrin/ imidacloprid 0.05 %	
Sapota	Leaf spot : Spraying of Mancozeb @ 2.0 g/l		
Papaya	Ring spot virus : Remove affected plants and burn .Spraying systemic insecticide for the control of vectors	Ring spot virus : Remove affected plants and burn .Spraying systemic insecticide for the control of vectors	Ring spot virus : Remove affected plants and burn .Spraying systemic insecticide for the control of vectors
Vegetable crops			
Green Chillies Murda complex	Spraying systemic insecticide like dimethoate (1.7 ml/l) and imidacloprid 0.05 %	Spraying systemic insecticide like dimethoate (1.7 ml/l) and imidacloprid 0.05 %	-
Onion	Thrips :Spraying of dimethoate @ 1.7 ml/l and for Purple blotch : Spraying of Mancozeb @ 2.0 g/l		
Tomato	Thrips and mites : Spraying of Oxydemeton methyl @ 1.0 ml/l		
Brinjal			

Fruit and shoot borer	Application of Neem cake @ 250 kg /ha at the time of transplanting Later two applications at the same concentrations has to be applied the once in a month 2-3 Sprayings of carbaryl @ 4.0 /l with 15 days interval starting from 15 days before flowering.	Application of Neem cake @ 250 kg /ha at the time of transplanting Later two applications at the same concentrations has to be applied the once in a month 2-3 Sprayings of carbaryl @ 4.0 /l with 15 days interval starting from 15 days before flowering.	2-3 Sprayings of carbaryl* @ 4.0 /l with 15 days interval starting from 15 days before flowering. * Harvesting should be done 10-15 days after spraying	Collect the infected fruits from produce and destroy
Beans	Mosiac: Spraying of systemic insecticide to control vectors	Fruit borer : Spraying of Carbaryl @ 4.0 g/l of water Mosiac: Spraying of systemic insecticide to control vectors		
Flowers				
Marigold	Sucking pests : Spraying of systemic insecticides			
Jasmine	Powdery mildew Powdery mildew : Spraying with Oxythioquinox (Moreston) @ 2.0 g/l Mites : Spraying of Dicofole @ 2.5 ml /l of water			
Rose	Sucking pests and flower bud borer : Spraying of Systemic insecticide Powdery mildew: Spraying of Carbendizim @ 1 g/l			
Chrysanthemum	Thrips : Spraying of systemic insecticides			

Crossandra	Sucking pests : Spraying of systemic insecticide Root rot: Drenching with Carbendizim @1.0 g/l	
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2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Maize	Drain out excess water Top dressing Intercultivation & weeding Plant protection measures	Drain out excess water Top dressing nitrogen Intercultivation & weeding Plant protection measures	Drain out excess water Topdressing Plant protection measures Harvesting at physiological maturity stage.	Drain out excess water, Harvesting and drying of produce
Soybean				
Green gram				
Groundnut				
Paddy				
Hy. Cotton				
Chilli + Cotton				
Horticulture Fruit Crops				
Citrus	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	Providing drainage trench (1.5 cu. ft) across the slope	Storing in Cold storage
Mango	-do-	Providing drainage trench (1.5 cu. ft) across the slope	-do-	-
Pomegranate		Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	Providing drainage trench (1.5 cu. ft) across the slope	Storing in Cold storage
Sapota		-do-		
Papaya		-		
Vegetable Crops				
Green Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray		
Onion	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	2000 ppm of MH spray 15 days before the harvest to	Store in well ventilated structure

			control sprouting in storage	
Tomato	-do-	Application of 10 ppm NAA spray		
Brinjal	-do-	Application of 10 ppm NAA spray		
Beans	-do-	-		
Spice and Plantation Crops				
Coconut	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Dry Chillies	-do-	Application of 10 ppm NAA spray		
Fenugreek	-do-	Providing drainage trench (1.5 cu. ft) across the slope		
Coriander	-do-	Providing drainage trench (1.5 cu. ft) across the slope		
Tamarind	-do-	-do-		
Flowers				
Marigold	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Jasmine	-do-	-do-		
Rose	-do-	-do-		
Chrysanthemum	-do-	-do-		
Crossandra	-do-	-do-		
Continuous submergence for more than 2 days²				
Maize	Re-sowing Draining the excess water in sunflower, groundnut, Bt.cotton. Avoid green gram, black gram, soybean	Drain out excess water Top dressing Intercultivation Re-sowing with suitable crop like maize, sunflower in the vent of crop failure	Drain out excess water Topdressing Plant protection measures Harvesting at physiological maturity stage	Drain out excess water, Harvesting and drying of produce
Soybean				
Green gram				
Groundnut				
Paddy				
Hy. Cotton				
Chilli + Cotton				
Fruit Crops				
Citrus	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope and	Providing drainage trench (1.5 cu. ft) across the slope	Storing in Cold storage

		application of 10 ppm NAA spray		
Mango		Providing drainage trench (1.5 cu. ft) across the slope		-
Pomegranate	-do-	Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	-do-	-do-
Sapota		-do-		
Papaya		-		
Vegetable Crops				
Green Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray		
Onion		Providing drainage trench (1.5 cu. ft) across the slope	2000 ppm of MH spray 15 days before the harvest to control sprouting in storage	Store in well ventilated structure
Tomato	-do-	Application of 10 ppm NAA spray		
Brinjal		Application of 10 ppm NAA spray		
Beans		-		
Spice and Plantation Crops				
Coconut	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Dry Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray		
Fenugreek		Providing drainage trench (1.5 cu. ft) across the slope		
Coriander	-do-			
Tamarind		-do-		
Flowers				
Marigold	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Jasmine		-do-		
Rose	-do-			
Chrysanthemum			-	

Crossandra				
Sea water intrusion				

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

Extreme event type	Suggested contingency measure ^r			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	NOT APPLICABLE			
Cold wave				
Frost				
Hailstorm				
Cyclone				

2.5. Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and Fodder availability	<p>As the district is frequently prone for drought, it should have reserves (feeding 5000 ACU (maintenance ration) for about 1-3 weeks period) of the following at any point of the year for mobilization to the needy areas</p> <p>Silage:20-50 t Urea molasses mineral bricks (UMMB):50-100 t Hay:100-250 t Concentrates: 20-50 t Minerals and vitamin supplements mixture:1-5 t</p> <p>Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production</p> <p>Increase area under short duration fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7</p> <p>Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality crop cutters.</p> <p>Avoid burning of maize stover</p> <p>Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon</p> <p>Proper drying, baling and densification of harvested grass</p>	<p>Harvest and use all the failed crop (Maize, Rice, Bengal gram, Groundnut, Wheat, green gram, jowar, soyabean) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipol etc) and unconventional feeds resources available and use as fodder for livestock (LS).</p> <p>Available feed and fodder should be cut from CPRs and stall fed in order to reduce the energy requirements of the animals</p> <p>Supply silage / hay to farmers having productive stock on subsidized rates</p> <p>Mild drought: hay should be transported to the drought affected villages</p> <p>Moderate drought: hay, silage and vitamin & minerals mixture should be transported to the drought affected villages</p> <p>Severe drought: UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the drought affected villages. All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS</p> <p>Herd should be split and supplementation should be given only to the highly productive and breeding animals during severe drought</p> <p>Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive & breeding stock)</p> <p>Encourage mixing available kitchen waste with</p>	<p>Short duration fodder crops of Sorghum / Bajra / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, Gaint Bajra, L-74, K-6677, Ananand / African tall, Kissan composite, Moti, Manjari, BI-7) should be sown in unsown and crop failed areas</p> <p>Capacity building to stake holders on drought/flood mitigation in livestock sector</p> <p>Flushing the stock to recoup</p> <p>Replenish the feed and fodder banks</p>

	Creation of permanent fodder, feed and fodder seed banks in all drought prone villages Capacity building and preparedness of the stakeholders and official staff for the unexpected events	dry fodder while feeding to the milch animals Arrangements should be made for mobilization of small ruminants across the districts where no drought exits Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals) Subsidized loans (5-10 crores) should be provided to the livestock keepers	
Cyclone	NA		
Floods	In case of early forewarning (EFW), harvest all the crops (Maize, Rice, Bengal gram, Groundnut, Wheat, green gram, jowar, soyabean) that can be useful as fodder/feed in future (store properly) Don't allow the animals for grazing if severe floods are forewarned Procure and stock water sanitizing tablets Motivate the farmers to store a minimum required quantity of hay (25-50kg) and concentrates (25kgs) per animals in farmer / LS keepers house / shed for feeding animals during floods Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations	Transportation of animals to elevated areas Stall feeding of animals with stored hay and concentrates Let loose the animals in shed Proper hygiene and sanitation of the animal shed In severe floods, un-tether or let loose the animals Emergency outlet establishment for required medicines or feed in each village Spraying of fly repellants in animal sheds	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Deworming with broad spectrum dewormers Vaccination against possible disease out breaks like HS, BQ, FMD and PPR Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Drying the harvested crop material and proper storage for use as fodder.
Heat & Cold wave	NA		
Health and Disease management	Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases Procure and stock emergency medicines vaccines for important endemic diseases of the area Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district	Carryout deworming to all animals entering into relief camps Identification and quarantine of sick animals Constitution of Rapid Action Veterinary Force Performing ring vaccination (8 km radius) in case of any outbreak Restricting movement of livestock in case of any	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production

		epidemic Rescue of sick and injured animals and their treatment Organize with community daily lifting of dung from relief camps	does not coincide with mid summer
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals
Drinking water	Identification of water resources Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Construction of drinking water tanks in herding places/village junctions/relief camp locations	Restrict wallowing of animals in water bodies/resources	Bleach (0.1%) drinking water / water sources Provide clean drinking water

Vaccination schedule in small ruminants (Sheep & Goat)

Disease	Season
Foot and mouth disease (FMD)	Preferably in winter / autumn
PPR	All seasons, preferably in June-July
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May
Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	December / march

Vaccination programme for cattle and buffalo:

Disease	Age and season at vaccination
Anthrax	In endemic areas only, Feb to May
HS	May to June
BQ	May to June
FMD	November to December

2.5.2 Poultry

	Suggested contingency measures		
	Before the event^a	During the event	After the event
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds	Supplementation to all
Drinking water	Rain water harvesting	Sanitation of drinking water	Give sufficient water as per the bird's requirement
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit
Floods			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging	Routine practices are followed

Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone	NA		
Heat wave and cold wave	NA		

2.5.3 Fisheries/ Aquaculture:

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
1) Drought			
A. Capture			
Marine	No intervention	No intervention	No intervention
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Stocking of advanced fingerlings in half or even less than the normal stocking density or stocking of common carp seed	Immediate harvesting or decreasing the density commensurate with the water quantity.	De weeding and deepening of tank to ensure retention of water for a longer period and provision of employment under MGNREGP
(ii) Changes in water quality	Regular monitoring of water quality parameters and application of geolites, soil probiotics, etc to maintain water quality	Immediate harvesting or changing the water quality by application of sanitisers.	Removal of top layer, deep ploughing of tank and application of lime
(iii) Any other			
B. Aquaculture			
(i) Shallow water in	Crop holiday or going for stocking of	Harvesting of fish and leaving the pond	Removal of top layer, deep ploughing

ponds due to insufficient rains/inflow	yearlings by reducing the density according to availability of water	fallow till next season	of tank and application of lime
(ii) Impact of salt load build up in ponds / change in water quality	Stocking of salinity tolerant fish / shrimp, application of geolites and other buffers	Frequent change of water with fresh water	Frequent draining of the pond with fresh water, removal of top layers
(iii) Any other			
2) Floods			
A. Capture			
Marine	No intervention	No intervention	No intervention
Inland			
(i) Average compensation paid due to loss of human life	Shifting the people from low lying areas to relief camps	Deployment of specially trained persons for rescue operations by providing life bouys, jackets, ropes, boats, etc	Payment sufficient ex-gratia to the families
(ii) No. of boats / nets/damaged	Shifting and relocating boats and nets to safer places when warnings are issued, to avoid fishing, etc	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of livelihoods
(iii) No. of houses damaged	Avoidance of construction of houses in flood prone areas, construction of pucca houses at elevated places,	Shifting of people by relief boats to the relief camps	Assessment of damages to houses and provision of compensation in case of partial damage and sanction house under existing schemes
(iv) Loss of stock	Avoidance of surface species like catla, silver carp since they are vulnerable in tanks prone to floods, erection of nets across the spill way or just beyond it	Erection of nets at spill ways	Taking up compensatory stocking
(v) Changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(vi) Health and diseases	Sometimes there may be heavy accumulation	There may be break out of	Removal of weeds, top layer of soil,

	of nutrients and organic matter.	Heamorrhagic septicimea. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to control the disease	deep ploughing of tank and application of lime, exposing to sun light
B. Aquaculture			
(i) Inundation with flood water	Raising and rivetting the bunds, construction of spill way to release excess water, erection of nets to avoid escape of fish	Continuous pumping of excess water, erection of nets low lying areas	Strengthening of bunds, excavating channels along the sides of the ponds for free escape of water
(ii) Water continuation and changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(iii) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Heamorrhagic septicimea. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to control the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light
(iv) Loss of stock and inputs (feed, chemicals etc)	Advance erection of nets, strengthening of bunds where they are prone to breaches, harvesting or reducing the density	Suspension of feeding, application of organic manures	Compensatory stocking, assessment of values and payment of subsidy on inputs
(v) Infrastructure damage (pumps, aerators, huts etc)	Insuring pond, accessories, etc., Shifting of aerators, pumps soon after warnigs are issued	Relocating pumps, aerators to elevated places	Assessment of damages and provision of them on subsidy
(vi) Any other			
3. Cyclone / Tsunami	NA		
4. Heat wave and cold wave			

^a based on forewarning wherever available