DISTRICTWISE CONTINGENCY CROP PLANNING FOR KONKAN MAHARASHTRA

RATNAGIRI

State: MAHARASHTRA

Agriculture Contingency Plan for District: <u>RATNAGIRI</u>

			1.0 District Agric	ulture profile							
1.1	Agro-Climatic/Ecological Zone										
	Agro Ecological Sub Region (ICAR)		Western Ghats and Coastal Plain, hot, humid-per humid eco region (19.2) and Western Ghats and Coastal Plain, Hot Humid-Perhumid Eco-Region (19.3)								
	Agro-Climatic Zone (Planning Commission)	Western Coas	Western Coast Plains and Ghat region (XII)								
	Agro Climatic Zone (NARP)	South Konkan	South Konkan Coastal Zone (MH-1)								
	List all the districts or part thereof falling under the NARP Zone	Ratnagiri and	Ratnagiri and Sindhudurg								
	Geographic coordinates of district		Latitude	Longitud	e	Altitude					
	headquarters	1	6 ⁰ 59'31.29" N	73 ⁰ 17' 32. 3	3" E	46 m.					
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS		Dr. Haladavnekar P.C., Associate Director of Research, Regional Fruit Research Station, Vengurle- 417 516, Dist. Sindhudurg (M.S.)								
	Mention the KVK located in the district	Krishi Vigyan Kendra, Devade, Post : Devade – 416 712 Tal.: Lanja, Dist. Ratnagiri (M.S.)									
	Name and address of the nearest Agromet Field Unit for agro- advisories in the zone		AMFU Dapoli, Department of Agronomy, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli - 415 712, Dist. Ratnagiri (M.S.)								
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	No	rmal Cessation					
	SW monsoon (June-Sep):	3414.7	91	2 nd week of June	2 nd v	week of October					
	NE Monsoon(October-December)										
	Post monsoon shower (October- December)	171.8	7	-							
	Winter (January- March)	4.6	0								
	Summer (April-May)	27.0	1								
	Annual	3618.2	99	-							

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non- agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000' ha)	816	215.46	5.86	21.17	28	138	49	197.918	31	42

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.	. 4	Major Soils (common names like red sandy loam deep soils (etc.,)*	Area ('000' ha)	Percent (%) of total geographical area
		Deep soils	64.3	7.8
		Medium deep soils	234.0	28.6
		Shallow soils	517.6	63.4

Source :- NBSS & LUP, Nagpur

1.5	Agricultural land use	Area ('000' ha)	Cropping intensity %
	Net sown area	303.0	111.6
	Area sown more than once	35.0	111.6
	Gross cropped area	338.0	

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.6	Irrigation	Area ('000' ha)		
	Net irrigated area	14		
	Gross irrigated area	10.4		
	Rainfed area	293.6		
	Sources of Irrigation	Number	Area ('000' ha)	Percentage of total irrigated area
	Canals	-	0.2	2.1
	Tanks	-	-	-
	Open wells	7534	2.3	59.6
	Bore wells	170		
	Lift irrigation schemes	453	6.1	38.3
	Micro-irrigation		0.1	36.3
	Other sources (please specify)			
	Total Irrigated Area		9.4	
	Pump sets	11587		
	No. of Tractors	31*		

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

^{*} District Socio-economic Review –2006-07 (Directorate of Economic & Statistics, Govt. of Maharashtra)

Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)							
Over exploited										
Critical										
Semi- critical										
Safe		25% ground water exploited								
Wastewater availability and use										
Ground water quality										
*over-exploited: groundwater utilization > 100%; critic	over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%									

1.7 Area under major field crops & horticulture etc.

	Major Field crops cultivated			Area ('(000' ha)				
		Kha	ırif	Ra	ıbi	Summer	Total		
		Irrigated	Rainfed	Irrigated	Rainfed				
I	Rice	30	70.49	0.1			77.3		
F	Finger millet		14.64				16.9		
F	Prosomillet		3.97				6.5		
	Pulses- (Lablab bean, pigeon pea, cowpea, black gram,horse gram, etc.	3.67	3.13	6.7			8.8		
(Groundnut		2.2	0.1			2.3		
I	Horticultural crops – Fruits 2009-10	Total Area ('000' ha)							
ľ	Mango	68.32							
(Cashew								
5	Sapota			109	.11				
(Other								
			Н	orticulture crops -	- Vegetables				
	Okra, Brinjal, Chilly, Cucurbits, Leafy vegetables etc.			2	36				
I	Plantation crops								
(Coconut	5.2							
A	Aracanut	3.4							
I	Fodder crops			-					

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

1.8	Livestock (2003)	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	273.5	178.3	451.9
	Crossbred cattle	9.2	16.2	25.5
	Non descriptive Buffaloes (local low yielding)	0.6	2.9	3.5
	Graded Buffaloes	0	0	44
	Goat	11.2	26.2	33.0
	Sheep	0.003	0.002	33.0
	Others (Horse, Camel, Pig, Yak etc.)	-	-	-
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. o	f birds
	Commercial	Data are not available	27904	.6
	Backyard	-	102603	34

Source: Maharashtra Animal and Fisheries Science University, Nagpur

.10	Fisheries (Data source: Chief Planning Officer)									
	A. Capture									
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Bos	ats		Nets	Storage facilities (Ice plants etc.)			
	•		Mechanized	Non- mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)				
		67615	2436	160	2304	35	28			
	ii) Inland (Data Source: Fisheries	No. Farmer ov	vned ponds	No. of R	eservoirs	No. of vill	age tanks			
	Department)	Data are not	available	40		Data are not available				
	B. Culture									
		Water Sp	read Area ('000' l	na)	Yield (t/ha)	Prod	uction (tons)			
	i) Brackish water (Data Source: MF Fisheries Department)	EDA/	0.125		0.7		87.5			
	ii) Fresh water (Data Source: Fisher Department)	ies	0.876		0.2		175.2			

1.11 Production and Productivity of major crops

1.11	Name of crop	ŀ	Kharif		ummer	Summer		Total		Crop
		Production ('00' MT)	Productivity (kg/ha)	Production ('00' MT)	Productivity (kg/ha)	Production ('00' MT)	Productivity (kg/ha)	Production ('00' MT)	Productivity (kg/ha)	residue as fodder ('000
										tons)
Major	Field crops (Cro	ps to be identif	ïed based on total	acreage)						
	1	1 1		T		T	T	T	T.	1
	Rice	1979	2550	3	2500			2141	3037	
	Finger millet	210	1193							
				2	1000			205	1400	
	Prosomillet	37	578	-	-			23	589	
	D. 1	12	COO	25	420			27.27	540	
	Pulses (Lablab bean,	12	600	25	439			37.37	549	
	pigeon pea,									
	cowpea, black									
	gram,horse									
	gram, etc.)									
	Groundnut,	8	348	5	1000			2.27	392	
	niger and			(Groundnut)	2000					
	mustard			2 (others)	2000					

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

Major F	Major Horticultural crops (Crops to be identified based on total acreage)										
	Mango							1890	3 t/ha		
	Cashew							991.76	1127 kg/ha		
	Coconuts							33509	90		
								lakh nuts	nuts/palm		

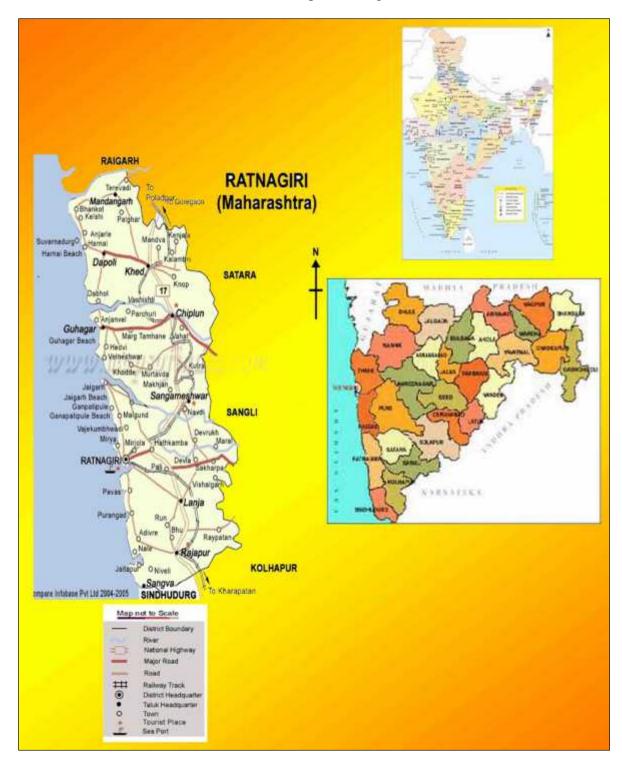
1.12	Sowing window for 5 major field crops	Rice	Finger millet	Groundnut	Black gram	Niger (Karala)
	Kharif- Rainfed	3 rd week of May to 2 nd week of June	1 st fortnight of June	to 2 nd week of June to 3 rd week of June	2 nd fortnight of July	1 st fortnight of June
	Kharif-Irrigated	-	-	-	1	-
	Rabi- Rainfed	=	=	-	-	-
	Rabi-Irrigated	2 nd week of Nov. to 2 nd week of December	-	2 nd week of December to 2 nd week of January	2 nd week of December to 2 nd week of January	-

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		✓	
	Flood		✓ (June to Aug.)	
	Cyclone		✓	
	Hail storm			✓
	Heat wave	✓		
	Cold wave			✓
	Frost			✓
	Sea water intrusion	✓		
	Pests and disease outbreak (specify the names of the major pests and diseases)	✓	-	
	1. Rice:- Bacterial blight, Blast			
	2. Finger millet :_ Bacterial blight, Blast			
	3. Groundnut :- Leaf spot and rust of groundnut			
	4. Mango :- Hopper, Mealy bug, thrips, fruit fly, Anthracnose, Powdery mildew, Branch drying & post harvest rots			
	5. Cashew: - Tea mosquito bug, thrips, aphids, Anthracnose.			
	6. Sapota :- Fruit drop			
	7. Coconut :- Rhinoceros beetle, eriophyid mite			
	8. Areca nut :- Koleroga , Inflorescence blight and Ganoderma rot.			

Others (specify)			
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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 But not clear

Location map of Ratnagiri district



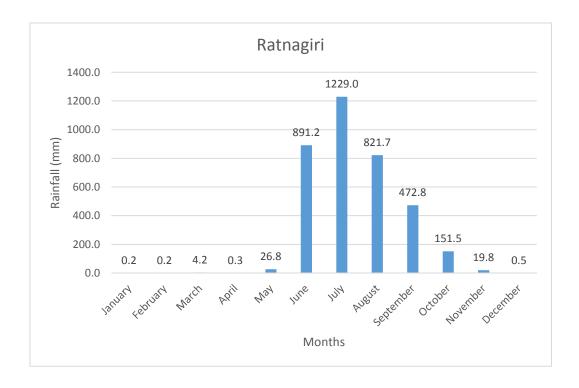
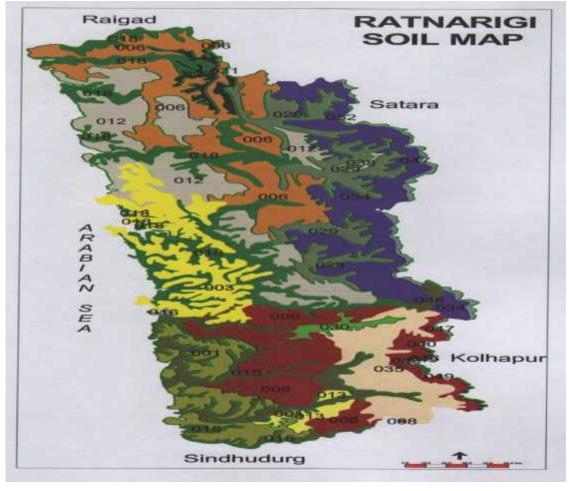


Fig: Mean monthly rainfall (mm) of Ratnagiri District.



Ratnagiri district (Source :- NBSS & LUP, Nagpur)

Soil map

2.0 Strategies for weather related contingencies

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 including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks 3 rd week of June	Upland medium deep to shallow soils	Rice	In case of failure of germination use very early duration variety (Ratnagiri – 73, Karjat-184)	Prepare the seedlings by mat nursery / Dapog method If raising of seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds)	Procure the seed from Maharashtra State Seed Corporation
		Finger millet	No change		
		Prosomillet	No change		
		Groundnut	No change		
		Niger	No change		
		Black gram	No change		
	Mid-land medium deep soils	Rice	In case of failure of germination use early duration variety (Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711, Karjat- 3, Karjat-4, Karjat-7.)	 Prepare the seedlings by mat nursery / Dapog method If raising of 	Procure the seed from Maharashtra State Seed Corporation

Low land deep soils	Rice	In case of failure of germination use mid late duration variety (Ratnagiri-4, Karjat-5, Karjat-9)	seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds)	
Hill slope	Finger millet	No change		
shallow soils	Prosomillet	No change		

Condition			Suggest	Suggested Contingency measures			
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation		
** Delay by 4 weeks	Upland medium deep to shallow soils	Rice	Use very early duration variety (Ratnagiri – 73, Karjat-184)	1. Raise the crop by direct seeding method (dry or sprouted seeds)			
1 st week of July		Finger millet	Cowpea (Var. Konkan Sadabahar), Black gram (TPU- 4)	-			
		Prosomillet	Oil Seed like niger (Var. IGP 76)	-	Procure the seed		
		Groundnut	Use early duration variety (Phule pragati, SB- XI)	-	from Maharashtra State Seed Corporation		
		Niger	No change		- corporation		
		Black gram	No change				
	Mid-land medium deep soils	Rice	Use very early duration variety (Ratnagiri – 73, Karjat-184)	Raise the crop by direct seeding method (dry or sprouted seeds)	Procure the seed from Maharashtra		

Low land deep soils	Rice	Use early duration variety (Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711, Karjat-3, Karjat-4, Karjat-7.)	State Seed Corporation
Hill slope shallow soils	Finger millet Prosomillet	Grow pulses like cowpea (Var. Konkan Sadabahar), black gram (TPU- 4) Oil Seed like Niger (Var. IGP 76)	

Note:- ** Generally such type of situation has not occurred during past years

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
** Delay by 6 weeks 3 rd week of July	Upland medium deep to shallow soils Mid-land medium deep soils	Not applicable Note :- ** Generally su	ach type of situation has not occurred d	uring past years	
	Low land deep soils Hill slope shallow soils				

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

** Delay by 8 weeks 2 nd week of August	Upland medium deep to shallow soils Mid-land medium deep soils Low land deep soils Hill slope shallow soils	Note:- ** Generally s	uch type of situation has not occurr	red during past years	
Condition Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Suggested Cor Crop management	soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell at the time of transplanting	Upland medium deep to shallow soils	Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm). Increase 25% recommended dose of fertilizer. For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method. Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery. 	Protective irrigation for nursery Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
		Finger millet Prosomillet	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) 	Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas, streams, rivers, etc.

		Niger Black gram	No change	 Adopt wee management practices with dry land weeder Mulching with tree lopping of glyricidia leaves Protective irrigation. 1 %n Spray of potassium. 	th cr
	Mid-land medium deep soils Low land deep soils	Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm) Increase 25% recommended dose of fertilizer For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery 	 Protective irrigation for nursery Protective irrigation after transplanting 	outside sources like
	Hill slope shallow soils	Finger millet Prosomillet	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) 	-	
Condition			Suggested Cor	ntingency measures	,
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management		Remarks on Implementation

At vegetative stage	Upland medium deep to shallow soils	Finger millet Prosomillet	 Protective irrigation. Postpone the split dose of Nitrogen application till receipts of rain/protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. Protective irrigation 	 Adopt weed management practices. Apply split dose of Nitrogen after restart of rains Spray % potassium 	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
		Groundnut Niger Black gram	Protective irrigation	 Adopt weed management practices with dry land weeder. Mulching with tree lopping or glyricidia leaves. Spray % potassium 	
	Mid-land medium deep soils	Rice	 Postpone the split dose of Nitrogen application till receipts of rain/protective 	Adopt weed management	

Low land deep soils	Rice	 Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast 	practices. • Maintain the existing water level in the field. • Apply split dose of Nitrogen after restart of rains • Spray % potassium
Hill slope shallow soils	Finger millet Prosomillet	Give protective irrigation if possible.	 Adopt weed manageme nt practices Apply split dose of Nitrogen after restart of rains

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation

At flowering/ fruiting stage	Upland medium deep to shallow soils	Rice	 Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium
		Finger millet Prosomillet Groundnut Niger Black gram	Protective irrigation.	 Adopt weed management practices with dry land weeder. Mulching with tree lopping or glyricidia leaves Spray % potassium
	Mid-land medium deep soils Low land deep soils	Rice	 Protective irrigation. Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium
	Hill slope shallow soils	Finger millet Prosomillet	Give protective irrigation if possible.	• Adopt weed management practices

Condition			Suggested Contingency measures			
Terminal drought	Major Farming	Normal Crop/cropping	Crop management	Rabi crop planning	Remarks on	
	situation	system			Implementation	
(Early withdrawal of	Upland	Rice	Harvest crop at	• Carry out sowing of Rabi		
monsoon)	-	Ein ann maill at	physiological maturity	crops as early as possible		
	medium deep to	Finger millet Prosomillet		(Cowpea, groundnut,		
	shallow soils	Groundnut		water melon, leafy		
				vegetables)		
		Niger Block grown		• Raise the seedlings of		
		Black gram		chilli, brinjal, cabbage,		
				knol knol)		
	Mid-land	Rice	• Protective irrigation	• Carry out sowing of Rabi		
	medium deep soils		• Harvest crop at	crops as early as possible (Cowpea, Horse gram,		
	medium deep sons		physiological			
			maturity	mustard, sweet corn, groundnut, water melon,		
				leafy vegetables)		
				• Raise the seedlings of		
				chilli, brinjal, cabbage,		
			_	knol knol)		
		Rice		Carry out sowing of Rabi crops as early as possible		
	Low land	Rice				
	deep soils			(Cowpea, Horse gram,		
				mustard, lab lab bean,		
				sweet corn, groundnut,		
				water melon, leafy		
				vegetables)		
				• Raise the seedlings of		
				chilli, brinjal, cabbage,		
				knol knol)		
	Hill slope	Finger millet	Harvest crop at			
	•	Prosomillet	physiological maturity			
	shallow soils					
	T. Control of the con	1	T .	I .		

2.1.2 Irrigated situation

Condition			Suggested	d 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	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Use early duration variety (Ratnagiri 73, Ratnagiri-1, Karjat-184) or Grow short duration pulses viz. cowpea (Var. Konkan Sadabahar), under control irrigation and tail end area	 Dapog/mat technique of nursery raising. Young seedling transplanting. SRI Technique. 	Procure the seed from Maharashtra State Seed Corporation
		Groundnut	Use early duration variety (Phule pragati) or grow short duration pulses viz. Cowpea (Var. Konkan Sadabahar),	• If other source of irrigation is available sow the crop as per schedule.	Procure the seed from Maharashtra State Seed Corporation
		Pulses (Cowpea, Horsegram, Green gram)	No change	Use micro irrigation (drip or micro sprinkler)	
		Vegetables	Use early duration vegetables like Kartoli and leafy vegetables varieties Coriander: Dapoli-1 Radish: Japanies white long, Pusa ketaki Math: Math durangi, Co-1	 If other source of irrigation is available sow the crop as per schedule. Use micro irrigation (drip or micro sprinkler) Prepare the seedlings in portrays of vegetables (cucurbitaceous crops, brinjal, chilli) to avoid delay in transplanting. 	Procure the seed from Maharashtra State Seed Corporation

Condition	Suggeste	d 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 Mid and low land Medium deep to deep soils	Rice (Rabi season)	 Prefer early duration variety in low land situation (Ratnagiri 73, Ratnagiri -1) Grow short duration pulses (cow pea, lab lab bean, horse gram), groundnut (Phule Pragati), vegetables in midland situation 	 Use SRI Technique for rice cultivation. Adopt Weed management practices Use micro irrigation (drip or micro sprinkler) 	Procure the seed from Maharashtra State Seed Corporation	
		Groundnut	Prefer short duration variety (Phule Pragati,)	 Adopt Weed management practices with dry weeder Use micro irrigation (drip or micro sprinkler) 	Procure the seed from Maharashtra State Seed Corporation
		Pulses (Cowpea, Horsegram, Green gram)	No change	Adopt mulching	
	Vegetables	Grow Dolichos bean or adopt soil conservation measures for regular vegetables	• Adopt Weed management practices.	• Procure the seed from Maharashtra	
		Water melon	Either follow the soil conservation measures for water melon or grow short duration pulses	 Use micro irrigation (drip or micro sprinkler) Adopt mulching 	State Seed Corporation. • Necessity of practical training on drip irrigation and mulching

Condition		Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation

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	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Lablab bean, horse gram, black gram, cowpea, mustard on residual moisture under low land situation	Minimum tillage and sowing of seed by dibbling.	Procure the seed from Maharashtr a State Seed	
in catchment		Groundnut	If farm pond water is available	• Adopt Weed	Corporation	
	Pulses (Cowpea, Horsegram, Green gram)	go for short duration pulses like cowpea (Konkan Sadabahar) and leafy vegetables	management practicesUse micro irrigation (drip or micro	·		
	Vegetables		sprinkler)			
		Water melon		 Adopt mulching 		

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	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Wal (lablab bean) - Var. Konkan Wal No. 1, Horse gram - Var. Dapoli - 1 on residual moisture under low land situation	Minimum tillage and sowing of seed by dibbling,Relay cropping	Procure the seed from Maharashtr a State Seed Corporation	
		Groundnut Pulses (Cowpea, Horsegram, Green gram) Vegetables Water melon	If farm pond water is available go for short duration pulses like cowpea (Konkan Sadabahar) and leafy vegetables	 Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler). Adopt mulching 		

Condition		Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Mid and low land Medium deep to deep soils	Not applicable			

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				
Rice	 Spray Cartap Hydrocloride 50SP @ 1.2 g/lit for the management of case worm. Close water in the field and Drag rope over crop to dislodge the cases after that open the water at one end of the field to collect the cases which can be destroyed afterwards Drain out excess water and spray Propiconazol @ 1ml /lit of water to control sheath blight 		Drain out excess water and harvest the crop before lodging	Immediate threshing and drying in shed				
Finger millet			Harvest the crop before lodging	Immediate threshing and drying in shed				
Groundnut	Drain out excess water	Drain out excess water 2.Spray mancozeb @ 2.5 g/lit of water to control Tikka and rust disease	Drain out excess water and harvest the crop immediately	• Separate the pods immediately and dry in shade.				
Niger	Drain out excess water	Drain out excess water	 Drain out excess water. Harvest the crop at	Immediate threshing and dry in shed				
Black gram	Drain out excess water	Drain out excess water	physiological maturity					
Horticulture								
Cucurbits	Drain out excess water	Drain out excess water	Drain out excess water					

Mango	Wait for congenial condition for application of Paclabutrazol @ of 0.75 g/ a.i. per meter average canopy diameter			
Cashew		-	-	-
Banana	 Drain out excess water Propping with bamboo Spray Hexaconazol @ 1ml/lit of water for control of Sigatoka Leaf spot and blight At pre flowering stage 	 Drain out excess water. Propping with bamboo 	Drain out excess waterPropping with bamboo	
Heavy rainfall with high speed winds in a short span				
Rice			Drain out water and harvest the crop at maturity immediately if lodging take place	Immediate threshing and drying in shed
Finger millet	-	-	Harvest the crop at maturity before its lodging.	
Groundnut	Drain out excess water	Drain out excess water	Drain out water and harvest the crop immediately	• Separate the pods immediately and dry in shade.
Niger	Drain out excess water	Drain out excess water	Drain out excess water	-
Black gram	Drain out excess water	Drain out excess water	-Do-	Immediate threshing and dry in shed

Horticulture				
Cucurbitaceous crop	Drain out excess water	 Drain out excess 	• Drain out excess water	
		water		

Cashew	 Prune the broken branches swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. 	 Prune the broken branches swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose. Swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation 	Swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. Collect and utilize fallen fruit immediately for suitable processing.	Swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk.
		 and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk. 		
Banana	 Drain out excess water Propping with bamboo	 Drain out excess water Propping with bamboo Flowers of broken plant may be used as vegetable 	 Drain out excess water Propping with bamboo Fruit of broken plants may be used as vegetable. 	
Outbreak of pests and diseases due to unseasonal rains				
Rice	• Spraying of Carbendazim 0.1% or Copper oxy chloride 0.25% or	• Spraying of Carbendazim 0.1% or	-	-

	tricyclazole 0.1% to control blast disease	Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease		
Fingermillets	-	-	-	-
Groundnut	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot		-
Niger	-	-	-	
Black gram	-	-	-	
Horticulture				
Cucurbitaceous crop			 Install Rakshak trap 4 per ha (Cue lure) to control fruit fly Spray with Copper Oxy Chloride @ 2.5 g/lit of water to control Downey mildew 	
Mango	 Take spray of Lambda Cyhalothrin 5 EC @ 0.6 ml/lit of water and second spray of Imidachloprid 17.8 EC @ 0.3 ml/lit of water for control of mango hopper, shoot borer. Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose 	• Spraying with 0.2% W.P. sulphur dust or 0.05% hexaconazol to control powdery mildew.	ha (Methyl eugenol) to	• Dipping fruits in hot water at 52°C for 10 min. after harvest to control post harvest rot.
Cashew	First spray with Profenophos 40EC 1ml/ lit of water, second spray with Lamda cyhalothrin 0.6 ml/ lit of water and third spray with prophenophos 1ml /lit of water @	-	-	-

	interval of one month. Sprays starting from leaf flush to control tea mosquito bug.		
Sapota		• Spraying of Metalaxyl + Mancozeb containing complex fungicide @ 0.2% to control fruit drop	Collect and destroy the fallen and infected fruits

2.3 Floods

Condition	Suggested contingency measure					
Transient water logging/ partial inundation	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest		
Rice	If washed out resowing of nursery by using mat nursery/sowing of sprouted seed on puddled field	• Drain out excess water	• Drain out excess water	 Drain out excess water. Immediate harvesting, threshing and drying in shed 		
Finger millet	Not applicable	Not applicable	Not applicable	Not applicable		
Groundnut						
Niger						
Black gram						
Horticulture (Vegetables)						
Cucurbitaceous crop	Not applicable	Not applicable	Not applicable	Not applicable		
Continuous submergence for more than 2 days						
Rice	If washed out resowing of nursery by using mat nursery/ sowing of sprouted seed on puddled field	 Drain out excess water Apply second dose (40%) of nitrogen after submergence is over 	• Drain out excess water	 Drain out excess water. Immediate harvesting, threshing and dry in shed 		
Finger millet	Not applicable	Not applicable	Not applicable	Not applicable		
Groundnut						
Niger						
Black gram						
Horticulture (Vegetables)						

Cucurbits	Not applicable	Not applicable	Not applicable	Not applicable
	1 1	1.1	11	11

Sea water intrusion				
Rice	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out, If wash out resowing of nursery with salt tolerant varieties like Panvel -1 and Panvel -2 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out 	 1.Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Immediate harvesting, threshing and drying in shed.
Fingermillets	Not applicable			
Groundnut				
Niger				
Black gram				
Horticulture (Vegetables)				
Cucurbitaceous crop	Not applicable	Not applicable	Not applicable	Not applicable
Coconut	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out Mound the crop with soil 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out

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							
Mango	Cover with shed net /Protective irrigationWater spray	Water spray / 1% potassium nitrate spray	Collect dropped fruits and use it for suitable processing	Collect dropped fruits and use it for suitable processing			
Cashew	• Cover with shed net /Protective irrigation Water spray	Protective irrigation	Protective irrigation				
Coconut	Cover with shed net.Water spray	Frequent irrigation	Frequent irrigation	Frequent irrigation			
Arecanut	Cover with shed net.Water spray	Frequent irrigation	Frequent irrigation	Frequent irrigation			
Cold wave		Not applicable					
Frost		Not applicable					
Hailstorm							
Mango		_	 Collect and destroy the fallen fruit to avoid the further built-up of pest and disease 	 Collect the fallen fruit to avoid the further built-up of pest and disease 			
Cyclone							
Mango	• Support the young seedlings/grafts	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing 	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing 			
Cashew	• Support the young seedlings/grafts	 Proper pruning and disposal of damaged or broken branches 	Proper pruning of damage or broken branchesCollect fallen nuts market it.	 Proper pruning of damage or broken branches Collect fallen nuts and store 			
Coconut	Support the young seedlings	Immediate disposal of damaged trunk	Collect fallen tender nuts, market it.	Collect fallen tender nuts market it.			
Arecanut	Support the young seedlings	Immediate disposal of damaged trunk	Collect fallen tender nuts market	Collect fallen tender nuts market it.			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

		Suggested co.	ntinger	ncy measures		
Drought		Before the event		During the event	A	After the event
Feed and	>	Conservation of green fodder as silage dry fodder as hay	\triangleright	Judicious use of feed resources	>	Green fodder
fodder		in flush season for utilization in lean period		processed as per type of livestock		production in next
availability		Dry fodder available should be processed i.e. Urea		possessed by the livestock owners.		Kharip season needs
		treatment of crop residues to enhance their nutritive	\triangleright	Distribution of fodder, UMMB		to be undertaken as
		value. For this inputs such as training of livestock		blocks, and other feed resources		a source of fodder at
		owners, material like urea, polythene sheet etc may be		stored in the affected area to the		earliest.
	_	provided free of cost to the livestock owners.		livestock owners as per the number		Mineral
		Judicial use of available feed resources by the livestock		and type of livestock possessed.		Supplementation
	_	owners.		Mineral supplementation – Mineral	_	should be continued.
		Non conventional feed resources such as Neem seed		mixture be provided for the		Concentrate feeding
		Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods	_	livestock@50 g/day/Anim.		for productive
	>	etc should be collected and stored.		Disposal/Transfer of the animals in		animals so as to
		Concentrate ingredients such as Grains, brans, chunnies		the area having feed resources		compensate the
		& oilseed cakes, low grade grains, Govt. Godowns	>	availability.		body condition and
		wastes, grains unfit for human consumption etc. should be procured for productive animals.		Concentrate feeding for productive animals to support minimum	A	production. The animals must be
	>	Urea molasses mineral blocks (UMMB) may be reserved		production & life saving of the		brought into cyclic
		with NDDB, Anand, Gujarat for emergency supply as		important animals.		stage for
		concentrate.	A	Other non productive animals are to		reproduction.
	>	Sugarcane bagasse, cane tops and molasses form		be fed at subsistence level.	>	Young crossbred
	ŕ	important byproducts. Sugarcane bagasse- is an	>	Use of food grains for biodiesel and		livestock needs to be
		important feed resource for ruminants.		distilleries should be stopped and		attended properly so
	>	Tree leaves are easily available. Leaves of neem, mango,		the grains be spared for productive		as to harness the
		banyan, pipal, babul, subabul, mahuva, etc. can be used		animals.		high productivity.
		as green fodder. Tree leaves are good source of protein,	>	Bypass protein concentrate	>	Adlib. feeding may
		calcium, Vitamin A and hence should be reserved for		ingredients may be provided in		be practiced with
		feeding during drought.		order to harvest maximum nutrients		balancing the
	>	Cactus is primarily found in deserts hence it is easily		for productive animals particularly		nutrients required.
		available during scarcity also. As such it is not used for		high productive crossbred cows.	>	The
		feeding animals but during scarcity it can be used.	\triangleright	Top feeds should be used during		unproductive/surplu
	>	Mineral mixture should be procured and stored for		scarcity period only.		s livestock needs to
		supply.	\triangleright	Oil seed cakes are good source of		be culled/disposed.
		Fodder Banks: Grasses & tree leaves: Grasses from		proteins and hence should be used	>	Livestock suitable
		periphery of forest area wastelands & farmlands & Dry		for productive animals only.		with the farming
		fallen forest tree leaves may be harvested & stored as	>	Feed supplements/ Additives needs		system practiced

- hay in bales.
- ➤ Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banks to be established at each Taluka in the drought area.
- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- > Cattle camp sites needs to be identified.
- > NGOs/Gorakshan Sanstha etc. needs to be identified.
- Anticipated number of livestock & feed resources to be provided needs to be assessed.
- > Livestock registration should be compulsory with identification by tagging
- Preparedness of veterinary services to drought prone areas.
- Encourage farmers to cultivate fodder crops.
- > Identification of the site for fodder depot.
- Facility to store fodder by creating centralized silage making facility with provision for transport.
- > Forage production and storage of fodder in irrigated areas.
- > Assessment of risk and vulnerability.
- Formation of village Disaster Management Committee.
- Establishment of drought monitoring system or early warning system.

- to be used widely for productive animals.
- Establishment of Cattle camps at identified sites.
- ➤ NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for maintenance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- Adaptation of proper distribution policy as per requirement with transport facility.
- Regular rest periods for working animals particularly bulls during hot period of the day.
- Capture and care of stray animals.
- The unproductive/surplus livestock needs to be culled/disposed.
- Sale of feed and fodder from the affected area to non affected area should be banned.
- Distribute fodder at reasonable rate.
- Monitoring feed and fodder prices.

- only should be maintained.
- Mechanization in agriculture needs to be encouraged.
- Feed processing needs to be encouraged in order to minimize the wastage of feed resources.
- In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.
- Readiness for feed and fodder bank as and when required for each districts with transport facility.
- Review of shortfalls in planning and refining action plan the before and during event.

	Suggested contingency measures				
Drought	Before the event	During the event	After the event		

Drinking	Water resources as in general are inadequate and hence
water	the resources should be trapped and increased.
	Available rain water harvesting technique should be adopted i.e. farm ponds etc.
	➤ Water conservations measures be adopted to increase water table like recharging of bore wells.
	Available water resources should be tapped and reserved.
	Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken.
	Judicious use of water in agriculture i.e. through drip/sprinkler irrigation.
	Wastage of water needs to be curbed.
	➤ Rain water harvesting measures needs to be implemented at village level.
	Proper utilization of Water to save water.
	Equal water distribution plan may be implemented.
	Cloud seeding desalination, recycle sewage water,

transvasment river project etc.

- Special distribution and carrying capacity should be implemented from other available resources. Water should be used as per the requirement
- of animals (@10-15 lit/ 100 kg body weight).
- Drinking water should not be used for washing animals.
- > Clean and chlorinated water be provided to prevent water borne diseases.
- Special distribution and carrying capacity should be supplemented from other available resources.
- Water for irrigation should be stopped.
- Judicious use of water for livestock.
- Supply of water through tankers during contingency.
- Private water resources such as wells shall be used for drinking water.
- Proper utilization of Water to save water.
- In vicinity of animal camp or chavani creation of borewell.

- Permanent water resources should be developed with campaign for public awareness.
- Steps should be taken to conserve water.
- Ensure fresh clean and cold water supply to livestock.

	Suggested contingency measures			
Drought	Before the event	During the event	After the event	
Health and	Personnel should be trained for health	> Services of trained personnel need to be made	Routine training	
disease	and disease management through	available in affected area with sufficient supply	programme as a refresher	
management	trainings and list of trained personnel	of life saving medicine of livestock.	course need to be	
	should be available at each district head	A team of veterinary experts be deployed for	implemented in relation to	
	quarter with stock of life saving	health management of drought hit livestock.	health and disease	
	medicine for livestock.	During occurrence of disease, affected animals	management during	
	Vaccination of animals for various	should be kept isolated and treated properly	drought with stock of life	
	diseases according to season.	and promptly.	saving medicine for	
	Deworming and spraying be done to get	Vaccination against contagious diseases like	livestock.	
	rid of endoparasites and ectoparasites to	HS, FMD, Theileriosis be carried out.	➤ There will be stress on	
	keep the health of animals in good	➤ Mineral mixture be provided to take care of	animals due to	
	condition.	deficiency disorders.	deterioration of health	
	Personnels should be trained for health	➤ Tick control measures be undertaken to prevent	during drought period.	
	and disease management through	tick borne diseases in animals under stress.	Concentrates and vitamin-	
	training	Deworming should be carried out.	mineral supplements be	
	➤ List of trained personnel should be	➤ Feed additives/Tonics/Vitamin supplements	provided to minimize the	
	available at each district head quarter.	should be provided.	stress on animals.	

- Feedadditives/Tonics/ Vitamin supplements should be stocked.
- Vaccines, Insecticides, disinfectants and dewormers needs to be stocked.
- Records/PM/ Carcass disposal arrangements needs to be ensured.
- Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls.
- Create temporary shade shelters to prevent heat stress on the animals. (animal camps)
- Supply of Mineral and Vitamins mixture.
- Application of preventive and control measures of SP & MD.

- ➤ Post Mortem /record keeping/carcass disposal arrangements be effected.
- > Restriction on movement of the animals to prevent the spread of diseases.
- Periodic disinfection and disinfestations of premises where animals are kept.
- Permission of only healthy and vaccinated animals in cattle market.
- > By proper treatment with supervision and exercise over starvation.
- > Special transport facility of mobile van for veterinary team be deployed

- The animals should be observed for signs of contagious diseases or deficiency disorders.
- Vaccination spraying and deworming programme needs to be undertaken.
- Record of affected livestock to be submitted for compensation of the loss.
- Farm disinfection and disinfestations.
- Assessment of losses due to mortality if any.

	Suggested contingency measures				
Floods	Before the event	During the event	After the event		
Feed and	➤ Identification of flood prone zones and flood forecasting.	Quick evacuation of livestock from	> Green fodder		
fodder	➤ Installation of early warning systems.	flood plane areas before area	production in next		
availability	> Steps to prevent spoilage of food and water supply due to	become flooded	Kharif season needs		
	flood water.	Prevent outflow of manure pit in	to be undertaken as		
	➤ Dedicated helpline to emergency contact and	river	a source of fodder at		
	communication at taluka level.	Proper feed, vaccine, drugs,	earliest. Fodder seed		
	Avoid construction of farm buildings in flood risk areas.	disinfecrants and feed supplement	of improved fodder		
	Local ponds and canals regularly inspected and cleared	distribution policy adopted with	crop varieties needs		
	off from obstruction	transport facility.	to be distributed.		
	Adequate stock of Tetanus toxoid.	Prevent spoilage of food and water	Mineral		
	Change cropping pattern according to flood risk periods.	supply	Supplementation		
	➤ Storage of available fodder at safe place before rainy	Judicious use of feed resources	should be continued.		
	season.	processed as per type of livestock	Concentrate feeding		
	Training of local personnel for disaster management.	possessed by the livestock owners.	for productive		
	➤ Dry fodder available should be processed i.e. Urea	Distribution of fodder, UMMB	animals so as to		
	treatment of crop residues to enhance their nutritive value.	blocks, other feed resources stored	compensate the		
	For this inputs such as training of livestock owners,	in the affected area to the livestock	body condition and		
	material like urea, polythene sheet etc may be provided	owners as per the number and type	production.		
	free of cost to the livestock owners.	of livestock possessed.	➤ The animals must be		

- Judicial use of available feed resources by the livestock owners.
- ➤ Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored.
- Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains, Govt Godowns wastes, grains unfit for human consumption etc. should be procured for productive animals.
- Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate.
- ➤ Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants.
- ➤ Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A & hence should be reserved for feeding during drought.
- ➤ Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.
- Mineral mixture should be procured and stored for supply.
- Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.
- Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banksto be established at each Taluka in the drought area.
- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- > State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- > Cattle camp sites needs to be identified.
- NGOs/Gorakshan Sanstha etc. needs to be identified.
- Anticipated number of livestock & feed resources to be

- Mineral supplementation Mineral mixture be provided for the livestock@50 g/day/Anim.
- Disposal/Transfer of the animals in the area having feed resources availability.
- Concentrate feeding for productive animals to support minimum production & life saving of the important animals.
- Other non productive animals are to be fed at subsistence level.
- Use of food grains for biodisel and distilleries should be stopped and the grains be spared for productive animals.
- Bypass protein concentrate ingredients may be provided in order to harvest maximum nutrients for productive animals particularly high productive crossbred cows.
- > Top feeds should be used during scarcity period only.
- Oil seed cakes are good source of proteins and hence should be used for productive animals only.
- Feed supplements/ Additives needs to be used widely for productive animals.
- Establishment of Cattle camps at identified sites.
- NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for maintainance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- The stored feeds & fodder can be

- brought into cyclic stage for reproduction.
- Young crossbred livestock needs to be attended properly so as to harness the high productivity.
- Adlib. feeding may be practiced with balancing the nutrients required.
- The unproductive/surplu s livestock needs to be culled/disposed.
- Livestock suitable with the farming system practiced only should be maintained.
- Mechanization in agriculture needs to be encouraged.
- Feed processing needs to be encouraged in order to minimize the wastage of feed resources.
- In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.
- Fodder resources should be exploited with sufficient transport facilities

provided needs to be assessed. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the city where feeds & fodder (silage) can be stored for emergency use	be exploited with sufficient transport facilities from other areas	from other areas of the district even after the event.

alth and disease management rough trainings and list of ined personnel should be	>	Suggested contingency measures During the event Services of trained personnel need to be made available in affected area with sufficient supply of	>	After the event
alth and disease management rough trainings and list of ined personnel should be	>			
ailable at each district head arter for flood affected areas th stock of life saving edicine for livestock. accination of animals for rious diseases according to ason. eworming and spraying be the to get rid of endoparasites	A	life saving medicine of livestock. Shifting of the animals at suitable place for temporary shelter. Disaster management team of veterinarians be deployed. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. Various referral centres in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques	A	Routine training programme as a refresher course need to be implemented in relation to health and disease management during flood with stock of life saving medicine for livestock. After flood condition there are chances of occurrence of specific diseases. Preventive measures
d ectoparasites to keep the alth of animals in good ndition.	>	Various diagnostic facility with modern techniques should be made available at Tahsil level besides district level so that more number of farmers may approach for diagnosis & treatment. Adequate nutrition including vitamin-mineral supplements should be given to animals to keep their health in proper condition. During occurrence of contagious diseases, affected animals should be kept isolated and treated properly. Isolation and treatment of ailing animals viz. hypothermia, wound, diarrhoea and pneumonia be undertaken.	A A	should be taken to reduce occurrence of diseases. Vaccination and deworming programme needs to be undertaken. Animals should closely be observed for new/re-emerging diseases. Proper disposal of carcass is very important in flood affected areas from public
wareness amongst farmers garding health care practices ring flood disaster be dertaken. edadditives/Tonics/ Vitamin pplements should be stocked. accines /Dewormers needs to stocked. ecords/PM/ Carcass disposal	A A A	animals be carried out. Use of antivenum in snake bite cases. Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken. Post Mortem /record keeping/carcass disposal	A	health point of view Methods of disposing of dead animals include burning, burying and composting Disinfection of animal sheds with 2% formaldehyde / 4% caustic soda. Provide proper shelter to protect animals from cold
rir de ed pp acc st ecc rar	ng flood disaster be rtaken. additives/Tonics/ Vitamin lements should be stocked. cines /Dewormers needs to ocked. ords/PM/ Carcass disposal agements needs to be	ng flood disaster be rtaken. additives/Tonics/ Vitamin lements should be stocked. cines /Dewormers needs to ocked. ords/PM/ Carcass disposal agements needs to be red.	should be undertaken. > Deworming and spraying of apparently healthy animals be carried out. > Use of antivenum in snake bite cases. > Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken. > Post Mortem /record keeping/carcass disposal arrangements be effected.	should be undertaken. Deworming and spraying of apparently healthy animals be carried out. Use of antivenum in snake bite cases. Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken. Post Mortem /record keeping/carcass disposal arrangements be effected.

>	shed should be constructed. Preparation of walls and hips to	<u> </u>	lime. Turn off electrical power.	>	Record livestock t	of	affected
	*		•				
	keep flood water away from	-	Training of farmers for maintaining optimum health		for compe	ensatioi	n of the
	village.		of animals, balance ration and recognize early signs		loss.		
	Supply of Mineral and Vitamins		of disease and managemental shortfalls during		In regular	r floo	d prone
	mixture.		floods.		areas defe	enses	such as
>	Application of preventive and	>	During severe regular flood, shifting of village away		levees, bu	ınds, r	eservoirs
	control measures of SP & MD.		from river or changing the path of river away from		and weivs	should	l be used
			village.		for future p	prevent	ions.

		Suggested contingency m	easures			
Cyclone	Before the event			During the event	After the event	
Cyclone Feed and fodder availability	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	There should be availability of fodder depot one each for every district. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the district where feeds & fodder (silage) can be stored for emergency use. The store house should have proper walls on all sides with one entrance to avoid effect of cyclone. Feed & fodder should be stored as emergency stock in Govt.		Adaptation of proper distribution policy as per requirement with transport facility.	Readiness for feed and fodder bank as and when required for each districts with transport facility should	
		warehouses which can be distributed to areas that need them		resources should be exploited with sufficient transport facilities from other areas of the district	be created.	

	Suggested contingency measures			
Cyclone	Before the event	During the event	After the event	
Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Rain water harvesting should be done in all districts. Every district should be made self-sufficient. Each district has plenty of rain water which should be harvested so that these areas are self-sufficient & if required they should be able to provide water to other 	 implemented from other available resources. Rain harvested water & bore well water should be disinfected & provided to the animals. Special distribution and carrying capacity should be implemented from other available resources. Disinfection of the water for consumption of the animals should be carried out to prevent water- 	Permanent water resources should be developed even after the event with campaign for public	

	dry areas too. The rain water should not be wasted in sea. Walls of the well should be constructed much above the ground level to avoic contamination.	preventing spread of airborne infections should be carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities	ee or
Cyclone	Refere the event	Suggested contingency measures During the event	After the event
Cyclone Health and disease management	Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for cyclone affecting areas with stock of life saving medicine for livestock. Vaccination against common infections like FMD, swine fever, black quarter, anthrax, haemorrhagic septicaemia, etc. should be given to animals. Stock of medicines should be kept available for use during cyclone. The walls and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Supply of Mineral and Vitamins mixture. Application of preventive and control measures of SP & MD.	 Neep watch on weather and listen to radio or TV and make others alert by warning. Shift the animals at safer place or in well secured cattle sheds. The wall and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Services of trained personnel need to be made available in cyclone affected area with sufficient supply of life saving medicine of livestock. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. Various referral centers in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be made available at Tahsil level besides district level so that more number of farmers may approach for diagnosis & treatment. 	After the event Routine training programme as a refresher course need to be implemented in relation to health and disease management during cyclone with stock of life saving medicine for livestock. Do not free the animals unless all clear or officially advised it is safe.

2.5.2 Poultry

	Suggested contingency measures			
Drought	Before the event ^s	During the event	After the event	
Shortage of	➤ There should be availability of feed, feed	Adaptation of proper distribution policy as	Readiness for feed, feed	
feed	ingredients and mineral mixtures with	per requirement with transport facility.	ingredients and mineral	
ingredients	sufficient storage capacity for every	Supply of feed ingredients through	mixtures as and when required	
	district.	government channel to the end users at	for each districts with	
	Registration of poultry farms made	reduced price.	transport facility.	
	compulsory to make it easier to be	➤ Make sure that birds receive adequate	> Strategies to minimize the	
	prepared and provide quick help to the	quantity and essential nutrients through	effects of stress due to drought	

farmers

- > Storage of feed ingredients of previous year in sufficient quantity to use in scarcity period.
- ➤ Identification and storage of locally available feed ingredients as an substitute for scares ingredients.
- A farm disaster kit should be prepared in advance. The kit should be placed in a central location and everyone should know where it is. The contents of the kit must be checked regularly to ensure fresh and complete supplies. The following items should be included in the kit in addition to the items that are used everyday:
 - Updated list of all farms with information about birds, their location and records of feeding, vaccination, tests.
 - Basic first aid kit.
 - Handling equipment & cages.
 - Waterier and feeders.
 - Sanitation and disinfection equipments & chemicals.
 - Other safety and emergency items for vehicles and trailers, e.g., Extra tyres, winches, tools, etc.
- Maize grain is limiting source as a feed ingredient in poultry feed.
- > Store maize for poultry feed.
- Substitute feed ingredient should be tapped as replacement for maize grain which can be used for poultry feed.
- Concentrate ingredients such as Grains, brans, & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured.
- ► Ban on export of oilseed meals needs to

- feed to minimize stress and to prevent occurrence of disease outbreaks.
- Crucial use of available feed avoiding excess feeding and wastage of the feed.
- > Stored feed ingredients will be utilized during contingency.
- Birds should be evacuated and taken to shelters as soon as there is news of an imminent disaster. Every flock must have some form of durable and visible identification.
- > There should be arrangements for appropriate transport, suitable for birds. Stranded birds should be rescued and taken to safer places.
- ➤ If the stranded place is considered safe for the next week or so, the birds may be left there but should be provided with feed and drinking water.
- Arrangements should be made so that veterinary and Para- veterinary personnel can quickly reach all affected farms to provide necessary measures.
- Officials and other personnel engaged in relief work should also gather intelligence on the extent and nature of the damage to individual farms and villages so that appropriate relief measures can be implemented.
- Adequate nutrition should be given to birds to keep their health in proper condition.
- > The available ingredients as poultry feed should be used with utmost care.
- Non-conventional feed ingredients can also be tapped to use as a poultry feed taking into consideration the antinutritional factors present in it.
- Alternate day feeding for broilers.
- Avoid feed wastage.
- Restricted feeding for layers.

- by optimum feeding and management of the flock.
- ➤ Use of mineral and vitamin supplements to reduce stress.
- Follow up of affected livestock for adequate feed supply.
- Proper utilization of the resources should be carried out. The situation should be assessed properly and decision has to be taken on which birds to be treated first and how.
- The birds that are in very poor condition with no chance of recovery should be culled in humane manner.
- The dead birds should be disposed off in hygienic manner by burial or incineration.
- The situation at the farm also should be assessed and the corrective measures should be taken as soon as possible. All damages should be repaired and shed should be made functional. Disinfection of the premises and shed should be carried to prevent spread of diseases.
- The stress on poultry due to shortage of feed during drought period can be minimized by proper feeding of the birds after drought period.
- Ad lib. feeding to compensate the egg production.
- > Feed additives may be used to maximize production

be implemented.	Poor layer birds to be culled.
Feed required for broilers3.5 kg./bin	for Broiler rear up to 4 weeks only.
six weeks. For Layers 55 kg /layer	
for a period of 72 weeks.	maximize the feed efficiency.

	Suggest	ed contingency measures		
Drought	Before the event	During the event	After the event	
Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Conservation of water for drought period. Water conservations measures adopted to increase water table like recharging of bore wells. Available water resources should be tapped and reserved. Leak proof water supply systems. Available rain water harvesting technique should be adopted i.e. farm ponds etc. Water conservations measures be adopted to increase water table. Judicious use of water. Use of nipples as waterers. 	 Special distribution and carrying capacity should be implemented from other available resources for poultry. Optimum use of available water as per the requirement of birds. Supply of adequate water to farms with transportation facility. Supply of water through tankers during contingency. Judicious use of water. Use of nipples as waterers. 	 Permanent water resources should be developed even after the event with campaign for public awareness. Evaluation and fine tuning of the contingency majors. Ensure clean, cold water supply to birds. Steps should be taken to conserve water and to develop permanent water resources. Fresh and ad lib. water should be provided. 	

	Suggested contingency measures			
Drought	Before the event ^s	During the event	After the event	
Health and	Personnel should be	Services of trained personnel need to be made	Routine training programmed as a refresher	
disease	trained for health and	available in affected area with sufficient	course need to be implemented in relation to	
management	disease management of	supply of medicine, mineral mixture and	health and disease management during	
	poultry through	vaccine for poultry.	drought with stock of life saving medicine	
	trainings and list of	Immediate attention to diseased birds by	and vaccine for poultry to prevent outbreak.	
	trained personnel	veterinarians.	Proper disposal system of poultry carcasses.	
	should be available at	Regular visits of veterinarians to detect	Efforts to minimize effects of stress through	
	each district head	diseased birds and veterinary care	optimum feeding, management and	
	quarter with stock of	Vaccination of birds if necessary.	veterinary care.	
	medicine, mineral	➤ If there is occurrence of disease, affected birds	➤ Assessment of losses due to mortality if	
	mixture and vaccine	should be kept isolated and treated properly	any.	
	for poultry.	and promptly.	Proper disposal of carcass.	

- Regular and strict vaccination of birds.
- ➤ Vaccination of wild birds through water whenever possible.
- Deworming of birds before and after drought period.
- Appointment of veterinarian on farms made compulsory

- Periodic disinfection and disinfestations of farm and premises.
- Measures to minimize risk of spreading contagious diseases.
- Birds should be checked for injury/ signs of disease.
- Antibiotic through water
- ➤ Anti-stress supplements
- ➤ Multivitamin supplements
- ➤ Bio-security measures to be implemented.
- Proper disposal of poultry carcass.

- There will be stress on birds due to deterioration of health during drought period. Hence proper feeding should be done to minimize the stress on birds by supplying vitamin supplements.
- Birds should be tested at regular interval to confirm that they are free of contagious diseases.
- Proper disposal of birds died of various diseases.
- Vaccination.
- Replacement of stock.

	Suggested contingency measures					
Flood	Before the event	During the event	After the event			
Shortage of feed	Poultry owners needs to be advised to be in readiness for-	Shifting of birds at Alternate poultry sheds with feed stock	Shifting at original site after repair of the shades and			
ingredients	 Alternate poultry sheds with feed stock at safe places. Displacement of stock- transport arrangements. Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers Measures to avoid spoilage of feed stores due to water. Construction of feed stores to stores feed sufficient 	at safe places. Stress reducing measures to be adopted. Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district. Adequate nutrition should be	restoration of the necessary facilities. Proper feeding should be done to minimize the stress on birds Ensure good quality feed and fodder supply to birds Feed and feed ingredients resources should be			
	for at least one month. Farmers will be encouraged to purchase and store the feed ingredient when it is cheaply available in the market. Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas.	given to birds to keep their health in proper condition. Judicious use of available feed.	exploited with sufficient transport facilities from other areas of the district even after the event.			

	Suggested contingency measures		
Flood	Before the event	During the event	After the event

.	
Drinking water	> Arrangement of clean and hygienic
	water.
	Look and contamination much water
	Leak and contamination proof water
	supply system.
	> Installations of the watering systems
	targeted to optimum use of available
	water avoiding water wastage.
	Source of water should be away from
	•
	flood affected areas.
	➤ Sufficient storage capacity should be
	made available particularly during rainy
	season in view of the forecasting of
	flood.
	Encourage the farmers for rain water
	C
	harvesting.
	➤ Proper utilization of Water to save
	water.
	water.

- Sufficient facility for transportation with advanced proper planning should be made in the areas of each district.
- ➤ Water treatment to avoid entry of pathogens through drinking water.
- Judicious use of potable chlorinated water.
- Avoid contamination of wells and tube wells by flood water.
- > Proper utilization of Water to save water.
- > Supply of water through tankers during contingency.
- > Water purification measures for ensuring hygienic water supply.

- Actions to rectify the water related issues observed during flood period.
- Ensure potable water supply to birds.
- Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district.
- Sources of potable drinking water should be tapped for its proper use.
- Use of disinfected water.
- Arrangements of hygienic water supply.

		Suggested contingency measures		
Flood	Before the event	During the event	After the event	
Health and	Personnel should be trained for health and	Services of trained personnel need to	Routine training programmed as a refresher course need	
disease	disease management through trainings and	be made available in affected area	to be implemented in relation to health and disease	
management	list of trained personnel should be available	with sufficient supply of medicine,	management during flood with stock of medicine and	
	at each district head quarter for flood	mineral mixture and vaccine.	vaccine for poultry to prevent outbreak. Proper disposal	
	affecting areas with stock of medicine,		system of poultry carcasses.	
	mineral mixture and vaccine for poultry.	During flood if it is difficult to shift		
		and manage large number of birds,	Cleaning and disinfection of poultry farms.	
	Vaccination and deworming schedule	they should be slaughter and sent to		
	should be observed strictly.	cold storage.	Monitoring for disease outbreaks in birds through regular farm visits by veterinarian.	
	Additional deworming can be carried out	Vaccination against contagious		
	before and after floods.	diseases.	Proper disposal of carcass is very important in flood	
			affected areas from public health point of view.	
	Medicine store facility with availability of	Proper disposal of birds died of		
	adequate drugs at each farm and veterinary	diseases particularly contagious	Vaccination for RD and IBD to avoid outbreaks.	
	dispensaries.	diseases.		
			Anti-stress treatment of birds is important to prevent	
	Training of farmers to identify signs of	Disinfection of sheds be undertaken.	mortality.	
	common contagious diseases particularly to			

avoid outbreaks.	Immediate veterinary help to the	Preventive measures should be taken to reduce occurrence
	farms.	of diseases, particularly use of antibiotics in drinking
Do not built poultry house on nalla or		water.
stream or otherwise remove the birds before	Adequate proper feeding and	
monsoon from such poultry house.	management.	Hygienic measures should be followed.
		Birds should be served for emerging infectious diseases.
		Restriction on movement of the birds.
		Compensation of the loss.

	Suggested contingency measures		
Cyclone	Before the event	During the event	After the event
Shortage of	Information at every district head quarter	> Feed and feed ingredients	> Feed and feed ingredients resources should be
feed	regarding availability of feed and feed	resources should be	exploited with sufficient transport and storage
ingredients	ingredients and mineral mixture resources from other areas with storage facility.	exploited with sufficient transport and storage facilities from other areas of the district.	after the event.
		Suggested contingency meas	sures
Cyclone	Before the event	During the event	After the event
Drinking water	Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the cyclone.	Sufficient facility for transportation with advanced proper planning should be made in the areas of each district.	with advanced proper planning should be made in the areas of each district

		Suggested contingency measures	
Cyclone	Before the event	During the event	After the event
Health and	Personnel should be trained for health and	> Services of trained personnel need to be	Routine training programme as a
disease	disease management through trainings and	made available in affected area with facilities	refresher course need to be
management	list of trained personnel should be available	to overcome heat waves through water	implemented in relation to health
	at each district head quarter during heat and	availability and cold through proper closed	and disease management during
	cold waves with stock of life saving	shelter with sufficient supply of medicine	heat and cold waves with stock of
	medicine, vaccine, feed and mineral	and vaccine for poultry. During heat fogging	medicine and vaccine for poultry
	mixture for poultry.	system should be ready and during cold	and sufficient arrangement.

artificial heat through electricity need to be provided. Detection & treatment of ailing birds. Vaccination against contagious diseases. Antistressor preparations or multivitamins preparations through drinking water during stress. Ad. lib. Cold water availability Supply of medicine and vaccine for poultry. Feed in cool hrs and increase the frequency of feeding with high density feeds. Mineral & Vitamin supplementation	 Anti- stress to relieve stress. Birds should be monitored for occurrence of diseases. Vaccination to avoid outbreaks. Proper disposal of poultry carcasses.
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2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Not applicable		
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Need to implement cost-effective water efficiency and conservation measures in very early stage to handle the drought. Strategic plan should be made to construct bunds & conserve water in drought prone areas.	In severe drought condition Most of the stock can be harvested immediately while Some portion of the local aquatic species should be transfer to the less affected areas so as to conserve them and reintroduce in its regional habitat.	Water policies should be determined If we want to restore our inland fishery resources. Need to set up hatcheries for drought affected fish species to avoid their extinction, and the conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.
(ii) Changes in water quality	Regular monitoring of water quality	Need to harvest the stock to minimize economic losses before mass mortality due to undesired water quality.	After achieving desired water quality, conserved species once again need to be reintroduced in their original habitats.

(iii) Any other	Gene bank should be made for all indigenous local commercially & ecologically important species.	To conserve the endangered species breeding and rearing indoor facility may be created for future restoration.	The conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.
P. A que quiture			
B. Aquaculture (i) Shallow water in ponds due to insufficient rains/inflow	Water temperature may get raised and also Dissolved Oxygen level may get declined, hence efforts should made to increase the depth of pond & avoid water seepage by using bentonite clay, plastic liners etc. Also artificial oxygenation systems as aerators etc. should be incorporated in aquaculture system.	Water recycling with the aid of potential filtration systems can be applied if available. Provide artificial oxygenation. If water level is too much low, can lead to mass mortality due to environmental stress hence it will be better to harvest the stock immediately.	Construction of small reservoirs or dams should be newly developed in drought prone area. Identifying culturable air breathing species / hardy species (e.g. <i>Notopterus, Clarius, Puntius</i> etc.) suitable to the regional aquatic environment.
(ii) Impact of salt load build up in ponds / change in water quality	Throughout the culture period salinity & other parameters should be checked for regular intervals. Fresh water storage ponds should be developed at aquaculture site.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Identifying best suitable euryhaline spp. (Pearl spot, Sea bass, Rabbit fish, mullets etc.) for the culture which can tolerate wide range of salinity.
(iii) Any other			

2) Floods			
A. Capture			
Marine	Disaster preparedness mission through Sea walls, Embankment. In future early warning systems and evacuation strategy planning for flood prone areas. Plan of Preventive measures against the epidemiological diseases, like malaria, cholera, <i>dengue</i> etc. among coastal communities. Educating coastal population about Disaster mitigation and provision of good transport means in coastal areas prior to the Flooding event which will be helpful for rescue operations.	Aid to populations at the affected zones and shelters. Affected population should be provided with adequate food & medicines in time.	National & international financial support for research on the various aspects of the flood will be needed for future strategies. Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socioeconomic status. Control of vector-borne endemic and epidemic diseases. Mangrove plantation & conservation strategies should be adopted in estuarine region for minimizing future risk.
Inland	In future early warning systems and evacuation strategy planning for flood prone areas. Awareness of People living in rural zones, or urban margins with regards to the geography of their area as they do not take into account whether they are on a river's flood plain, an unstable hillside, a dry river bed in a flooding area, etc., when they (fisheries community) build their houses. More emphasis should be given on the maintenance of public infrastructure, such as highways, secondary roads and bridges prior to the flooding event which will be helpful for rescue operations. Awareness should be created for using good materials for their	Aid to populations at the affected zones and shelter. Timely help to populations at the affected zon and shelters. Affected population should be provided wi adequate food & medicines in time.	minimize socio-economic losses. Microfinance to the affected population

	construction of houses. Strategic planning to build up local rescue teams in flood prone areas.		
(i) Average compensation paid due to loss of human life	Not applicable		
(ii) No. of boats / nets/damaged	Not applicable		
(iii) No. of houses damaged	Not applicable		
(iv) Loss of stock	Not applicable		
(v) Changes in water quality	Not applicable		
(vi) Health and diseases	Preventive measures of Plan of the Health Ministry for the prevention of epidemiological diseases, like malaria, cholera, <i>dengue</i> etc. & vaccination in flood prone area.	Affected population should be provided with adequate food & medicines in time.	Control of vector-borne endemic and epidemic diseases.

B. Aquaculture			
(i) Inundation with flood water	Early warning systems should be developed to minimize future risk. Elevating the height of peripheral dykes of the aquaculture ponds. Providing elevated net fencing on the bunds to the avoid loss of fish during flooding.		Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Water contamination and changes in water quality	Elevating the peripheral dykes of the aquaculture ponds.	Need to harvest the stock as early as possible to minimize economic losses	Drain out all the water from the pond and refill it with good quality water for future crop.
(iii) Health and diseases	Adequate vaccination of fish stocks prior to flooding event is	In situ observations & analysis of health status of cultivable species and stress inducing factors and	Quarantining of culture pond before next stocking.

	recommended to minimize the risk.	recommendation of treatments to specific diseases.	
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.
(v) Infrastructure damage (pumps, aerators, huts etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for the pumps & aerators in flood condition.	Transport of the pumps, aerators etc. to the safer places.	Insurance and micro-finance for repair and maintenance of the infrastructure.
(vi) Any other	-	-	-

3. Cyclone / Tsunami			
A.Capture			
Marine	Timely Communication of weather forecasting to fishermen Implementation of Tsunami detection & warning system in Indian ocean and evacuation strategy planning for Cyclone / Tsunami prone area. Disaster preparedness mission through Sea walls, Embankment Provision of Wave breakers &dry docks for fishing vessel security. Encouragement and financial incentives should be given to fishermen to carry Safety Devices on their fishing crafts. Educating coastal population about Disaster mitigation and provision of good transport means in coastal areas prior to the Cyclone / Tsunami event which will be helpful for rescue	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socioeconomic status. Control of vector-borne endemic and epidemic diseases; National & international financial support for research on the various aspects of the Cyclone / Tsunami will be needed for the planning of future strategies. Mangrove conservation, plantation strategies should be adopted in estuarine / coastal region for minimizing future risk

	operations.		
	Preventive measures for the prevention of epidemiological diseases, like malaria, cholera, dengue etc		
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland	Timely Communication of weather forecasting to fishermen Encouragement and financial incentives should be given to fishermen to carry safety devices on their fishing crafts.	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socio- economic status. Rehabilitation of fishermen communities.
B. Aquaculture			
(i) Overflow / flooding of ponds	Elevating the peripheral dykes of the aquaculture ponds Early warning systems should be developed to minimize future risk.	In very initial stage prior to flooding, need to harvest the stock as early as possible to minimize economic losses. In severe condition nothing can be controlled.	Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Changes in water quality (fresh water / brackish water ratio)	Elevating the peripheral dykes of the aquaculture ponds. Regular monitoring of water quality.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Drain out excess water, After achieving desired water quality, restocking by adopting standard aquaculture protocols.
(iii) Health and diseases	Adequate vaccinisation of the stocks prior to this is recommended to minimize the risk	In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Disinfecting / Quarantining of culture pond before the next stocking.
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.

(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Elevating the peripheral dykes of the aquaculture ponds and Initial provision of good indoor storage facility for pumps & aerators.	Transport of the pumps, aerators etc. to the safer places.	Insurance and microfinance with low interest from Govt. for the repair and maintenance of the infrastucture.
(vi) Any other			
4. Heat wave and cold wave			
A. Capture			
Marine	Not applicable		
Inland	Not applicable		
B. Aquaculture			
(i) Changes in pond environment (water quality)	Depth of the aquaculture ponds should be increased to minimize thermal stress.	Aerators should properly utilized for the good circulation of water maintaining good pond environment.	Identification of best suitable eurythermic spp. for aquaculture to tolerate wide temperature range.
	Plantation at the peripheral dykes of aquaculture ponds can be recommended.		
(ii) Health and Disease management	Maintaining water parameters at desired levels can reduce the stressful condition & can avoid disease.	Aerators should properly utilized for the good circulation of water maintaining optimum water quality.	Early warning systems should be developed to minimize future risk. Identification of hardy species for aquaculture practices.
(iii) Any other			

^a based on forewarning wherever available

SINDHUDURGA

State: MAHARASHTRA

Agriculture Contingency Plan for District: <u>SINDHUDURG</u>

	1.0	District Agricu	lture profile				
1.1	Agro-Climatic/Ecological Zone						
	Agro Ecological Sub Region (ICAR)	Central and south Sahyadris, hot moist, subhumid to humid eco-subregion (19.2)					
	Agro-Climatic Zone (Planning Commission)	Western Coas	st Plains and Gh	nat region (XII)			
	Agro Climatic Zone (NARP)	South Konkan Coastal Zone (MH-1)					
	List all the districts or part thereof falling under the NARP Zone	Ratnagiri and Sindhudurg					
	Geographic coordinates of district headquarters	Latitude		Longitude	Altitude		
		16°10 [°] 30.42 ^{°°} 15°37°.16.40°		73° 44'42.89" E 73°19' 74.18 E	213 m		
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Dr. Haladavnekar P.C., Associate Director of Research, Regional Fruit Research Station, Vengurle- 417 516, Dist. Sindhudurg (M.S.)					
	Mention the KVK located in the district Krishi Vigyan Kendra, Kirlos, Tal. Malvan, Dist. Sindhudurg (M.S.)- 416510						
	Name and address of the nearest Agromet Field Unit for agro- advisories in the zone	Technical Officer, Integrated Agro Advisory Services, Agricultural Research Station, Mulde, Dist. Sindhudurg (M.S.)					
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)		
	SW monsoon (June-Sep):	3047.7	91	First week of June	2 nd week of October		
	NE Monsoon(Oct-Dec):			-	-		
	Post monsoon showers (Oct Dec)	195.6	9	-	-		
	Winter (Nov-Feb)	7.7	0	-	-		
	Summer (Mar-May)	41.1	2	-	-		
	Annual	3292.1	102	-	-		

1.3	Land use	Geographical	Cultivable	Forest	Land under	Permanent	Cultivable	Land	Barren and	Current	Other
	pattern of the	area	area	area	non-	pastures	wasteland	under	uncultivable	fallows	fallows
	district (latest				agricultural use			Misc.	land		
	statistics)							tree			
								crops			
								and			
								groves			
	Area ('000 ha)	504	163	55.5	21	1	65	35	122	16	42

Source: District Socio-economic Review, 2014-15(Directorate of Economic & Statistics, Govt. of Maharashtra)

1.4	Major Soils (common names like red sandy loam deep soils	Area ('000'ha)	Percent (%) of total
	(etc.,)		
	Deep soils	57.17	11.34
	Medium deep soils	192.28	38.15
	Shallow soils	254.53	50.50

Source :- NBSS & LUP, Nagpur

1.5	Agricultural land use	Area ('000'ha)	Cropping intensity %	
	Net sown area	163	102.4	
	Area sown more than once	4	102.4	
	Gross cropped area	167		

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.6	Irrigation Area ('000'ha)							
	Net irrigated area	28.86	28.86					
	Gross irrigated area 30.95							
	Rainfed area	127	127					
	Sources of Irrigation	Number	Area ('000'ha)	Percentage of total irrigated area				
	Canals		7.6	44.7				
	Tanks	-	-	-				
	Open wells	4772	9.2	54.1				
	Bore wells	110	0.2	1.2				
	Lift irrigation schemes	1451	0.2	1.2				

Micro-irrigation			
Other sources (please specify)			
Total Irrigated Area		17.0	
Pump sets	2529		
No. of Tractors	35		

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tahasils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
Over exploited			
Critical			
Semi- critical			
Safe			
Wastewater availability and use			
Ground water quality		<u> </u>	
*over-exploited: groundwater utilization > 100%; critical: 90-100%; s	semi-critical: 70-90%; safe:	<70%	

1.7 Area under major field crops & horticulture etc.

1.7	Major Field crops cultivated		Area ('000' ha)				
		K	harif	Ra	abi	Summer	Total
		Irrigated	Rainfed	Irrigated	Rainfed		
	Rice		60.54	3.9		1.276	78.7
	Finger millet		1.64	0.5		0.059	3.7
	Prosomillet		0.3	-			0.3
	Pulses (Lab lab bean, black gram, horse gram, cowpea, etc.)		1.4	0.66			6.0
	Groundnut		1.14	0.74			5.8
	Niger, sunflower			0.1			
	Sugarcane			0.62			0.62

Horticultural crops – Fruits	Total Area ('000'ha)
Mango	31.36
Cashew	60.6
Sapota	0.2
Other fruit crops	80.93
	Horticulture crops – Vegetables
Okra, Brinjal, Chilli and Leafy vegetables etc.	0. 7 (2001-02)
Plantation crops	
Coconut	16.5
Arecanut	0.8
Fodder crops	3.9 (2001-02)

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

	Livestock	Male	Female	Total	
1.8					
	Non descriptive Cattle (local low yielding)	116386	70998	147410	
	Crossbred cattle	4360	7730	12090	
	Non descriptive Buffaloes (local low yielding)	194	953	66935	
	Graded Buffaloes	0	0	0	
	Goat	10193	21050	28125	
	Sheep	0	0	11	
	Others (Camel, Pig, Yak etc.)			1747	
	Commercial dairy farms (Number)				
1.9	Poultry	No. of farms	Total	No. of birds	
	Commercial	Data are not available	769151		
	Backyard	-			

Source: Maharashtra Animal and Fisheries Science University, Nagpur

A. Capture									
i) Marine (Data Source: Fisheries Department)			F	Boats	N	Storage			
•		No. of fishermen	Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non- mechanized (Shore Seines, Stake & trap nets)	facilities (Ice plants etc.) Number of processing uni		
	2783	38	1498	1165	79276		18		
ii) Inland (Data Source: Fisheries Department)	No.	Farmer	owned ponds	No. of Res	servoirs	No. of village tank			
	Da	Data are not available		23		Data are not available			
B. Culture									
		Wat	er Spread Area ('000'ha)	Yield (t/ha)		Production (tons))		
i) Brackish water (Data Source: Fisheries Department)	MPEDA/		1.6	11.67		18675			
) Fresh water (Data Source: Fisheries		0.492	0.02	9.84				

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi-Summer		Summer		Total		Crop residue as fodder
		Produc tion ('00'MT)	Produc tivity (kg/ha)	Produc tion ('00'MT)	Produc tivity (kg/ha)	Production ('00' Mt)	Produc tivity (kg/ha)	Produc tion ('00' MT)	Produc ivity (kg/ha)	as fodder ('000 tons)
Major l	Field crops (Crops to	be identified bas	sed on total acre	eage)						
	Rice	2015	3257	77	1833			2196	2787	
	Finger millet	27	1677	4	1000			37	1121	

Prosomillet	2	500	-	-	 	2	500	
Pulses (Lab lab bean, black gram, horse gram, cowpea, etc.)	4.8	563	20	444	 1	29	475	
Groundnut and other oil seed	26	2314	80 (Groundnut) 1 others)	2352 1000	 1	97	1702	

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

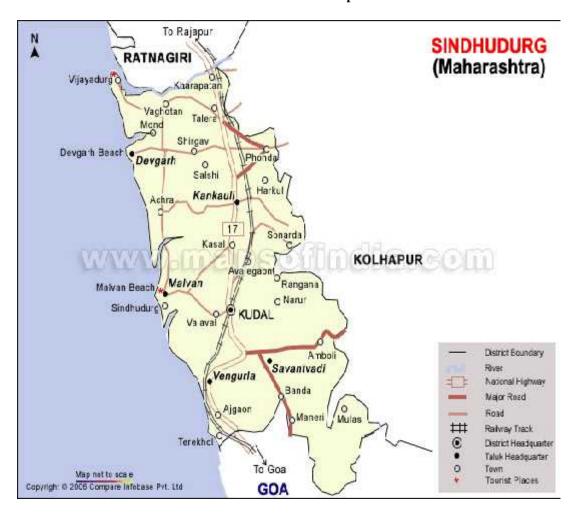
	1									
Major H	Major Horticultural crops (Crops to be identified based on total acreage)									
	Mango							839.28	3 MT/ha	
	Cashew							684.79	1127	
	Coconuts							166920000	90	
								nuts	nuts/palm	
	Sapota							5.00	2.5 MT/ha	

1.12	Sowing window for 5 major field crops	Rice	Finger millet	Ground	nut	Niger (Karl	a)	Sugarcane		
	Kharif- Rainfed	3 rd week of June to 4 th week of June	3 rd week of June-4 th week of June	June - 2	reek of 2 nd week July		eek of June- eek of June		-	
	Kharif-Irrigated	-	-	-		-		-		
	Rabi- Rainfed	-	-	-		-			-	
	Rabi-Irrigated	2 nd week of Nov- 2 nd week of December.		Decem	reek of ber - 2 nd week of Oct - 2 nd week of Nov. (Cowpea, Wal, Horse gram, Sunflower) Green gram - February			veek of Decer week of Janua		
1.13	What is the major contingency t	the district is prone to? ((Tick mark)		Re	gular	Occasional		None	
	Drought						✓			
	Flood						✓ (June to Augu	st)		1
	Cyclone						✓]
	Hail storm					🗸			-	

Heat wave	✓	-	
Cold wave			✓
Frost		✓ (NovDec.)	
Sea water intrusion	✓	-	
Pests and disease outbreak (specify for major pests and diseases) 1. Rice:- Bacterial blight, Blast	√	-	
2. Finger millet :_ Bacterial blight, Blast			
3. Groundnut :- Leaf spot and rust of groundnut			
4. Mango :- Hopper, Mealy bug, thrips, fruit fly, Anthracnose, Powdery mildew, Branch drying & post harvest rots			
5. Cashew: - Tea mosquito bug, thrips, aphids, Anthracnose.			
6. Coconut :- Rhinoceros beetle, eriophyid mite			
7. Areca nut :- Koleroga , Inflorescence blight and Ganoderma rot.			
Others (specify)			

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

Annexure I- Location map



Annexure - 2

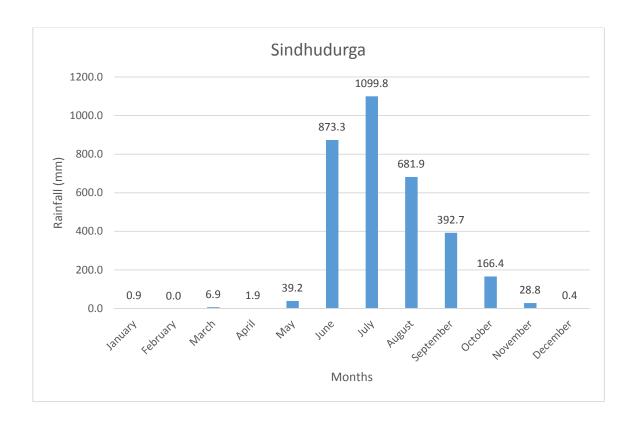
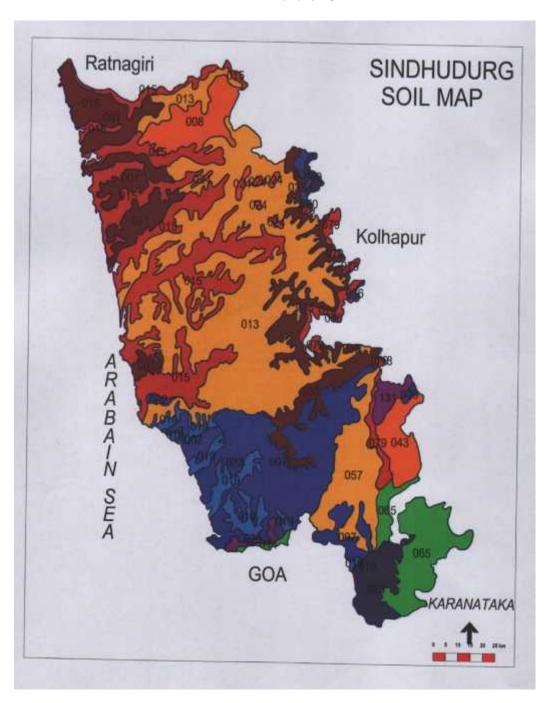


Fig: Mean monthly rainfall (mm) of Sindhudurga District.

Annexure - 3



Soil map Sindhudurg district (Source :- NBSS & LUP, Nagpur)

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Co	ntingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation	
Delay by 2 weeks (3 rd week of June)*	a) Upland medium deep to shallow soils	Rice	In case of failure of germination use very early duration variety (Ratnagiri – 73, Karjat-184)	Prepare the seedlings by mat nursery / Dapog method If raising of seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds)	Procure the seed from Maharashtra State Seed Corporation	
		Finger millet	No change			
		Prosomillet	No change			
		Groundnut	No change			
		Niger	No change			
		Sugarcane	No change			
	b) Mid-land medium deep soils	Rice	In case of failure of germination use early duration variety (Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711, Karjat-3, Karjat-4, Karjat-7.)	 Prepare the seedlings by mat nursery / Dapog method If raising of 	Procure the seed from Maharashtra State Seed Corporation	

c) Low land deep soils	Rice	In case of failure of germination use mid late duration variety (Ratnagiri-4, Karjat-5, Karjat-9)	seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds)	
d) Hill slope	Finger millet	No change		
shallow soils	Prosomillet	No change		

Condition			Suggested Co	ontingency measures	
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
** Delay by 4 weeks medium	a) Upland medium deep to shallow soils	Rice	Use very early duration variety (Ratnagiri – 73, Karjat-184)	1. Raise the crop by direct seeding method (dry or sprouted seeds)	Procure the seed from Maharashtra State Seed Corporation
(1 st Week of July)	Prosomillet Cowpea (Black gran Oil Seed Groundnut Use	Cowpea (Var. Konkan Sadabahar), Black gram (TPU- 4)			
		Prosomillet	Oil Seed like niger (Var. IGP 76)		
		Groundnut	Use early duration variety (Phule pragati, SB- XI)		
		Niger	No change		
		Sugarcane	No change	Irrigation as per requirement	
	b) Mid-land medium deep soils	Rice	Use very early duration variety (Ratnagiri – 73, Karjat-184)	Raise the crop by direct seeding method (dry or	Procure the seed from Maharashtra State Seed

c) Low land deep soils	Rice	Use early duration variety (Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711, Karjat-3, Karjat-4, Karjat-7.)	sprouted seeds)	Corporation
d) Hill slope shallow soils	Finger millet Prosomillet	Grow pulses like cowpea (Var. Konkan Sadabahar), black gram (TPU-4) Oil Seed like Niger (Var. IGP 76)		

Note :- ** Generally such type of situation has not occurred during past years

Condition		Suggested Contingency measures			
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping systemincluding variety	Agronomic measures	Remarks on Implementation
** Delay by 6 weeks (3 rd week of July)	a) Upland medium deep to shallow soils b) Mid-land medium deep soils c) Low land deep soils d) Hill slope shallow soils	Note :- ** Generally	such type of situation has not occurred	during past years	

Condition		Suggested Contingency measures			sures
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
** Delay by 8 weeks	a) Upland medium deep to shallow soils	Not applicable Note:- ** Generally such type of situation has not occurred during past years			

	(1 st Week of August)	b) Mid-land medium deep soils
Ì		c) Low land
		deep soils
Î		d) Hill slope
		shallow soils

Condition			Suggested Co	ontingency measures
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & Remarks on Implementation conservation measues
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	a) Upland Rice shallow soils	Rice	Re-raising nursery by mat technique	Protective irrigation/ mulching between row of seedling with glyricidia
		Finger millet	Use short duration variety (H.R. 374) and delay sowing till monsoon restart.	Protective irrigation
		Groundnut	Sow after monsoon restart	
		Niger	No change	
		Sugarcane	No change	Protective irrigation
	b) Mid-land medium deep soils	Rice		Protective irrigation
	c) Low land deep soils	Rice		Protective irrigation
	d) Hill slope	Finger millet	Use short duration variety and delay	Protective irrigation

shallow soils	Prosomillet	sowing till monsoon restart	Protective	
		_	irrigation	

Condition			Suggested Co	ntingency measures	
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell at the time of transplanting	a) Upland medium deep to shallow soils	Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm). Increase 25% recommended dose of fertilizer. For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method. Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery. Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) 	 Protective irrigation for nursery Protective irrigation after transplanting 	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
		Finger millet Prosomillet		Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas, streams, rivers, etc.
		Groundnut Sugarcane	No change	 Adopt weed management practices with dry land weeder. Mulching with tree lopping or glyricidia leaves. Protective irrigation. 1 %n Spray of potassium. 	

b) Mid-land medium deep soils c) Low land deep soils	Niger Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm) Increase 25% recommended dose of fertilizer For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery 	Protective irrigation for nursery Protective irrigation after transplanting Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
d) Hill slope shallow soils	Finger millet Prosomillet	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) 	

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	a) Upland medium deep to shallow soils	Rice Finger millet Prosomillet	 Protective irrigation. Postpone the split dose of Nitrogen application till receipts of rain/protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. Protective irrigation. 	 Adopt weed management practices. Apply split dose of Nitrogen after restart of rains Spray % potassium 	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
		Groundnut Niger	Protective irrigation	Adopt weed management practices with dry land	
		Sugarcane		 weeder. Mulching with tree lopping or glyricidia leaves. Spray % potassium 	
	b) Mid-land medium deep soils	Rice	Postpone the split dose of Nitrogen application till	Adopt weed management	

c) Low land deep soils	Rice	receipts of rain/protective irrigation • Protective irrigation • Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. • Take three sprays of Tricyclazole 1g/lit of water for control of rice blast	practices. • Maintain the existing water level in the field. • Apply split dose of Nitrogen after restart of rains • Spray % potassium
d) Hill slope shallow soils	Finger millet Prosomillet	Give protective irrigation if possible.	 Adopt weed management practices Apply split dose of Nitrogen after restart of rains

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measure	Remarks on Implementation
At flowering/ fruiting stage	a) Upland medium deep to shallow soils	Rice	 Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium 	

	Finger millet Prosomillet Groundnut Niger Sugarcane	Protective irrigation.	Adopt weed management practices with dry land weeder. Mulching with tree lopping or glyricidia leaves Spray % potassium	
b) Mid-land medium deep c) Low land deep soils	Rice Proprieta Rice Rice	 Protective irrigation. Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium 	
d) Hill slope shallow soils	Finger millet Prosomillet	 Give protective irrigation if possible. 	• Adopt weed management practices	

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Condition			Suggested Contingency measures			
Terminal drought	Major Farming situation	Normal Crop/cropping	Crop management	Rabi crop planting	Remarks on	
		system			Implementation	
(Early withdrawal of	a) Upland	Rice	Harvest crop at	• Carry out sowing of Rabi	Use of farm pound	
monsoon)	′ 1		physiological maturity	crops as early as possible	for protective	
,	medium deep to shallow	Finger millet		(Cowpea, groundnut,	irrigation of crops	
		Prosomillet		, 1 , 5	1	

soils	Groundnut Niger	No change	water melon, leafy vegetables) • Raise the seedlings of chilli, brinjal, cabbage,	
	Sugarcane	No change	knol knol) Protective irrigation	
b) Mid-land medium deep soils c) Low land deep soils	Rice	 Protective irrigation Harvest crop at physiological maturity 	Carry out sowing of Rabi crops as early as possible (Cowpea, Horse gram, mustard, sweet corn, groundnut, water melon, leafy vegetables) Raise the seedlings of chilli, brinjal, cabbage, knol knol)	
d) Hill slope shallow soils	Finger millet Prosomillet	Harvest crop at physiological maturity		

2.1.3 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation

Condition			Suggested Co	ontingency 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	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Use early duration variety (Ratnagiri 73, Ratnagiri-1, Karjat-184) or Grow short duration pulses viz. cowpea (Var. Konkan Sadabahar), under control irrigation and tail end area	 Dapog/mat technique of nursery raising. Young seedling transplanting. SRI Technique. 	Procure the seed from Maharashtra State Seed Corporation
		Groundnut	Use early duration variety (Phule pragati) or grow short duration pulses viz. Cowpea (Var. Konkan Sadabahar),	• If other source of irrigation is available sow the crop as per schedule.	Procure the seed from Maharashtra State Seed Corporation
		Pulses (Cowpea, Horsegram, Green gram)	No change	Use micro irrigation (drip or micro sprinkler)	
		Vegetables	Use early duration vegetables like Kartoli and leafy vegetables varieties Coriander: Dapoli-1 Radish: Japanies white long, Pusa ketaki Math: Math durangi, Co-1	 If other source of irrigation is available sow the crop as per schedule. Use micro irrigation (drip or micro sprinkler) Prepare the seedlings in portrays of vegetables (cucurbitaceous crops, brinjal, chilli) to avoid delay in transplanting. 	Procure the seed from Maharashtra State Seed Corporation
		Water melon		Use black polythene mulch	
		Sugarcane		If other source of irrigation is available sow the crop as per schedule.	

Condition			Suggeste	d Contingency measures	
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
water in canals due M	Mid and low land Medium deep to deep soils	Rice (Rabi season)	 Prefer early duration variety in low land situation (Ratnagiri 73, Ratnagiri -1) Grow short duration pulses (cow pea, lab lab bean, horse gram), groundnut (Phule Pragati), vegetables in midland situation 	 Use SRI Technique for rice cultivation. Adopt Weed management practices Use micro irrigation (drip or micro sprinkler) 	Procure the seed from Maharashtra State Seed Corporation
		Groundnut	Prefer short duration variety (Phule Pragati,)	 Adopt Weed management practices with dry weeder Use micro irrigation (drip or micro sprinkler) 	• Procure the seed from Maharashtra State Seed Corporation
		Pulses (Cowpea, Horsegram, Green gram)	No change	Adopt mulching	
		Vegetables	Grow Dolichous bean or adopt soil conservation measures for regular vegetables	 Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler) Adopt mulching 	 Procure the seed from Maharashtra State Seed Corporation. Necessity of practical training on drip irrigation and mulching
		Water melon	Either follow the soil conservation measures for water melon or grow short duration pulses		
		Sugarcane	No change	Protective irrigation	

Condition			Suggeste	d Contingency measures	
	Major Farming	Normal Crop/cropping system	Change in crop/cropping	Agronomic measures	Remarks on
	situation		system		Implementation
Non release of water in canals under delayed onset of monsoon	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Lab lab bean, horse gram, black gram, cowpea, mustard on residual moisture under low land situation	Minimum tillage and sowing of seed by dibbling.	• Procure the seed from Maharashtra State Seed
onset of monsoon in catchment		Groundnut Pulses (Cowpea, horsegram, green gram) Vegetables Water melon	If farm pond water is available go for short duration pulses like cowpea (Konkan Sadabahar) and leafy vegetables	 Adopt Weed management practices Use micro irrigation (drip or micro sprinkler) Adopt mulching 	Corporation.
		Sugarcane		Protective irrigation	

Condition			Suggeste	d Contingency measures	
	Major Farming	Normal Crop/cropping system	Change in crop/cropping	Agronomic measures	Remarks on
	situation		system		Implementation
Lack of inflows into tanks due to Medi	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Wal (lablab bean) - Var. Konkan Wal No. 1, Horse gram - Var. Dapoli - 1 on residual moisture under low land situation	 Minimum tillage and sowing of seed by dibbling, Relay cropping 	• Procure the seed from Maharashtra State Seed Corporation.
		Groundnut Pulses (Cowpea, horsegram, green gram) Vegetables Water melon	If farm pond water is available go for short duration pulses like cowpea (Konkan Sadabahar) and leafy vegetables	 Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler). Adopt mulching 	Corporation
		Sugarcane		Protective irrigation	

Condition			Suggested Contingency measures			
	Major Farming	Normal Crop/cropping system	Change in crop/cropping	Agronomic measures	Remarks on	
	situation		system		Implementation	

Condition			Suggeste	ed Contingency measures	
	Major Farming	Normal Crop/cropping system	Change in crop/cropping	Agronomic measures	Remarks on
	situation		system		Implementation
Insufficient groundwater recharge due to low rainfall	Mid and low land Medium deep to deep soils	Not applicable			
				1	
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		
Rice	 Spray Cartap Hydrocloride 50SP @ 1.2 g/lit for the management of case worm Close water in the field and Drag rope over crop to dislodge the cases after that open the water at one end of the field to collect the cases which can be destroyed afterwards Drain out excess water and spray Propiconazol @ 1ml /lit of water to control sheath blight 		Drain out excess water and harvest the crop before lodging	Immediate threshing and drying in shed		

Fingermillets			Harvest the crop before lodging	Immediate threshing and drying in shed
Groundnut	Drain out excess water	Drain out excess water 2.Spray mancozeb @ 2.5 g/lit of water to control Tikka and rust disease	Drain out excess water and harvest the crop immediately	Separate the pods immediately and dry in shade.
Niger	Drain out excess water	Drain out excess water	 Drain out excess water. Harvest the crop at physiological maturity	Immediate threshing and dry in shed
Sugarcane	Drain out excess water Tie the sugarcane at grand growth stage	Drain out excess water	Drain out water and harvest at physiological maturity stage	Send immediately for crushing
Horticulture				
Cucurbitaceous crop	Drain out excess water	Drain out excess water	Drain out excess water	
Mango	Wait for congenial condition for application of Paclabutrazol @ of 0.75 g/ a.i. per meter average canopy diameter			
Cashew		-	-	-
Banana	 Drain out excess water Propping with bamboo Spray Hexaconazol @ 1ml/lit of water for control of Sigatoka Leaf spot and blight At pre flowering stage 	Drain out excess water.Propping with bamboo	Drain out excess waterPropping with bamboo	
Pineapple	Drain out excess water	Drain out excess water	Drain out excess water	
Heavy rainfall with high speed winds in a short span				
Rice			• Drain out water and harvest the crop at maturity immediately if lodging take place	Immediate threshing and drying in shed
Fingermillets	-	-	• Harvest the crop at maturity before its lodging.	
Groundnut	Drain out excess water	Drain out excess water	Drain out water and harvest the crop immediately	• Separate the pods immediately and dry in shade.
Niger	Drain out excess water	Drain out excess water	Drain out excess water	-

Sugarcane	Drain out excess water Tie the sugarcane at grand growth stage	Drain out excess water	Drain out water and harvest at physiological maturity stage	Send immediately for crushing
Horticulture				-
Cucurbitaceous crop	Drain out excess water	Drain out excess water	Drain out excess water	
Mango	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. 	 Prune the broken branches swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose. 	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. Collect and utilize fallen fruit immediately for suitable processing. 	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk.
Cashew		Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk.		
Banana	Drain out excess water	Drain out excess water	Drain out excess water	
	• Propping with bamboo	Propping with bamboo	Propping with bamboo	
		• Flowers of broken plant may be used as vegetable	• Fruit of broken plants may be used as vegetable.	
Pineapple	Drain out excess water	Drain out excess water	Drain out excess water	

Outbreak of pests and diseases due to unseasonal rains				
Rice	• Spraying of Carbendazim 0.1% or Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease	• Spraying of Carbendazim 0.1% or Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease	-	-
Fingermillet	-	-	-	-
Groundnut	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	-	-
Niger	-	-	-	-
Sugarcane			-	
Horticulture				
Cucurbitaceous crop			 Install Rakshak trap 4 per ha (Cue lure) to control fruit fly Spray with Copper Oxy Chloride @ 2.5 g/lit of water to control Downey mildew 	
Mango	 Take spray of Lambda Cyhalothrin 5 EC @ 0.6 ml/lit of water and second spray of Imidachloprid 17.8 EC @ 0.3 ml/lit of water for control of mango hopper, shoot borer . Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose 	• Spraying with 0.2% W.P. sulphur dust or 0.05% hexaconazol to control powdery mildew.	Install Rakshak trap 4 per ha (Methyl eugenol) to control fruit fly	• Dipping fruits in hot water at 52°C for 10 min. after harvest to control post harvest rot.
Cashew	• Spray with Profenophos 0.05 % after the rains to control tea mosquito bug.	-	-	-
Acecanut	-	Spraying with 1% Bordeaux mixture or 0.37% copper oxychloride or root feeding		

		four times at monthly intetvals (June to sept.) with fosetyl AL 0.3% to control kolerog		
Sapota	-	Spraying of Metalaxyl + Mancozeb containing complex fungicide @ 0.2% to control fruit drop	_	Collect and destroy the fallen and infected fruits

2.3 Floods

Condition		Suggested contin	ngency measure	
Transient water logging/ partial inundation ¹	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Rice	If washed out resowing of nursery by using mat nursery/sowing of sprouted seed on puddled field	Drain out excess water	• Drain out excess water	Drain out excess water.Immediate harvesting, threshing and drying in shed
Fingermillets	Not applicable	Not applicable	Not applicable	Not applicable
Groundnut				
Niger				
Sugarcane				
Horticulture (Vegetables)				
Cucurbitaceous crop	Not applicable	Not applicable	Not applicable	Not applicable
Continuous submergence for more than 2 days				
Rice	If washed out resowing of nursery by using mat nursery/ sowing of sprouted seed on puddled field	 Drain out excess water Apply second dose (40%) of nitrogen after submergence is over 	• Drain out excess water	 Drain out excess water. Immediate harvesting, threshing and dry in shed
Fingermillet	Not applicable	Not applicable	Not applicable	Not applicable
Groundnut				
Niger				
Sugarcane				

Horticulture (Vegetables)				
Cucurbitaceous crop	Not applicable	Not applicable	Not applicable	Not applicable
Sea water intrusion				
Rice	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out, If wash out resowing of nursery with salt tolerant varieties like Panvel -1 and Panvel -2 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Immediate harvesting, threshing and drying in shed.
Fingermillets	Not applicable			
Groundnut				
Niger				
Black gram				
Horticulture (Vegetables)				
Cucurbitaceous crop	Not applicable	Not applicable	Not applicable	Not applicable
Coconut	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out Mound the crop with soil 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out

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

Extreme event type	Suggested contingency measure					
	Seedling / nursery stage	Reproductive stage	At harvest			
Heat Wave						
Mango	Cover with shed net /Protective	• Water spray / 1%	• Collect dropped fruits and use it	• Collect dropped fruits and use it		

	irrigation	potassium nitrate spray	for suitable processing	for suitable processing
	Water spray			
Cashew	 Cover with shed net /Protective irrigation Water spray 	Protective irrigation	Protective irrigation	
Coconut	Cover with shed net.Water spray	Frequent irrigation	Frequent irrigation	Frequent irrigation
Arecanut	Cover with shed net.Water spray	Frequent irrigation	Frequent irrigation	Frequent irrigation
Cold wave	Not applicable			
Frost	Not applicable			
Hailstorm				
Mango	_	_	 Collect and destroy the fallen fruit to avoid the further built-up of pest and disease 	 Collect the fallen fruit to avoid the further built-up of pest and disease
Cyclone				
Mango	Support the young seedlings/grafts	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing 	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing
Cashew	• Support the young seedlings/grafts	 Proper pruning and disposal of damaged or broken branches 	Proper pruning of damage or broken branchesCollect fallen nuts market it.	 Proper pruning of damage or broken branches Collect fallen nuts and store
Coconut	Support the young seedlings	Immediate disposal of damaged trunck	Collect fallen tender nuts, market it.	Collect fallen tender nuts market it.
Arecanut	Support the young seedlings	Immediate disposal of damaged trunck	Collect fallen tender nuts market	• Collect fallen tender nuts market it.

2.6 Contingent strategies for Livestock, Poultry & Fisheries

2.6.1 Livestock

	Suggeste		
Drought	Before the event ^s	During the event	After the event
Feed and fodder availability	 Conservation of green fodder as silage dry fodder as hay in flush season for utilization in lean period Dry fodder available should be processed i.e. Urea 	Judicious use of feed resources processed as per type of livestock possessed by the livestock	For Green fodder production in next Kharip season needs to be undertaken as a
	treatment of crop residues to enhance their nutritive value. For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to the livestock owners.	owners. Distribution of fodder, UMMB blocks, other feed resources stored in the affected area to the	source of fodder at earliest. Mineral Supplementation should be continued. Concentrate feeding for
	Judicial use of available feed resources by the livestock owners.	livestock owners as per the number and type of livestock	productive animals so as to compensate the body
	➤ Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored.	possessed. Mineral supplementation – Mineral mixture be provided for	condition and production. The animals must be brought into cyclic stage
	Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured for productive animals.	the livestock@50 g/day/Anim. Disposal/Transfer of the animals in the area having feed resources availability.	for reproduction. Young crossbred livestock needs to be attended properly so as to harness
	Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate.	Concentrate feeding for productive animals to support minimum production & life	the high productivity. > Adlib. feeding may be practiced with balancing
	Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants.	saving of the important animals. Other non productive animals are to be fed at subsistence level.	the nutrients required. The unproductive/surplus livestock needs to be
	Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A and hence	Use of food grains for biodisel and distillaries should be stopped and the grains be spared for productive animals.	culled/disposed. Livestock suitable with the farming system practiced only should be maintained.
	should be reserved for feeding during drought. Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used	Bypass protein concentrate ingredients may be provided in order to harvest maximum	Mechanization in agriculture needs to be encouraged.
	for feeding animals but during scarcity it can be used. Mineral mixture should be procured and stored for supply.	nutrients for productive animals particularly high productive crossbred cows.	Feed processing needs to be encouraged in order to minimize the wastage of
	Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.	 Top feeds should be used during scarcity period only. Oil seed cakes are good source of proteins and hence should be used 	feed resources. In-situ storage and feeding of processed animal feed resources by the livestock
	Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms	for productive animals only. Feed supplements/ Additives needs to be used widely for	owners needs to be encouraged. > Readiness for feed and

- left after removing grains from the crops. These may be stored in these banks to be established at each Taluka in the drought area.
- Govt. should provide support to farmers for making stacks, bailing & storage.
- State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- Cattle camp sites needs to be identified.
- NGOs/Gorakshan Sanstha etc. needs to be identified.
- Anticipated number of livestock & feed resources to be provided needs to be assessed.
- ➤ Livestock registration should be compulsory with identification by tagging
- Preparedness of veterinary services to drought prone areas.
- Encourage farmers to cultivate fodder crops.
- > Identification of the site for fodder depot.
- ➤ Facility to store fodder by creating centralized silage making facility with provision for transport.
- Forage production and storage of fodder in irrigated areas.
- Assessment of risk and vulnerability.
- > Formation of village Disaster Management Committee.
- Establishment of drought monitoring system or early warning system.

- productive animals.
- Establishment of Cattle camps at identified sites.
- ➤ NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/ day/adult animal for maintenance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- Adaptation of proper distribution policy as per requirement with transport facility.
- Regular rest periods for working animals particularly bulls during hot period of the day.
- Capture and care of stray animals.
- The unproductive/surplus livestock needs to be culled/disposed.
- Sale of feed and fodder from the affected area to non affected area should be banned.
- Distribute fodder at reasonable rate
- Monitoring feed and fodder prices.

- fodder bank as and when required for each districts with transport facility.
- Review of shortfalls in planning and refining action plan the before and during event.

	Suggested contingency measures				
Drought	Before the event ^s	During the event	After the event		
Drinking	➤ Water resources as in general are inadequate and	Special distribution and carrying capacity	Permanent water		
water	hence the resources should be trapped and increased.	should be implemented from other	resources should		
	Available rain water harvesting technique should be	available resources.	be developed with		
	adopted i.e. farm ponds etc.	➤ Water should be used as per the	campaign for		
	Water conservations measures be adopted to increase	requirement of animals (@10-15 lit/ 100 kg	public awareness.		
	water table like recharging of bore wells.	body weight).	> Steps should be		

- Available water resources should be tapped and reserved.
- ➤ Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken.
- Judicious use of water in agriculture i.e. through drip/sprinkler irrigation.
- Wastage of water needs to be curbed.
- Rain water harvesting measures needs to be implemented at village level.
- Proper utilization of Water to save water.
- Equal water distribution plan may be implemented.
- Cloud seeding desalination, recycle sewage water, transvasment river project etc.

- Drinking water should not be used for washing animals.
- > Clean and chlorinated water be provided to prevent water borne diseases.
- Special distribution and carrying capacity should be supplemented from other available resources.
- Water for irrigation should be stopped.
- > Judicious use of water for livestock.
- Supply of water through tankers during contingency.
- Private water resources such as wells shall be used for drinking water.
- Proper utilization of Water to save water.
- In vicinity of animal camp or chavani creation of borewell.

- taken to conserve water.
- Ensure fresh clean and cold water supply to livestock.

	Suggested contingency measures					
Drought		Before the event ^s		During the event		After the event
Health and	>	Personnel should be trained for health	>	Services of trained personnel need to be	\triangleright	Routine training programme as
disease		and disease management through		made available in affected area with		a refresher course need to be
management		trainings and list of trained personnel		sufficient supply of life saving medicine of		implemented in relation to
		should be available at each district		livestock.		health and disease management
		head quarter with stock of life saving	>	A team of veterinary experts be deployed		during drought with stock of life
		medicine for livestock.		for health management of drought hit		saving medicine for livestock.
	>	Vaccination of animals for various		livestock.	\triangleright	There will be stress on animals
		diseases according to season.	>	During occurrence of disease, affected		due to deterioration of health
	>	Deworming and spraying be done to		animals should be kept isolated and treated		during drought period.
		get rid of endoparasites and		properly and promptly.	\triangleright	Concentrates and vitamin-
		ectoparasites to keep the health of	>	Vaccination against contagious diseases		mineral supplements be
		animals in good condition.		like HS, FMD, Theileriosis be carried out.		provided to minimize the stress
	\triangleright	Personnels should be trained for	>	Mineral mixture be provided to take care		on animals.
		health and disease management		of deficiency disorders.	\triangleright	The animals should be observed
		through training	>	Tick control measures be undertaken to		for signs of contagious diseases
	\triangleright	List of trained personnel should be		prevent tick borne diseases in animals		or deficiency disorders.
		available at each district head quarter.		under stress.	\triangleright	Vaccination spraying and
	>	Feedadditives/Tonics/ Vitamin	>	Deworming should be carried out.		deworming programme needs to

- supplements should be stocked.
- Vaccines, Insecticides, disinfectants and dewormers needs to be stocked.
- Records/PM/ Carcass disposal arrangements needs to be ensured.
- > Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls.
- Create temporary shade shelters to prevent heat stress on the animals. (animal camps)
- > Supply of Mineral and Vitamins mixture.
- > Application of preventive and control measures of SP & MD.

- Feed additives/Tonics/Vitamin supplements should be provided.
- ➤ Post Mortem /record keeping/carcass disposal arrangements be effected.
- Restriction on movement of the animals to prevent the spread of diseases.
- Periodic disinfection and disinfestations of premises where animals are kept.
- Permission of only healthy and vaccinated animals in cattle market.
- > By proper treatment with supervision and exercise over starvation.
- > Special transport facility of mobile van for veterinary team be deployed.

- be undertaken.
- Record of affected livestock to be submitted for compensation of the loss.
- Farm disinfection and disinfestations.
- Assessment of losses due to mortality if any.

	Suggeste	d contingency measures	
Floods	Before the event ^s	During the event	After the event
Feed and	➤ Identification of flood prone zones and flood	Quick evacuation of livestock	Green fodder production in
fodder	forecasting.	from flood plain areas before	next Kharif season needs to
availability	Installation of early warning systems.	area become flooded	be undertaken as a source
	Steps to prevent spoilage of food and water supply due to flood water.	Prevent outflow of manure pit in river	of fodder at earliest. Fodder seed of improved fodder
	Dedicated helpline to emergency contact and communication at taluka level.	Proper feed, vaccine, drugs, disinfectants and feed	crop varieties needs to be distributed.
	Avoid construction of farm buildings in flood risk areas.	supplement distribution policy adopted with transport facility.	Mineral Supplementation should be continued.
	➤ Local ponds and canals regularly inspected and cleared off from obstruction	Prevent spoilage of food and water supply	Concentrate feeding for productive animals so as to
	Adequate stock of Tetanus toxoid.	Judicious use of feed resources	compensate the body
	Change cropping pattern according to flood risk periods.	processed as per type of livestock possessed by the	condition and production. The animals must be
	Storage of available fodder at safe place before rainy season.	livestock owners. Distribution of fodder, UMMB	brought into cyclic stage for reproduction.
	 Training of local personnel for disaster management. Dry fodder available should be processed i.e. Urea 	blocks, and other feed resources stored in the affected area to the	 Young crossbred livestock needs to be attended

- treatment of crop residues to enhance their nutritive value. For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to the livestock owners.
- > Judicial use of available feed resources by the livestock owners.
- ➤ Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored.
- Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains, Govt Godowns wastes, grains unfit for human consumption etc. should be procured for productive animals.
- Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate.
- Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants.
- Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A&hence should be reserved for feeding during drought.
- Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.
- Mineral mixture should be procured and stored for supply.
- Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.
- ➤ Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banksto be established at each Taluka in the drought area.

- livestock owners as per the number and type of livestock possessed.
- Mineral supplementation Mineral mixture be provided for the livestock@50 g/day/Anim.
- Disposal/Transfer of the animals in the area having feed resources availability.
- Concentrate feeding for productive animals to support minimum production & life saving of the important animals.
- > Other non productive animals are to be fed at subsistence level.
- ➤ Use of food grains for biodisel and distillaries should be stopped and the grains be spared for productive animals.
- Bypass protein concentrate ingredints may be provided in order to harvest maximum nutrients for productive animals particularly high productive crossbred cows.
- Top feeds should be used during scarcity period only.
- Oil seed cakes are good source of proteins and hence should be used for productive animals only.
- Feed supplements/ Additives needs to be used widely for productive animals.
- > Establishment of Cattle camps at identified sites.
- ➤ NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for

- properly so as to harness the high productivity.
- Adlib. feeding may be practiced with balancing the nutrients required.
- The unproductive/surplus livestock needs to be culled/disposed.
- Livestock suitable with the farming system practiced only should be maintained.
- Mechanization in agriculture needs to be encouraged.
- Feed processing needs to be encouraged in order to minimize the wastage of feed resources.
- In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.
- Fodder resources should be exploited with sufficient transport facilities from other areas of the district even after the event.

- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- > State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- > Cattle camp sites needs to be identified.
- NGOs/Gorakshan Sanstha etc. needs to be identified.
- Anticipated number of livestock & feed resources to be provided needs to be assessed.
- Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the city where feeds & fodder (silage) can be stored for emergency use.

- maintainance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district.

	Suggested contingency measures					
Floods	Before the event ^s	During the event	After the event			
Drinking water	➤ Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the flood. Rain water harvesting should be done in all districts. Every district should be made	Sufficient facility for transportation with advanced proper planning should be made in the areas of each district.	 Sufficient infrastructure facility for transportation with advanced proper planning should be made 			
	self-sufficient. Every district gas plenty of rain water which should be harvested so that these areas should become self-sufficient & if required they should be able to provide water to other dry areas too. The rain water should not be wasted in sea.	During flood condition there will be polluted water, whatever potable drinking water source is available should be used with almost care.	 in the areas of each district. Clean disinfected water from bore well or rain harvested water may be 			
	Shelters & temporary camps should be set up at a height in city area as well as in suburbs after choosing the right location for each area. Same provisions	 Disinfection of drinking water i.e. chlorination of water should be carried out Stop use of 	supplied to the animals as water-borne infections are common after floods.			
	 should be done in other Konkan districts. Bore well facilities should be exploited in districts for supply of clean water. Contamination of local water 	drinking water for animals from contaminated water resources. Disinfection of the water for	Sources of potable drinking water should be tapped for its proper use.			
	resources due to flood water should be prevented Potable drinking water source should be there to supply water to animals.	consumption of the animals should be carried out to prevent water-borne diseases. Aerosol	 Permanent water resources should be developed with campaign 			
	Every society should implement rain harvesting system, so that water can be stored for use whole year long. Water problem likely to be faced in future.	spray of the disinfectant for preventing spread of airborne infections should be carried out.	for public awareness. Water storage facility created away from the			

	Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken. > Judicious use of water in agriculture i.e. through drip/sprinkler irrigation. > Wastage of water needs to be curbed. > Rain water harvesting measures needs to be implemented even at village level with establishment of water Storage and Purification facility Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities. > Judicious use of water for livestock. > Water tankers provision > Private water resources such as wells shall be used for drinking
	water availability only.
	Suggested contingency measures
Floods	Before the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for flood affected areas with stock of life saving medicine for livestock. Vaccination of animals for various diseases according to season. Deworming and spraying be done to get rid of endoparasites and ectoparasites to keep the health of animals in good condition. Stock of life saving medicine be made. Disaster management team of veterinarians be deployed. Various referral centres in the disease diagnostic should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be mode adayiable at a Tahsil level besides district/taluka/panchayat level. Training to veterinarians in health and disease management team of veterinarians be constituted at district/taluka/panchayat level. Training to veterinarians in health and disease management during flood disaster be given. Awareness amongst farmers regarding health care practices during flood disaster be during flood disaster be
	undertaken. Feedadditives/Tonics/ Vitamin supplements should be stocked. be undertaken. Deworming and spraying of apparently healthy animals be carried out. dead animals include burning, burying and composting

- Vaccines /Dewormers needs to be stocked.
- Records/PM/ Carcass disposal arrangements needs to be ensured.
- In flood prone area pucca cattle shed should be constructed.
- Preparation of walls and hips to keep flood water away from village.
- Supply of Mineral and Vitamins mixture.
- ➤ Application of preventive and control measures of SP & MD.

- > Use of antivenum in snake bite cases.
- Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken.
- Post Mortem /record keeping/carcass disposal arrangements be effected.
- Disinfect the premises with bleaching powder and lime.
- > Turn off electrical power.
- Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls during floods.
- During severe regular flood, shifting of village away from river or changing the path of river away from village.

- Disinfection of animal sheds with 2% formaldehyde / 4% caustic soda.
- Provide proper shelter to protect animals from cold and rain.
- Record of affected livestock to be submitted for compensation of the loss.
- ➤ In regular flood prone areas defenses such as levees, bunds, reservoirs and weivs should be used for future preventions.

	Suggested contingency measures				
Cyclone	Before the event ^s	During the event	After the event		
Feed and	➤ There should be availability of fodder depot one each for	Adaptation of proper	Readiness for feed		
fodder	every district.	distribution policy as per	and fodder bank as		
availability	➤ Information at every district head quarter regarding	requirement with transport	and when required		
	availability of fodder resources from other areas for	facility.	for each districts		
	exploitation should be made available. A storehouse can be	➤ The stored feeds & fodder can	with transport		
	prepared at a highest point in the district where feeds &	be used to feed the animals &	facility should be		
	fodder (silage) can be stored for emergency use. The store	if it is short then Fodder	created.		
	house should have proper walls on all sides with one	resources should be exploited			
	entrance to avoid effect of cyclone.	with sufficient transport			
	➤ Feed & fodder should be stored as emergency stock in Govt.	facilities from other areas of			
	warehouses which can be distributed to areas that need	the district.			
	them.				

	Suggested contingency measures					
Cyclone	Befo	During the event	After	the event		
Drinking water			Special distribution and carrying capacity should	>	Permanent	
	and hence the resources should be trapped and			be implemented from other available resources.		water
	increased.			Rain harvested water & bore well water should be		resources
		rvesting should be done in all		disinfected & provided to the animals.		should be
	districts. Every	district should be made self-		Special distribution and carrying capacity should		developed
	sufficient. Each	district has plenty of rain water				even after the

	which should be harvested so that these areas are self-sufficient & if required they should be able to provide water to other dry areas too. The rain water should not be wasted in sea. Walls of the well should be constructed much above the ground level to avoid contamination.	be implemented from other available resources. Disinfection of the water for consumption of animals should be carried out to prevent wa borne diseases. Aerosol spray of the disinfect for preventing spread of airborne infections should be carried out. Shelters & temporary camps displaced animals should be set up with prosanitation facilities	the campaign for public awareness.
		gested contingency measures	
Cyclone	Before the event ^s	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for cyclone affecting areas with stock of life saving medicine for livestock. Vaccination against common infections like FMD, swine fever, black quarter, anthrax, haemorrhagic septicaemia, etc. should be given to animals. Stock of medicines should be kept available for use during cyclone. The walls and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Supply of Mineral and Vitamins mixture. Application of preventive and control measures of SP & MD. 	Keep watch on weather and listen to radio or TV and make others alert by warning. Shift the animals at safer place or in well secured cattle sheds. The wall and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Services of trained personnel need to be made available in cyclone affected area with sufficient supply of life saving medicine of livestock. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. Various referral centers in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be made available at Tahsil level besides district level so that more number of farmers may approach for diagnosis & treatment.	 ➢ Routine training programme as a refresher course need to be implemented in relation to health and disease management during cyclone with stock of life saving medicine for livestock. ➢ Do not free the animals unless all clear or officially advised it is safe.

2.6.2 Poultry

	Suggested contingency measures			
Drought	Before the event ^s	During the event	After the event	
Shortage of	> There should be availability of feed,	➤ Adaptation of proper distribution policy	> Readiness for feed, feed	
feed	feed ingredients and mineral mixtures	as per requirement with transport facility.	ingredients and mineral	
ingredients	with sufficient storage capacity for	Supply of feed ingredients through	mixtures as and when required	

- every district.
- Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers
- > Storage of feed ingredients of previous year in sufficient quantity to use in scarcity period.
- ➤ Identification and storage of locally available feed ingredients as a substitute for scares ingredients.
- A farm disaster kit should be prepared in advance. The kit should be placed in a central location and everyone should know where it is. The contents of the kit must be checked regularly to ensure fresh and complete supplies. The following items should be included in the kit in addition to the items that are used everyday:
 - Updated list of all farms with information about birds, their location and records of feeding, vaccination, tests.
 - Basic first aid kit.
 - Handling equipment & cages.
 - Waterier and feeders.
 - Sanitation and disinfection equipments & chemicals.
 - Other safety and emergency items for vehicles and trailers, e.g.,Extra tyres, winches, tools, etc.
- ➤ Maize grain is limiting source as a feed ingredient in poultry feed.
- > Store maize for poultry feed.
- Substitute feed ingredient should be tapped as replacement for maize grain which can be used for poultry feed.
- Concentrate ingredients such as Grains, brans, & oilseed cakes, low grade

- government channel to the end users at reduced price.
- Make sure that birds receive adequate quantity and essential nutrients through feed to minimize stress and to prevent occurrence of disease outbreaks.
- Crucial use of available feed avoiding excess feeding and wastage of the feed.
- Stored feed ingredients will be utilized during contingency.
- ➤ Birds should be evacuated and taken to shelters as soon as there is news of an imminent disaster. Every flock must have some form of durable and visible identification.
- ➤ There should be arrangements for appropriate transport, suitable for birds. Stranded birds should be rescued and taken to safer places.
- ➤ If the stranded place is considered safe for the next week or so, the birds may be left there but should be provided with feed and drinking water.
- Arrangements should be made so that veterinary and Para- veterinary personnel can quickly reach all affected farms to provide necessary measures.
- Officials and other personnel engaged in relief work should also gather intelligence on the extent and nature of the damage to individual farms and villages so that appropriate relief measures can be implemented.
- Adequate nutrition should be given to birds to keep their health in proper condition.
- The available ingredients as poultry feed should be used with utmost care.
- Non-conventional feed ingredients can also be tapped to use as a poultry feed taking into consideration the anti-

- for each districts with transport facility.
- Strategies to minimize the effects of stress due to drought by optimum feeding and management of the flock.
- Use of mineral and vitamin supplements to reduce stress.
- Follow up of affected livestock for adequate feed supply.
- Proper utilization of the resources should be carried out. The situation should be assessed properly and decision has to be taken on which birds to be treated first and how.
- The birds that are in very poor condition with no chance of recovery should be culled in humane manner.
- The dead birds should be disposed off in hygienic manner by burial or incineration.
- The situation at the farm also should be assessed and the corrective measures should be taken as soon as possible. All damages should be repaired and shed should be made functional. Disinfection of the premises and shed should be carried to prevent spread of diseases.
- ➤ The stress on poultry due to shortage of feed during drought period can be minimized by proper feeding of the birds after drought period.
- Ad lib. feeding to compensate the egg production.

grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured. > Ban on export of oilseed meals needs to be implemented. > Feed required for broilers3.5 kg./bird for six weeks. For Layers 55 kg /layer bird for a period of 72 weeks.	 nutritional factors present in it. Alternate day feeding for broilers. Avoid feed wastage. Restricted feeding for layers. Poor layer birds to be culled. Broiler rear up to 4 weeks only. Use of feed additives be enhanced to maximize the feed efficiency. 	Feed additives may be used to maximize production
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	Suggested contingency measures				
Drought	Before the event ^s	During the event	After the event		
Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Conservation of water for drought period. Water conservations measures adopted to increase water table like recharging of bore wells. Available water resources should be tapped and reserved. Leak proof water supply systems. Available rain water harvesting technique should be adopted i.e. farm ponds etc. Water conservations measures be adopted to increase water table. Judicious use of water. Use of nipples as waterers. 	 Special distribution and carrying capacity should be implemented from other available resources for poultry. Optimum use of available water as per the requirement of birds. Supply of adequate water to farms with transportation facility. Supply of water through tankers during contingency. Judicious use of water. Use of nipples as waterers. 	 Permanent water resources should be developed even after the event with campaign for public awareness. Evaluation and fine tuning of the contingency majors. Ensure clean, cold water supply to birds. Steps should be taken to conserve water and to develop permanent water resources. Fresh and ad lib. water should be provided. 		

	Suggested contingency measures				
Drought	Before the event ^s	During the event	After the event		
Health and	Personnel should be	> Services of trained personnel need to be	➤ Routine training programmed as a refresher		
disease	trained for health and	made available in affected area with	course need to be implemented in relation to		
management	disease management	sufficient supply of medicine, mineral	health and disease management during		
	of poultry through	mixture and vaccine for poultry.	drought with stock of life saving medicine and		
	trainings and list of	Immediate attention to diseased birds by	vaccine for poultry to prevent outbreak. Proper		

trained personnel
should be available at
each district head
quarter with stock of
medicine, mineral
mixture and vaccine
for poultry.
Popular and strict

- Regular and strict vaccination of birds.
- Vaccination of wild birds through water whenever possible.
- Deworming of birds before and after drought period.
- Appointment of veterinarian on farms made compulsory.

veterinarians.

- Regular visits of veterinarians to detect diseased birds and veterinary care
- Vaccination of birds if necessary.
- ➤ If there is occurrence of disease, affected birds should be kept isolated and treated properly and promptly.
- Periodic disinfection and disinfestations of farm and premises.
- Measures to minimize risk of spreading contagious diseases.
- Birds should be checked for injury/ signs of disease.
- > Antibiotic through water
- ➤ Anti-stress supplements
- ➤ Multivitamin supplements
- ➤ Bio-security measures to be implemented.
- Proper disposal of poultry carcass.

disposal system of poultry carcasses.

- Efforts to minimize effects of stress through optimum feeding, management and veterinary care.
- Assessment of losses due to mortality if any.
- Proper disposal of carcass.
- There will be stress on birds due to deterioration of health during drought period. Hence proper feeding should be done to minimize the stress on birds by supplying vitamin supplements.
- Birds should be tested at regular interval to confirm that they are free of contagious diseases.
- Proper disposal of birds died of various diseases.
- Vaccination.
- > Replacement of stock.

	Suggesto	ed contingency measures	
Floods	Before the event ^s	During the event	After the event
Shortage of feed ingredients	 Poultry owners needs to be advised to be in readiness for- Alternate poultry sheds with feed stock at safe places. Displacement of stock- transport arrangements. Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers Measures to avoid spoilage of feed stores due to water. Construction of feed stores to stores feed sufficient for at least one month. 	 Shifting of birds at Alternate poultry sheds with feed stock at safe places. Stress reducing measures to be adopted. Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district. Adequate nutrition should be given to birds to keep their 	After the event Shifting at original site after repair of the shades and restoration of the necessary facilities. Proper feeding should be done to minimize the stress on birds Ensure good quality feed and fodder supply to birds Feed and feed ingredients resources should be exploited with sufficient
	 Farmers will be encouraged to purchase and store the feed ingredient when it is cheaply available in the market. Information at every district head quarter regarding availability of feed and feed ingredients and 	health in proper condition. > Judicious use of available feed.	transport facilities from other areas of the district even after the event.

	mineral mixture resources from other area				
771	D 0 4 4	Sugges	sted contingency meas		10. 11
Floods Drinking water	Before the event ^s Arrangement of clean and hygienic water.		During the Sufficient	he event facility for	After the event Actions to rectify the water
	 Leak and contamination proof water system. Installations of the watering systems ta optimum use of available water avoiding wastage. Source of water should be away from affected areas. Sufficient storage capacity should be available particularly during rainy season of the forecasting of flood. Encourage the farmers for rain water harves are proper utilization of Water to save water. 	argeted to ling water rom flood be made on in view westing.	proper plant in the areas of Water treatr of pathogen water. > Judicious chlorinated vortice and tube well Proper utilities save water. > Supply of we during contine Water purifications.	amination of wells lls by flood water. zation of Water to vater through tankers	related issues observed during flood period. Ensure potable water supply to birds. Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. Sources of potable drinking water should be tapped for its proper use. Use of disinfected water. Arrangements of hygienic water supply.
		Sugge	sted contingency meas	Survos	
Floods	Before the event ^s		ng the event		After the event
Health and	Personnel should be trained for	> Service	C		ining programmed as a refresher
disease management	health and disease management through trainings and list of trained personnel should be available at each district head quarter for flood affecting areas with stock of medicine, mineral mixture and vaccine for poultry. > Vaccination and deworming schedule should be observed strictly. > Additional deworming can be carried out before and after floods. > Medicine store facility with availability of adequate drugs at each farm and veterinary dispensaries. > Training of farmers to identify	person made area supply miner vaccin Durin diffict manage birds, slaugh storag Vacci contag Prope died	nnel need to be available in affected with sufficient y of medicine, ral mixture and ne. In a g flood if it is ult to shift and ge large number of they should be hter and sent to cold	course need health and di stock of me prevent out poultry carca Cleaning and Monitoring f regular farm Proper disposition of the prevent wiew. Vaccination of the prevent mort preventive me occurrence of the prevent more occurrence of the prevent out the prevent more occurrence of the prevent out the prevent more occurrence of the prevent out the prevent of the prevent out the prev	to be implemented in relation to isease management during flood with edicine and vaccine for poultry to break. Proper disposal system of asses. I disinfection of poultry farms. For disease outbreaks in birds through visits by veterinarian. It is bed areas from public health point of for RD and IBD to avoid outbreaks. It treatment of birds is important to

	signs of common contagious diseases particularly to avoid outbreaks. Do not built poultry house on nalla or stream or otherwise remove the	 Disinfection of sheds be undertaken. Immediate veterinary help to the farms. Immediate veterinary below the farms. 	Hygienic measures should be followed. Birds should be served for emerging infectious liseases. Restriction on movement of the birds. Compensation of the loss.
	birds before monsoon from such poultry house.	Adequate proper feeding and management.	
		Suggested contingency measures	
Cyclone	Before the event ^s	During the event	After the event
Shortage of	➤ Information at every district head	> Feed and feed ingredients	➤ Feed and feed ingredients resources
feed	quarter regarding availability of feed	resources should be exploited	should be exploited with sufficient
ingredients	and feed ingredients and mineral	with sufficient transport and	transport and storage facilities from
	mixture resources from other areas	storage facilities from other areas	other areas of the district even after the
	with storage facility.	of the district.	event.
		Suggested contingency measures	
Cyclone	Before the event ^s	During the event	After the event
Drinking water	Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the cyclone.	Sufficient facility for transportation with advanced proper planning should be made in the areas of each district.	Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district.

	Suggested contingency measures			
Cyclone	Before the event ^s During the event		After the event	
Health and	➤ Personnel should	➤ Services of trained personnel need to be made available in	Routine training programme	
disease	be trained for	affected area with facilities to overcome heat waves through	as a refresher course need to	
management	health and disease management through trainings and list of trained personnel should be available at each district head quarter during heat and cold waves with stock of life saving medicine, vaccine,	 water availability and cold through proper closed shelter with sufficient supply of medicine and vaccine for poultry. During heat fogging system should be ready and during cold artificial heat through electricity need to be provided. Detection & treatment of ailing birds. Vaccination against contagious diseases. Antistressor preparations or multivitamins preparations through drinking water during stress. Ad. lib. Cold water availability Supply of medicine and vaccine for poultry. Feed in cool hrs and increase the frequency of feeding with 	be implemented in relation to health and disease management during heat and cold waves with stock of medicine and vaccine for poultry and sufficient arrangement. > Anti- stress to relieve stress. > Birds should be monitored for occurrence of diseases. > Vaccination to avoid	

feed and mineral mixture for poultry.	high density feeds. Mineral & Vitamin supplementation	>	outbreaks. Proper disposal of poultry
			carcasses.

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
1) Drought			
A. Capture			
Marine	Not applicable	Not applicable	Not applicable
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Need to implement cost-effective water efficiency and conservation measures in very early stage to	the local aquatic species should be transfer to the less affected areas so as to conserve them and reintroduce in its regional habitat.	Water policies should be determined If we want to restore our inland fishery resources.
	handle the drought. Strategic plan should be made to construct bunds & conserve water in drought prone areas.		Need to set up hatcheries for drought affected fish species to avoid their extinction, and the conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.
(ii) Changes in water quality	Regular monitoring of water quality	Need to harvest the stock to minimize economic losses before mass mortality due to undesired water quality.	After achieving desired water quality, conserved species once again need to be reintroduced in their original habitats.
(iii) Any other	Gene bank should be made for all indigenous local commercially & ecologically important species.	To conserve the endangered species breeding and rearing indoor facility may be created for future restoration.	The conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.
B. Aquaculture			

(i) Shallow water in ponds due to insufficient rains/inflow	Water temperature may get raised and also Dissolved Oxygen level may get declined, hence efforts should made to increase the depth of pond & avoid water seepage by using bentonite clay, plastic liners etc. also artificial oxygenation systems as aerators etc. should be incorporated in aquaculture system.	Water recycling with the aid of potential filtration systems can be applied if available. Provide artificial oxygenation. If water level is too much low, can lead to mass mortality due to environmental stress hence it will be better to harvest the stock immediately.	Construction of small reservoirs or dams should be newly developed in drought prone area. Identifying culturable air breathing species / hardy species (e.g. <i>Notopterus</i> , <i>Clarius</i> , <i>Puntius</i> etc.) suitable to the regional aquatic environment.
(ii) Impact of salt load build up in ponds / change in water quality	Throughout the culture period salinity & other parameters should be checked for regular intervals. Fresh water storage ponds should be developed at aquaculture site.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Identifying best suitable euryhaline spp. (Pearl spot, Sea bass, Rabbit fish, mullets etc.) for the culture which can tolerate wide range of salinity.
(iii) Any other			

2) Floods	
A. Capture	

Marine	Disaster preparedness mission through Sea walls, Embankment. In future early warning systems and evacuation strategy planning for flood prone areas. Plan of Preventive measures against the epidemiological diseases, like malaria, cholera, dengue etc. among coastal communities. Educating coastal population about Disaster mitigation and provision of good transport means in coastal areas prior to the Flooding event which will be helpful for rescue operations.	Aid to populations at the affected zones and shelters. Affected population should be provided with adequate food & medicines in time.	National & international financial support for research on the various aspects of the flood will be needed for future strategies. Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socioeconomic status. Control of vector-borne endemic and epidemic diseases. Mangrove plantation & conservation strategies should be adopted in estuarine region for minimizing future risk.
Inland	In future early warning systems and evacuation strategy planning for flood prone areas. Awareness of People living in rural zones, or urban margins with regards to the geography of their area as they do not take into account whether they are on a river's flood plain, an unstable hillside, a dry river bed in a flooding area, etc., when they (fisheries community) build their houses. More emphasis should be given on the maintenance of public infrastructure, such as highways, secondary roads and bridges prior to the flooding event which will be helpful for rescue operations. Awareness should be created for using good materials for their construction of houses. Strategic planning to build up local resce	Aid to populations at the affected zones and shelters. Timely help to populations at the affected zones and shelters. Affected population should be provided with adequate food & medicines in time.	Diversifying course of flooding river to minimize socio-economic losses. Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socio-economic status.
(i) Average compensation paid due to loss of human life	teams in flood prone areas. Not applicable		
(ii) No. of boats / nets/damaged	Not applicable		

(iii) No. of houses damaged	Not applicable			
(iv) Loss of stock	Not applicable			
(v) Changes in water quality	Not applicable			
(vi) Health and diseases	Preventive measures of Plan of the Health Ministry for the prevention of epidemiological diseases, like malaria, cholera, <i>dengue</i> etc. & vaccinisation in flood prone area.	Affected population should be provided with adequate food & medicines in time.	Control of vector-borne endemic and epidemic diseases.	

B. Aquaculture			
(ii) Inundation with flood water	Early warning systems should be developed to minimize future risk. Elevating the height of peripheral dykes of the aquaculture ponds. Providing elevated net fencing on the bunds to the avoid loss of fish during flooding.	Need to harvest the stock as early as possible to minimize economic losses	Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Water contamination and changes in water quality	Elevating the peripheral dykes of the aquaculture ponds.	Need to harvest the stock as early as possible to minimize economic losses	Drain out all the water from the pond and refill it with good quality water for future crop.
(iii) Health and diseases	Adequate vaccinisation of fish stocks prior to flooding event is recommended to minimize the risk.	In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Quarantining of culture pond before next stocking.
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.
(v) Infrastructure damage (pumps, aerators, huts etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for the pumps & aerators in flood condition.	Transport of the pumps, aerators etc. to the safer places.	Insurance and micro-finance for repaire and maintenance of the infrastructure.

(vi) Any other	-	_	-

3. Cyclone / Tsunami			
A.Capture			
Marine	Timely Communication of weather forecasting to fishermen Implementation of Tsunami detection & warning system in Indian ocean and evacuation strategy planning for Cyclone / Tsunami prone area. Disaster preparedness mission through Sea walls, Embankment Provision of Wave breakers &dry docks for fishing vessel security. Encouragement and financial incentives should be given to fishermen to carry Safety Devices on their fishing crafts. Educating coastal population about Disaster mitigation and provision of good transport means in coastal areas prior to the Cyclone / Tsunami event which will be helpful for rescue operations. Preventive measures for the prevention of epidemiological diseases, like malaria, cholera, dengue etc	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socioeconomic status. Control of vector-borne endemic and epidemic diseases; National & international financial support for research on the various aspects of the Cyclone / Tsunami will be needed for the planning of future strategies. Mangrove conservation, plantation strategies should be adopted in estuarine / coastal region for minimizing future risk
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			

(iii) Avg. no. of houses damaged			
Inland	Timely Communication of weather forecasting to fishermen Encouragement and financial incentives should be given to fishermen to carry safety devices on their fishing crafts	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socio- economic status. Rehabilitation of fishermen communities.
B. Aquaculture			
(i) Overflow / flooding of ponds	Elevating the peripheral dykes of the aquaculture ponds Early warning systems should be developed to minimize future risk.	In very initial stage prior to flooding, need to harvest the stock as early as possible to minimize economic losses. In severe condition nothing can be controlled.	Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Changes in water quality (fresh water / brackish water ratio)	Elevating the peripheral dykes of the aquaculture ponds. Regular monitoring of water quality.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Drain out excess water, After achieving desired water quality, restocking by adopting standard aquaculture protocols.
(iii) Health and diseases	Adequate vaccinisation of the stocks prior to this is recommended to minimize the risk	In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Disinfecting / Quarantining of culture pond before the next stocking.
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Elevating the peripheral dykes of the aquaculture ponds and Initial provision of good indoor storage facility for pumps & aerators.	Transport of the pumps, aerators etc. to the safer places.	Insurance and microfinance with low interest from Govt. for the repair and maintainance of the infrastucture.
(vi) Any other			
4. Heat wave and cold wave			

A. Capture				
Marine	Not applicable			
Inland	Not applicable			
B . Aquaculture				
(i) Changes in pond environment (water quality)	Depth of the aquaculture ponds should be increased to minimize thermal stress. Plantation at the peripheral dykes of aquaculture ponds can be recommended.	Aerators should properly utilized for the good circulation of water maintaining good pond environment.	Identification of best suitable eurythermic spp. for aquaculture to tolerate wide temperature range.	
(ii) Health and Disease management	Maintaining water parameters at desired levels can reduce the stressful condition & can avoid disease.	Aerators should properly utilized for the good circulation of water maintaining optimum water quality.	Early warning systems should be developed to minimize future risk. Identification of hardy species for aquaculture practices.	
(iii) Any other				

^a based on forewarning wherever available

RAIGAD

State: MAHARASHTRA

Agriculture Contingency Plan for District: RAIGAD

	S	1.	<u> </u>	riculture profil						
1.1	Agro-Climatic/Ecological Zone	ogical Zone								
	Agro Ecological Sub Region (ICAR)	Western Ghats And Coastal Plain, Hot Humid-Perhumid Eco-Region (19.3) Western Ghats And Coastal Plain, Hot Humid-Perhumid Eco-Region (19.1)								
	Agro-Climatic Zone (Planning Commission)	West Coast Plains And Ghat Region (XII)								
	Agro Climatic Zone (NARP)	North Konkan Coastal Zone (MH-2)								
	List all the districts or part thereof falling under the NARP Zone	Thane and Raigad								
	Geographic coordinates of district	Latitude			Longitude	Altitude				
	headquarters	18°30′56.71" N 17 ° 51 ′19.80′ N			94°15'37.25" E 72 °51'	73.40" E 38 M				
	Name and address of the concerned ZRS/ZARS/RARS/RRS/RRTTS	Dr. L. S. Chavan, Associate Director of Research, Regional Agricultural Research Station, Karjat- 410 201, Dist. Raigad								
	Mention the KVK located in the district	Krishi Vidyanan Kendra, Roha-402 109, Dist. Raigad								
	Name and address of the nearest Agromet Field Unit for agro- advisories in the zone	Technical Officer, Integrated Agro Advisory Services, Department of Agronomy, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli - 415 712, Dist. Ratnagiri (M.S.)								
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)		ormal Onset week and month)	Normal Cessation (specify week and month)				
İ	SW monsoon (June-September):	2922.3	84	1 st v	week of June	2 nd week of October				
	NE Monsoon(October -December):	-	-		-	-				
	Post Monsoon shower	124.3	6	2 nd w	reek of October	-				
	Winter (January- February)	2.8	0		-	-				
	Summer (March-May)	32.1	1		-	-				
	Annual	3081.6	91		-	-				

1.3	Land use	Geographical	Cultivable	Forest	Land under	Permanent	Cultivable	Land	Barren and	Current	Other
	pattern of the	area	area	area	non-	pastures	wasteland	under	uncultivable	fallows	fallows
	district (latest statistics)				agricultural use			Misc. tree	land		
								crops			
								and groves			
	Area ('000 ha)	687	203	172.54	52	37	57	31	104	31	23

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.4	Major Soils (common names like red sandy loam deep soils) (Medium black soils)	Area ('000'ha)	Percent (%) of total geographical area
	Shallow soils	453.8	66.1
	Medium deep soils	233.0	33.9
	Deep soils	0.2	0.03

Source :- NBSS & LUP, Nagpur

1.5	Agricultural land use	Area ('000'ha)	Cropping intensity %		
	Net sown area	203	114.0		
	Area sown more than once	30	114.8		
	Gross cropped area	233			

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.6	1.6 Irrigation Area ('000'ha)									
	Net irrigated area	7.16	7.16							
	Gross irrigated area	11.91	11.91							
	Rainfed area	188.1	188.1							
	Sources of Irrigation	Number	Area ('000'ha)	Percentage of total irrigated area						
	Canals		5.6	37.6						
	Tanks	-	-	-						
	Open wells	5426	9.3	62.4						

Bore wells	85		
Lift irrigation schemes			
Micro-irrigation			
Other sources (please specify)			
Total Irrigated Area		14.9	
Pump sets	13685		
No. of Tractors	118		

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

Groundwater availability and use* (Data	No. of blocks/	(%) area	Quality of water (specify the problem such as
source: State/Central Ground water	Tahsils		high levels of arsenic, fluoride, saline etc)
Department /Board)			
Over exploited			
Critical			
Semi- critical			
Safe		46% of ground water is exploited	
Wastewater availability and use			
Ground water quality			

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

1.7 Area under major field crops & horticulture etc.

Major Field crops cultivated			Area ('			
	Kha	ırif	Ra	bi	Summer	Total
	Irrigated	Rainfed	Irrigated	Rainfed		
Rice		124	6.2			130
Pulses (Lab lab bean, cowpea, black		2.1	11.7			13.8
gram, horse gram, etc.)						
Finger millets		11				11
Prosomillet		1.3				3.9
Groundnut		0.0	0.2			1
Mustard and sasamum			0.1			
Horticultural crops – Fruits			Total Area	('000'ha)		
Mango			12.4	433		
Cashew			12	2.7		
Sapota			0.	.8		
Other fruit crops			2.	.9		
Horticulture crops – Vegetables						
Okra, Brinja, Chillil and Leafy			4.3	21		
vegetables etc.						
Plantation crops			-	-		
Coconut			3.	9		
Arecanut			0.	.9		
Fodder crops			3	8		

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

1.8	Livestock	Male	Female	Total
	Non descriptive Cattle (local low yielding)	213658	181850	395508
	Crossbred cattle	3922	6410	10332
	Non descriptive Buffaloes (local low yielding)	5601	57306	62907
	Graded Buffaloes	0	0	0
	Goat	35674	88249	123923
	Sheep	56	70	126
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			NA

1.9	Poultry	No. of farms	Total No. of birds
	Commercial	Data are not available	3576786
	Backyard	Data are not available	956925

Source: Maharashtra Animal and Fisheries Science University, Nagpur

1.10	Fisheries (Data source: Chief Planning Officer)									
	A. Capture									
	i) Marine (Data Source: Fisheries Department)			Boa	ats		Nets	Storage facilities (Ice		
	Tisheries Department)	No. of fishermen		Mechanized	Non- mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	plants etc.)		
		65430		2588	640	271880		39		
	ii) Inland (Data Source:	No	No. Farmer owned ponds		No. of Reservoirs		No. of v	No. of village tanks		
	Fisheries Department)	•		5.	555		-			
	B. Culture									
			Water S	pread Area (ha)		Yield (t/ha)	Produ	ection ('000 tons)		
	i) Brackish water (Data Source MPEDA/ Fisheries Department)		Data are not available		Data	Data are not available		39.505		
	ii) Fresh water (Data Source: Find Department)	isheries	Data are not available		Data	Data are not available		1.0		

1.11 Production and Productivity of major crops (Average of last 5 years)

1.11	Name of crop	Kharif		Rabi-S	Rabi-Summer		Summer		Total	
		Production (00't)	Productivity (kg/ha)	Production (00't)	Productivity (kg/ha)	Production ('00 t)	Productivity (kg/ha)	Production (00't)	Productivity (kg/ha)	residue as fodder ('000
										tons)
Major	Field crops (Crop	os to be identif	ied based on total a	creage)						
	Rice	3425	2411	228	2651			3205	2426	-
	Finger millet	80	777	-	-			80	777	-
	Proso millet	99	548	-	-			23	548	-
	Pulses	40	667	57	479			73	510	
	Groundnut	0.04	1600	4	2000				800	-
	Mustard and sasamum	0.024	300	1	500			8		-

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

		Total production (00't)	Total Productivity (Kg/ha)
1	Mango	179.3	1512
2	Cashew	11.4	366
3	Coconuts	172 Lack nuts	42 nut /plam
4	Sapota	7.8	4200

Source – District Socio-economic Review –2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Finger millets	Groundnut	Wal (Lablab bean)	Blackgram	
	Kharif- Rainfed	25 th May to 25 th June	1 st fortnight of June				
	Kharif-Irrigated						
	Rabi- Rainfed						
	Rabi-Irrigated	2 nd fortnight of November		2 nd fortnight of December		November (Cowpea, Wal, ack gram, Green gram)	

3 What is the major contingency the district is prone	Regular	Occasional	None
to? (Tick mark)			
Drought		✓	
Flood		✓	
Cyclone		✓	
Hail storm			✓
Heat wave	✓		
Cold wave			✓
Frost			✓
Sea water intrusion	✓		
Pests and disease outbreak (specify) 1. Rice :- : Stem borer, Bacterial blight, Blast 2. Finger millet :- Bacterial blight, Blast 3. Groundnut :- Early and late leaf spot	✓		
4. Mango :- Mealy bug, thrips, fruit fly			
5. Cashew: - Tea mosquito bug, thrips,			
6. Areca nut :- Koleroga, Inflorescence blight and Ganoderma rot			
7. Coconut :- Rhinoceros beetle, eriophyid mite			
8. Pulses :- Damping off & Cuscuta			
Others (specify)	-	-	-

1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: No
		Soil map as Annexure 3	Enclosed: Yes

Annexure 1



Annexure - 2

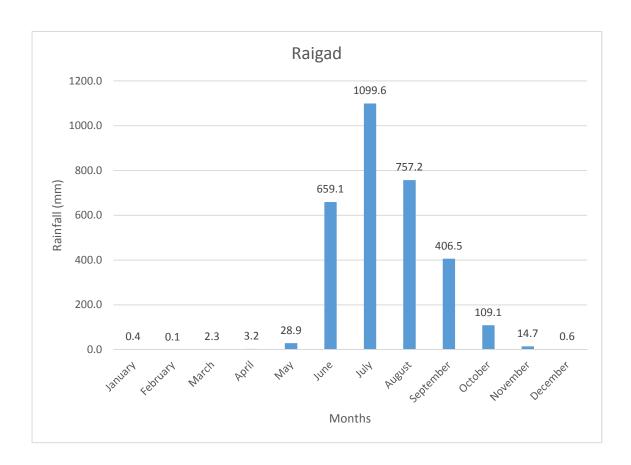
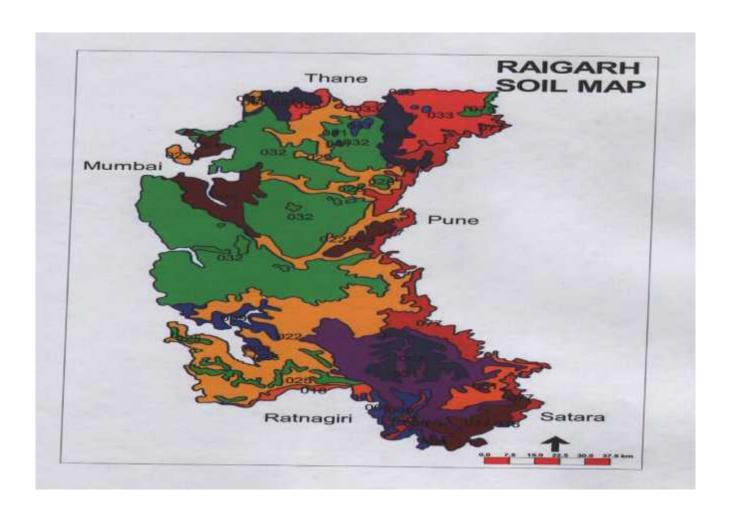


Fig: Mean monthly rainfall (mm) of Raigad District.

Annexure 3



Soil map Raigad district (Source :- NBSS & LUP, Nagpur)

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Cont	tingency measures	
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (3 rd week of June)	Upland medium deep to shallow soils	Rice	In case of failure of germination use very early duration variety (Karjat-184, Ratnagiri – 73)	Prepare the seedlings by mat nursery / Dapog method.	Procure the seed from Maharashtra State Seed Corporation.
				If raising of seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds)	
	Fir	Finger millet	No change		
	Mid-land Rice medium deep soils		In case of failure of germination use early duration variety (Karjat- 3, Karjat-4, Karjat-7, Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711)	Prepare the seedlings by mat nursery / Dapog method.	

Low land deep soils	Rice	In case of failure of germination use mid late duration variety (Karjat-5, Karjat-9, Palghar-1, Palghar-2, Ratnagiri-4)	• If raising of seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds)
Hill slope shallow soils	Finger millet	No change	
Khar land	Rice	Use <i>salt tolerant</i> varieties (Panvel -2)	Sowing of sprouted seed

Condition			Suggested Contingency measures			
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation	
**Delay by 4 weeks (1st week of July)	Upland medium deep to shallow soils	Rice	Use very early duration variety (Karjat-184, Ratnagiri – 73)	Raise the crop by direct seeding method (dry or sprouted seeds)	Source of Seed : Maharashtra State seed corporation and other seed agency	
		Finger millet	Cowpea (Var. Konkan Sadabahar), Black gram (TPU- 4) Oil Seed like niger (Var. IGP 76)			
	Mid-land medium deep soils	Rice	Use very early duration variety (Karjat-184, Ratnagiri – 73)	Raise the crop by direct seeding method (dry or sprouted seeds)		

Low land deep soils	Rice	Use early duration variety (Karjat- 3, Karjat-4, Karjat-7, Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711.)	Raise the crop by direct seeding method (dry or sprouted seeds)	
Hill slope shallow soils	Finger millet Prosomillet	Grow pulses like cowpea (Var. Konkan Sadabahar), black gram (TPU-4) Oil Seed like Niger (Var. IGP 76)	-	
Khar land	Rice	Short duration variety suitable for Kharland (Panvel - 2)	Sowing of sprouted seeds	

Note:- ** Generally such type of situation has not occurred during past years

Condition			Suggested Contingency measures			
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation	
**Delay by 6 weeks	Upland medium deep to shallow	Not applicable	ch type of situation has not occurred dur	ing past years		
(3 rd week of July)	Mid-land medium deep soils					
	Low land deep soils					
	Hill slope shallow soils	- -				
	Kharland					

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

**Delay by 8 weeks	Upland	Not applicable
	medium deep to shallow soils	Note:- ** Generally such type of situation has not occurred during past years
(1 st Week of August)	Mid-land	
	medium deep soils	
	Low land	
	deep soils	
	Hill slope	
	shallow soils	
	Kharland	

Condition			Suggested Contingency measures			
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management Soil nutrient of moisture conservation measures	Remarks on Implementation		
Normal onset followed by 15-20 days dry spell at the time of transplanting	Upland medium deep to shallow soils	Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm). Increase 25% recommended dose of fertilizer. For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method. Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery. 	nalas, streams, rivers for puddling operation		
		Finger millet	• Increase 25% recommended Protective	Use water from the		

	Prosomillet	dose of fertilizer • Adopt closer spacing (15 x15 cm) irrigation after transplanting ponds, nalas, streams, rivers, etc.
Mid-land medium dee	P soils Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm) Increase 25% recommended dose of fertilizer For shortage of seedling prepare seedling by mat nursery using short duration variety. Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation Protective irrigation after transplanting Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
Hill slope shallow soil	Finger millet Prosomillet	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm)
Kharland	Rice	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery Protective irrigation after transplanting Use water from the outside sources like farm ponds, nalas, streams, rivers for protective irrigation

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	Upland medium deep to shallow soils	Finger millet Prosomillet	 Postpone the split dose of Nitrogen application till receipts of rain/protective irrigation Protective irrigation. Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. Protective irrigation 	 Adopt weed management practices. Apply split dose of Nitrogen after restart of rains Spray % potassium Adopt weed management practices. Apply split dose of Nitrogen after restart of rains Spray % potassium 	Use water from the outside sources like farm ponds, nalas, streams, rivers for protective irrigation	
	Mid-land medium deep soils	Rice	Postpone the split dose of Nitrogen application till receipts	Adopt weed management	Use water from the outside sources like	

Low land deep soils	Rice	•	of rain/protective irrigation Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast	•	practices. Maintain the existing water level in the field. Apply split dose of Nitrogen after restart of rains pray % potassium	farm ponds, nalas, streams, rivers for protective irrigation
Hill slope shallow soils	Finger millet Prosomillet		Give protective irrigation if possible.	•	Adopt weed management practices. Apply split dose of Nitrogen after restart of rains	
Kharland	Rice	•	Postpone the split dose of Nitrogen application till receipts of rain/protective irrigation Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast	•	Adopt weed management practices. Maintain the existing water level in the field. Apply split dose of Nitrogen after restart of rains Spray % potassium	Use water from the outside sources like farm ponds, nalas, streams, rivers for protective irrigation

Condition			Suggested Contingency measures		
Mid season drought	Major Farming	Normal Crop/cropping	Crop management Soil nutrient & Remarks on		Remarks on

(long dry spell)	situation	system		moisture conservation measures	Implementation
At flowering/ fruiting stage Upland medium deep to shallow soils Mid-land medium deep soils Low land deep soils	Rice	 Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium 	Use water from the outside sources like farm ponds, nalas, streams, rivers for protective irrigation	
	Finger millet Prosomillet	Protective irrigation.	 Adopt weed management practices. Spray % potassium 		
	Rice	 Protective irrigation. Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium 		
	Hill slope shallow soils	Finger millet Prosomillet	Give protective irrigation if possible.	Adopt weed management practices	

Kharland	Rice	 Apply protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium
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Condition			Sug	ggested Contingency measures	S
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi crop planning	Remarks on Implementation
	Upland medium deep to shallow soils	Rice Finger millet Prosomillet	Harvest crop at physiological maturity	 Carry out sowing of Rabi crops as early as possible (Cowpea, groundnut, water melon, leafy vegetables) Raise the seedlings of chilli, brinjal, cabbage, knol knol) 	Source of Seed : Maharashtra State seed corporation and other seed agency
	Mid-land medium deep soils Low land deep soils	Rice	Protective irrigation Harvest crop at physiological maturity	 Carry out sowing of Rabi crops as early as possible (Cowpea, Horse gram, mustard, sweet corn, groundnut, water melon, leafy vegetables) Raise the seedlings of chilli, brinjal, cabbage, knol knol) Under flood (field to field) irrigation go for rice cultivation 	

Hill slope shallow soils	Finger millet Prosomillet	Harvest crop at physiological maturity	
Kharland	Rice	Harvest crop at physiological maturity	Suitable vegetable crops like sugar beet, radish, spinach, etc.

Irrigated situation

Condition			Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation	
D 1 1 1 C		Rice (Rabi season)	Use early duration variety (Karjat-3, Karjat-184, Ratnagiri 73, Ratnagiri -1) or Grow short duration pulses viz. cowpea (Var. Konkan Sadabahar), under control irrigation and tail end area	 Dapog/mat technique of nursery raising. Young seedling transplanting. SRI Technique. 	Source of Seed Maharashtra State Seed corporation and other seed agency	
		Groundnut	Prefer short duration variety (Phule pragati) or grow short duration pulses viz. Cowpea (Var. Konkan Sadabahar),	If other source of irrigation is available sow the crop as per schedule.		
	- 8	Pulses (Wal, cowpea, green gram)	No change	Use micro irrigation (drip or micro sprinkler) Prepare the seedlings in portrays of vegetables (cucurbitaceous		
		Vegetables (Cucurbitaceous crop, chilli, okra etc.)	Prefer short duration vegetables like Kartoli and leafy vegetables varieties			
			Coriander: Dapoli-1 Radish: Japanies white long, Pusa ketaki Math: Math durangi, Co-1			
		Water melon	Use short duration varieties	crops, brinjal, chilli) to avoid delay in transplanting.		

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 Me	Mid and low land Medium deep to deep soils	Rice (Rabi season)	 Prefer early duration variety in low land situation (Karjat-3, Karjat-184, Ratnagiri 73, Ratnagiri -1) Grow short duration pulses (cow pea (Var. Konkan Sadabahar), Lab lab bean (Konkan wal no. 1). lab lab bean, horse gram), groundnut (Phule Pragati), vegetables in midland situation 	 Use SRI Technique for rice cultivation. Adopt Weed management practices Use micro irrigation (drip or micro sprinkler) 	Procure the seed from Maharashtra State Seed Corporation
	Puls gran Veg crop	Groundnut	Prefer short duration variety (Phule Pragati,)	 Adopt Weed management practices with dry weeder Use micro irrigation (drip or micro sprinkler) 	Procure the seed from Maharashtra State Seed Corporation
		Pulses (Wal, Cowpea, Green gram)	No change	Adopt Mulcinhg	
		Vegetables (Cucurbitaceous crop, Chilli, Okra etc.)	Grow Dolichous bean or adopt soil conservation measures for regular vegetables	Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler) Adopt mylobing	Procure the seed from Maharashtra State Seed Corporation
		Water melon	Either follow the soil conservation measures for water melon or grow short duration pulses	Adopt mulching	

Condition		Suggested Contingency measures				
	Major Farming	Normal Crop/cropping	Change in crop/cropping	Agronomic measures	Remarks on	
	situation	system	system		Implementation	

Condition			Sugge	ested Contingency measure	es
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals Mediu	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Grow Lab lab bean, horse gram, black gram, bengal gram cowpea, mustard on residual moisture under low land situation.	sowing of seed by	Procure the seed from Maharashtra State Seed Corporation
		Groundnut	No change	**	
		Wal (Lablab bean)		(drip or micro	
		Pulses (Cowpea, Horsegram, Greengram, Bengalgram, Pea etc.)		sprinkler) • Adopt mulching	
	Vegetables (Cucurbitaceous crop, Chilli, Capsicum, Okra etc.) Water melon	No change	Adopt Weed management practices Use micro irrigation (drip or micro)		
				sprinkler) • Adopt mulching	

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	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Wal (lablab bean) - Var. Konkan Wal No. 1, Horse gram - Var. Dapoli – 1, Bengal gram,on residual moisture under low land situation	sowing of seed by dibbling,	

		Suggeste	d Contingency measures	
Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Groundnut	Short duration pulses like Bengal Gram, Wal (lablab bean), horse gram, black gram, greengram cowpea (Konkan Sadabahar) on residual moisture. If farm pond water is available grow leafy vegetables.	 Minimum tillage and sowing of seed by dibbling, relay cropping Adopt Weed management practices. Use micro irrigation 	
Pulses (Cowpea, Horsegram, Green gram, Wal)	No change	(drip or micro sprinkler).Adopt mulching		
	Vegetables (Cucurbitaceous crop, chilli, okra etc.) Water melon	Short duration pulses like Bengal Gram, Wal (lablab bean), horse gram, black gram, greengram cowpea (Konkan Sadabahar) on residual moisture. If farm pond water is available grow leafy vegetables.	 Minimum tillage and sowing of seed by dibbling, relay cropping Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler). 	
		Green gram, Wal) Vegetables (Cucurbitaceous crop, chilli, okra etc.)	Vegetables (Cucurbitaceous crop, chilli, okra etc.) Water melon Short duration pulses like Bengal Gram, Wal (lablab bean), horse gram, black gram, greengram cowpea (Konkan Sadabahar) on residual moisture. If farm pond water is available	Pulses (Cowpea, Horsegram, Green gram, Wal) Vegetables (Cucurbitaceous crop, chilli, okra etc.) Water melon Short duration pulses like Bengal Gram, Wal (lablab bean), horse gram, black gram, greengram cowpea (Konkan Sadabahar) on residual moisture. If farm pond water is available grow leafy vegetables. Wegetables (Cucurbitaceous crop, chilli, okra etc.) Minimum tillage and sowing of seed by dibbling, relay cropping • Adopt Weed management practices. • Use micro irrigation (drip or micro

Condition			Suggeste	d Contingency measures	
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater	Mid and low land Medium deep to	Rice (Rabi season)	Not applicable		
1.100	deep soils	Groundnut			
		Wal			

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
		Pulses (Cowpea, Horsegram, Green gram)			
		Vegetables (Cucurbitaceous crop, chilli, okra etc.)			
		Water melon			
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	
Rice	Spray Cartap Hydrocloride 50SP @ 1.2 g/lit for the management of case worm Close water in the field and Drag rope over crop to dislodge the cases after that open the water at one end of the field to collect the cases which can be destroyed afterwards Drain out excess water and spray Propiconazol @ 1ml /lit of water to control sheath blight		Drain out excess water and harvest the crop before lodging	Immediate threshing and drying in shed	
Fingermillet		-	Harvest the crop before lodging	Immediate threshing and	

				drying in shed
Groundnut	Drain out excess water	Drain out excess water 2.Spray mancozeb @ 2.5 g/lit of water to control Tikka and rust disease	Drain out excess water and harvest the crop immediately	Separate the pods immediately and dry in shade.
Blackgram	Drain out excess water	Drain out excess water	 Drain out excess water. Harvest the crop at physiological maturity	Immediate threshing and drying in shed
Horticulture				
Cucurbitaceous crop	Drain out excess water	Drain out excess water	Drain out excess water	-
Solanaceous crop	Drain out excess water	Drain out excess water	Drain out excess water	
Mango	Wait for congenial condition for application of Paclabutrazol @ of 0.75 g/a.i. per meter average canopy diameter	-	-	-
Banana	 Drain out excess water Propping with bamboo Spray Hexaconazol @ 1ml/lit of water for control of Sigatoka Leaf spot and blight At pre flowering stage 	 Drain out excess water. Propping with bamboo 	 Drain out excess water Propping with bamboo 	

Heavy rainfall with high speed winds in a short span				
Rice	-	-	Drain out water and harvest the crop at maturity immediately if lodging take place	Immediate threshing and drying in shed
Fingermillet	-	-	Harvest the crop before lodging	Immediate threshing and drying in shed
Groundnut	Drain out excess water	Drain out excess water	Drain out water and harvest at physiological maturity stage	Separate pods immediately and dry in shed
Blackgram	Drain out excess water	Drain out excess water	Drain out water and harvest at	Immediate threshing and

			physiological maturity stage	drying in shed
Horticulture				
Cucurbitaceous crop	Drain out excess water Repair the pendol	Drain out excess water Repair the pendol	Drain out excess water	-
Solanaceous crop	Drain out excess water Do staking	Drain out excess water Do staking	Drain out excess water	-
Mango	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. 	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk. Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose. 	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk. Collect and utilize fallen fruit immediately for suitable processing. 	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk.
Cashew	Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk.	Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux	-	

		paste on cut surface and trunk.		
Banana	Drain out excess water Propping with bamboo	 Drain out excess water Propping with bamboo Flowers of broken plant may be used as vegetable 	 Drain out excess water Propping with bamboo Fruit of broken plants may be used as vegetable. 	-
Outbreak of pests and diseases due to unseasonal rains		<u> </u>		
Rice	Spraying of Carbendazim 0.1% or Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease	Spraying of Carbendazim 0.1% or Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease	-	-
Fingermillet	-	-	-	-
Groundnut	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	-	-
Horticulture				
Cucurbitaceous crop			 Install Rakshak trap 4 per ha (Cue lure) to control fruit fly Spray with Copper Oxy Chloride @ 2.5 g/lit of water to control Downey mildew 	
Solanecious crop				
Mango	Take spray of Lambda Cyhalothrin 5 EC @ 0.6 ml/lit of water and second spray of Imidachloprid 17.8 EC @ 0.3 ml/lit of water for control of mango	• Spraying with 0.2% W.P. sulphur dust or 0.05% hexaconazol to control powdery mildew.	Install Rakshak trap 4 per ha (Methyl eugenol) to control fruit fly	• Dipping fruits in hot water at 52°C for 10 min. after harvest to control post harvest rot.

	hopper and shoot borer. • Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose			
Cashew	First spray with Profenophos 40EC 1ml/lit of water, second spray with Lamda cyhalothrin 0.6 ml/ lit of water and third spray with prophenophos 1ml /lit of water @ interval of one month. Sprays starting from leaf flush to control tea mosquito bug.	-	-	-
Arecanut		Spraying with 1% Bordeaux mixture or 0.37% copper oxychloride or root feeding four times at monthly intetvals (June to sept.) with fosetyl AL 0.3% to control kole rog		
Sapota	Three sprays of Emamectin benzoate 5 SG 0.45 g/lit. or Deltamethrin 2.8 EC @ 1 ml/lit. or Lambda cyhalothrin 5 EC @ 1 ml/lit or profenofos 40 EC @ 1 ml/lit for control of sapota bud borer. The first spray should be given at the fifty per cent flowering i.e. March and subsequent two	For control of Sapota seed borer spraying of Profenophos 40 EC @ 1ml/lit. by the end of monsoon, Therafter Deltamethrin 2.8 EC 1 ml/lit. one month after first spray, Lambdacyhalothrin 5 EC 1 ml/lit. one month after second	-	Collect and destroy the fallen and infected fruits

	s should be given at an al of one month.	spray and Deltamethrin	
IIIteiva	ai of one month.	2.8 EC/lit one month after third spray	
		Spraying of Metalaxyl +	
		Mancozeb containing complex fungicide @	
		0.2% to control fruit drop	

2.3 Floods

Condition	Suggested contingency measure				
Transient water logging/ partial inundation	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest	
Rice	If washed out resowing of nursery by using mat nursery/sowing of sprouted seed on puddled field	• Drain out excess water	• Drain out excess water	Drain out excess water.Immediate harvesting, threshing and drying in shed	
Fingermillet	Not applicable				
Groundnut					
Blackgram					
Horticulture (Vegetables)					
Cucurbitaceous crop	Resowing	Drain out excess water	Drain out excess water	-	
Solanaceous crop	Resowing /Replanting of seedlings	Drain out excess water	Drain out excess water		

Continuous submergence for more than 2 days				
Rice	If washed out resowing of nursery by using mat nursery/ sowing of sprouted seed on puddled field	 Drain out excess water Apply second dose (40%) of nitrogen after submergence is over 	Drain out excess water	 Drain out excess water. Immediate harvesting, threshing and dry in shed
Fingermillet	Not applicable			

Groundnut				
Black gram				
Horticulture (Vegetables)				
Cucurbitaceous crop	Resowing of seeds	Drain out excess water	Drain out excess water	-
Solanaceous crop	Resowing of seeds/ Replanting of seedlings	Drain out excess water	Drain out excess water	

Sea water intrusion				
Rice	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out, If wash out resowing of nursery with salt tolerant varieties like Panvel -1 and Panvel -2 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out 	 1.Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Immediate harvesting, threshing and drying in shed.
Fingermillets	Not applicable			
Groundnut				
Niger				
Black gram				
Horticulture (Vegetables)				
Cucurbitaceous crop	Not applicable	Not applicable	Not applicable	Not applicable
Coconut	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out Mound the crop with soil 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out

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						
Mango	Cover with shed net /Protective irrigationWater spray	Water spray / 1% Potassium nitrate spray	Collect and destroy dropped fruits	Collect and destroy dropped fruits		
Cashew	• Cover with shed net /Protective irrigation Water spray	Protective irrigation	Protective irrigation			
Coconut	 Cover with shed net. Water spray	Frequent irrigation	Frequent irrigation	Frequent irrigation		
Arecanut	Cover with shed net.Water spray	Frequent irrigation	Frequent irrigation	Frequent irrigation		
Cold wave		NA				
Frost		Ī	NA			
Hailstorm						
Mango	-	-	Collect and destroy the fallen fruit to avoid the further built-up of pest and disease inoculums	Collect the fallen fruit to avoid the further built-up of pest and disease inoculums		
Cyclone						
Mango	Support the young seedlings/grafts	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing 	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing 		
Cashew	Support the young seedlings/grafts	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect fallen nuts market it. 	 Proper pruning of damage or broken branches Collect fallen nuts and store 		

Coconut	Support the young seedlings	Immediate disposal of damaged trunk	Collect fallen tender nuts, market it.	Collect fallen tender nuts market it.
Arecanut	Support the young seedlings	Immediate disposal of damaged trunk	Collect fallen tender nuts market	Collect fallen tender nuts market it.

2.7 Contingent strategies for Livestock, Poultry & Fisheries

2.7.1 Livestock

	Suggested contingency measures			
Drought	Before the event	During the event	After the event	
Feed and fodder availability	 Conservation of green fodder as silage dry fodder as hay in flush season for utilization in lean period Dry fodder available should be processed i.e. Urea treatment of crop residues to enhance their nutritive value. For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided 	 Judicious use of feed resources processed as per type of livestock possessed by the livestock owners. Distribution of fodder, UMMB blocks, other feed resources stored in the affected area to the livestock 	For the production of the prod	
	free of cost to the livestock owners. > Judicial use of available feed resources by the livestock	owners as per the number and type of livestock possessed.	 Mineral Supplementation should be continued. 	
	 owners. Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored. 	 Mineral supplementation – Mineral mixture be provided for the livestock@50 g/day/Anim. Disposal/Transfer of the animals in 	Concentrate feeding for productive animals so as to	
	Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be	the area having feed resources availability.Concentrate feeding for productive	compensate the body condition and production.	
	 procured for productive animals. Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate. 	 animals to support minimum production &lifesaving of the important animals. Other nonproductive animals are to 	The animals must be brought into cyclic stage for reproduction.	
	 Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants. 	be fed at subsistence level. > Use of food grains for biodisel and distillaries should be stopped and the	Young crossbred livestock needs to be attended properly so	
	Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein,	grains be spared for productive animals. > Bypass protein concentrate	as to harness the high productivity. > Adlib. feeding may	
	calcium, Vitamin A and hence should be reserved for feeding during drought.	ingredients may be provided in order to harvest maximum nutrients for	be practiced with balancing the	

- Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.
- Mineral mixture should be procured and stored for supply.
- ➤ Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.
- Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banks to be established at each Taluka in the drought area.
- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- > State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- > Cattle camp sites needs to be identified.
- ➤ NGOs/Gorakshan Sanstha etc. needs to be identified.
- Anticipated number of livestock & feed resources to be provided needs to be assessed.
- > Livestock registration should be compulsory with identification by tagging
- > Preparedness of veterinary services to drought prone areas.
- Encourage farmers to cultivate fodder crops.
- > Identification of the site for fodder depot.
- Facility to store fodder by creating centralized silage making facility with provision for transport.
- > Forage production and storage of fodder in irrigated areas.
- Assessment of risk and vulnerability.
- Formation of village Disaster Management Committee.
- > Establishment of drought monitoring system or early warning system.

- productive animals particularly high productive crossbred cows.
- Top feeds should be used during scarcity period only.
- Oil seed cakes are good source of proteins and hence should be used for productive animals only.
- Feed supplements/ Additives needs to be used widely for productive animals.
- Establishment of Cattle camps at identified sites.
- NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for maintenance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- Adaptation of proper distribution policy as per requirement with transport facility.
- Regular rest periods for working animals particularly bulls during hot period of the day.
- > Capture and care of stray animals.
- The unproductive/surplus livestock needs to be culled/disposed.
- Sale of feed and fodder from the affected area to non affected area should be banned.
- > Distribute fodder at reasonable rate.
- Monitoring feed and fodder prices.

- nutrients required.
- The unproductive/surplus livestock needs to be culled/disposed.
- Livestock suitable with the farming system practiced only should be maintained.
- Mechanization in agriculture needs to be encouraged.
- Feed processing needs to be encouraged in order to minimize the wastage of feed resources.
- > In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.
- Readiness for feed and fodder bank as and when required for each districts with transport facility.
- Review of shortfalls in planning and refining action plan the before and during event.

	Suggested contingency measures		
Drought	Before the event	During the event	After the event
Drinking	➤ Water resources as in general are inadequate and	> Special distribution and carrying capacity	> Permanent water

water	 hence the resources should be trapped and increased. Available rain water harvesting technique should be adopted i.e. farm ponds etc. Water conservations measures be adopted to increase water table like recharging of bore wells. Available water resources should be tapped and reserved. Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken. Judicious use of water in agriculture i.e. through drip/sprinkler irrigation. Wastage of water needs to be curbed. Rain water harvesting measures needs to be implemented at village level. Proper utilization of Water to save water. Equal water distribution plan may be implemented. Cloud seeding desalination, recycle sewage water, transvasment river project etc. 	 Water should be used as per the requirement of animals (@10-15 lit/100 kg body weight). Drinking water should not be used for washing animals. Clean and chlorinated water be provided to prevent water borne diseases. Special distribution and carrying capacity should be supplemented from other available resources. Water for irrigation should be stopped. Judicious use of water for livestock. Supply of water through tankers during contingency. Private water resources such as wells shall be used for drinking water. 	resources should be developed with campaign for public awareness. > Steps should be taken to conserve water. > Ensure fresh clean and cold water supply to livestock.
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	Suggested contingency measures		
Drought	Before the event	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter with stock of life saving medicine for livestock. Vaccination of animals for various diseases according to season. 	 Services of trained personnel need to be made available in affected area with sufficient supply of life saving medicine of livestock. A team of veterinary experts be deployed for health management of drought hit livestock. During occurrence of disease, affected 	 Routine training programme as a refresher course need to be implemented in relation to health and disease management during drought with stock of life saving medicine for livestock. There will be stress on
	 Deworming and spraying be done to get rid of endoparasites and ectoparasites to keep the health of animals in good condition. Personnels should be trained for health and disease management through training 	 animals should be kept isolated and treated properly and promptly. Vaccination against contagious diseases like HS, FMD, Theileriosis be carried out. Mineral mixture be provided to take care of deficiency disorders. 	animals due to deterioration of health during drought period. Concentrates and vitaminmineral supplements be provided to minimize the

- List of trained personnel should be available at each district head quarter.
- Feedadditives/Tonics/ Vitamin supplements should be stocked.
- Vaccines, Insecticides, disinfectants and dewormers needs to be stocked.
- Records/PM/ Carcass disposal arrangements needs to be ensured.
- ➤ Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls.
- Create temporary shade shelters to prevent heat stress on the animals. (animal camps)
- > Supply of Vitamin and minerals mixture.
- Application of preventive and control measures of SP & MD.

- Tick control measures be undertaken to prevent tick borne diseases in animals under stress.
- > Deworming should be carried out.
- Feed additives/Tonics/Vitamin supplements should be provided.
- Post Mortem /record keeping/carcass disposal arrangements be effected.
- Restriction on movement of the animals to prevent the spread of diseases.
- Periodic disinfection and disinfestations of premises where animals are kept.
- Permission of only healthy and vaccinated animals in cattle market.
- > By proper treatment with supervision and exercise over starvation.
- Special transport facility of mobile van for veterinary team be deployed.

- stress on animals.
- The animals should be observed for signs of contagious diseases or deficiency disorders.
- Vaccination spraying and deworming programme needs to be undertaken.
- Record of affected livestock to be submitted for compensation of the loss.
- Farm disinfection and disinfestations.
- Assessment of losses due to mortality if any.

	Suggested c	contingency measures	
Floods	Before the event	During the event	After the event
Feed and fodder availability	 Identification of flood prone zones and flood forecasting. Installation of early warning systems. Steps to prevent spoilage of food and water supply due to flood water. Dedicated helpline to emergency contact and communication at taluka level. Avoid construction of farm buildings in flood risk areas. Local ponds and canals regularly inspected and cleared off from obstruction Adequate stock of Tetanus toxoid. Change cropping pattern according to flood risk periods. Storage of available fodder at safe place before rainy season. Training of local personnel for disaster management. Dry fodder available should be processed i.e. Urea treatment of crop residues to enhance their nutritive value. 	 Quick evacuation of livestock from flood plane areas before area become flooded Prevent outflow of manure pit in river Proper feed, vaccine, drugs, disinfecrants and feed supplement distribution policy adopted with transport facility. Prevent spoilage of food and water supply Judicious use of feed resources processed as per type of livestock possessed by the livestock owners. Distribution of fodder, UMMB blocks, other feed resources stored 	 ▶ Green fodder production in next Kharip season needs to be undertaken as a source of fodder at earliest. Fodder seed of improved fodder crop varieties needs to be distributed. ▶ Mineral Supplementation should be continued. ▶ Concentrate feeding for productive animals so as to compensate the

- For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to the livestock owners.
- Judicial use of available feed resources by the livestock owners.
- Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored.
- Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes,low grade grains, Govt Godowns wastes, grains unfit for human consumption etc. should be procured for productive animals.
- ➤ Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate.
- ➤ Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants.
- ➤ Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A&hence should be reserved for feeding during drought.
- ➤ Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.
- Mineral mixture should be procured and stored for supply.
- Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.
- Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banksto be established at each Taluka in the drought area.
- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity

- in the affected area to the livestock owners as per the number and type of livestock possessed.
- ➤ Mineral supplementation Mineral mixture be provided for the livestock@50 g/day/Anim.
- Disposal/Transfer of the animals in the area having feed resources availability.
- Concentrate feeding for productive animals to support minimum production & life saving of the important animals.
- Other non productive animals are to be fed at subsistence level.
- Use of food grains for biodisel and distillaries should be stopped and the grains be spared for productive animals.
- Bypass protein concentrate ingredints may be provided in order to harvest maximum nutrients for productive animals particularly high productive crossbred cows.
- Top feeds should be used during scarcity period only.
- Oil seed cakes are good source of proteins and hence should be used for productive animals only.
- Feed supplements/ Additives needs to be used widely for productive animals.
- > Establishment of Cattle camps at identified sites.
- ➤ NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for maintainance 2.0 kg. concentrate

- body condition and production.
- The animals must be brought into cyclic stage for reproduction.
- Young crossbred livestock needs to be attended properly so as to harness the high productivity.
- Adlib. feeding may be practiced with balancing the nutrients required.
- The unproductive/surplu s livestock needs to be culled/disposed.
- Livestock suitable with the farming system practiced only should be maintained.
- Mechanization in agriculture needs to be encouraged.
- Feed processing needs to be encouraged in order to minimize the wastage of feed resources.
- Fig. 1.5. In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.

period. Cattle camp sites needs to be identified. NGOs/Gorakshan Sanstha etc. needs to be identified. Anticipated number of livestock & feed resources to be provided needs to be assessed. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the city where feeds & fodder (silage) can be stored for emergency use.	mixture/day/adult animal for supporting minimum milk production. The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district.	Fodder resources should be exploited with sufficient transport facilities from other areas of the district even after the event.
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	Suggested contingency measures			
Floods	Before the event	During the event	After the event	
Drinking water	 Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the flood. Rain water harvesting should be done in all districts. Every district should be made self-sufficient. Every district gas plenty of rain water which should be harvested so that these areas should become self-sufficient & if required they should be able to provide water to other dry areas too. The rain water should not be wasted in sea. Shelters & temporary camps should be set up at a height in city area as well as in suburbs after choosing the right location for each area. Same provisions should be done in other Konkan districts. Bore well facilities should be exploited in districts for 	 Sufficient facility for transportation with advanced proper planning should be made in the areas of each district. During flood condition there will be polluted water, whatever potable drinking water source is available should be used with almost care. Disinfection of drinking water <i>i.e.</i> chlorination of water should be carried out Stop use of drinking water for animals from contaminated water resources. 	 Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. Clean disinfected water from bore well or rain harvested water may be supplied to the 	
	 supply of clean water. Contamination of local water resources due to flood water should be prevented Potable drinking water source should be there to supply water to animals. Every society should implement rain harvesting system, so that water can be stored for use whole year long. Water 	Disinfection of the water for consumption of the animals should be carried out to prevent water- borne diseases. Aerosol spray of the disinfectant for preventing spread of airborne infections should be	animals as water-borne infections are common after floods. Sources of potable drinking water	
	problem likely to be faced in future. Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken. > Judicious use of water in agriculture i.e. through drip/sprinkler irrigation.	carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities. Judicious use of water for livestock.	should be tapped for its proper use. Permanent water resources should be developed with	

> >	Wastage of water needs to be curbed. Rain water harvesting measures needs to be implemented	Water tankers provisionPrivate water resources such as		mpaign for public vareness.
	even at village level with establishment of water Storage and Purification facility	wells shall be used for drinking water availability only.	fac aw	ater storage cility created vay from the soded area.

	Suggested contingency measures		
Floods	Before the event	During the event	After the event
Health and	> Personnel should be trained for	> Services of trained personnel need to be made available	> Routine training
disease	health and disease management	in affected area with sufficient supply of life saving	programme as a refresher
management	through trainings and list of	medicine of livestock.	course need to be
G	trained personnel should be	Shifting of the animals at suitable place for temporary	implemented in relation to
	available at each district head	shelter.	health and disease
	quarter for flood affected areas	Disaster management team of veterinarians be	management during flood
	with stock of life saving	deployed.	with stock of life saving
	medicine for livestock.	Makeshift Veterinary medical facilities should be	medicine for livestock.
	Vaccination of animals for	created at the site nearer to disaster place.	After flood condition
	various diseases according to	Various referral centres in the disease diagnostics	there are chances of
	season. Deworming and spraying be	should be roped in for detection of infections which	occurrence of specific diseases.
	 Deworming and spraying be done to get rid of endoparasites 	cannot be diagnosed at field level.	Preventive measures
	and ectoparasites to keep the	Various diagnostic facility with modern techniques should be made available at Tahsil level besides	should be taken to reduce
	health of animals in good	district level so that more number of farmers may	occurrence of diseases.
	condition.	approach for diagnosis & treatment.	Vaccination and
	Stock of life saving medicine be	Adequate nutrition including vitamin-mineral	deworming programme
	made.	supplements should be given to animals to keep their	needs to be undertaken.
	Disaster management team of	health in proper condition.	Animals should closely be
	veterinarians be constituted at	 During occurrence of contagious diseases, affected 	observed for new/re-
	district/taluka/panchayat level.	animals should be kept isolated and treated properly.	emerging diseases.
	> Training to veterinarians in	Isolation and treatment of ailing animals viz.	Proper disposal of carcass
	health and disease management	hypothermia, wound, diarrhoea and pneumonia be	is very important in flood
	during flood disaster be given.	undertaken.	affected areas from public
	> Awareness amongst farmers	Vaccination against HS, BQ and FMD in bovines and	health point of view
	regarding health care practices	PPR and enterotoxaemia in small ruminants should be	Methods of disposing of
	during flood disaster be	undertaken.	dead animals include
	undertaken.	Deworming and spraying of apparently healthy animals	burning, burying and

- Feedadditives/Tonics/ Vitamin supplements should be stocked.
- Vaccines /Dewormers needs to be stocked.
- Records/PM/ Carcass disposal arrangements needs to be ensured.
- In flood prone area pucca cattle shed should be constructed.
- Preparation of walls and hips to keep flood water away from village.
- Supply of Vitamin and minerals mixture.
- Application of preventive and control measures of SP & MD.

- be carried out.
- > Use of antivenum in snake bite cases.
- Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken.
- ➤ Post Mortem /record keeping/carcass disposal arrangements be effected.
- Disinfect the premises with bleaching powder and lime.
- Turn off electrical power.
- Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls during floods.
- During severe regular flood, shifting of village away from river or changing the path of river away from village.

- composting
- Disinfection of animal sheds with 2% formaldehyde / 4% caustic soda.
- Provide proper shelter to protect animals from cold and rain.
- Record of affected livestock to be submitted for compensation of the loss.
- ➤ In regular flood prone areas defenses such as levees, bunds, reservoirs and weivs should be used for future preventions.

	Suggested contingency measures				
Cyclone	Before the event ^s	During	the event	After the	event
Feed and fodder availability	 There should be availability of fodder depot district. Information at every district head quarter re of fodder resources from other areas for exp made available. A storehouse can be prepare in the district where feeds & fodder (silage emergency use. The store house should have sides with one entrance to avoid effect of cycles. Feed & fodder should be stored as emerge warehouses which can be distributed to areas 	garding availability loitation should be d at a highest point can be stored for proper walls on all lone. ncy stock in Govt.	Adaptation of proper distribution policy as per requirement with transport facility. The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district.	fe ba re di tra	eadiness for ed and fodder ank as and when quired for each stricts with ansport facility could be created.
		Suggested contingency m	easures		
Cyclone	Before the event ^s	During the event		After t	he event
Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Rain water harvesting should be done in all 	implemented from Rain harvested v	on and carrying capacity should to other available resources. water & bore well water should to the animals.		Permanent water resources should be

districts. Every district should be made self-
sufficient. Each district has plenty of rain
water which should be harvested so that
these areas are self-sufficient & if required
they should be able to provide water to other
dry areas too. The rain water should not be
wasted in sea.

- ➤ Walls of the well should be constructed much above the ground level to avoid contamination.
- > Special distribution and carrying capacity should be implemented from other available resources.
- Disinfection of the water for consumption of the animals should be carried out to prevent water-borne diseases. Aerosol spray of the disinfectant for preventing spread of airborne infections should be carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities

developed
even after the
event with
campaign for
public
awareness.

		Suggested contingency measures	
Cyclone	Before the event	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for cyclone affecting areas with stock of life saving medicine for livestock. Vaccination against common infections like FMD, swine fever, black quarter, anthrax, haemorrhagic septicaemia, etc. should be given to animals. Stock of medicines should be kept available for use during cyclone. The walls and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Supply of Mineral and Vitamins mixture. Application of preventive and control measures of SP & MD. 	 Keep watch on weather and listen to radio or TV and make others alert by warning. Shift the animals at safer place or in well secured cattle sheds. The wall and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Services of trained personnel need to be made available in cyclone affected area with sufficient supply of life saving medicine of livestock. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. Various referral centers in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be made available at Tahesil level besides district level so that more number of farmers may approach for diagnosis & treatment. 	to be implemented in relation to health and disease management during cyclone with stock of life saving

2.7.2 Poultry

	Suggested contingency measures		
Drought	Before the event ^s	During the event	After the event
Shortage of feed ingredients	There should be availability of feed, feed ingredients and mineral mixtures with sufficient storage capacity for every district.	 Adaptation of proper distribution policy as per requirement with transport facility. Supply of feed ingredients through government channel to the end users at 	Readiness for feed, feed ingredients and mineral mixtures as and when required for each districts
	Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers	reduced price. Make sure that birds receive adequate quantity and essential nutrients through feed to minimize stress and to prevent occurrence of disease outbreaks.	with transport facility. Strategies to minimize the effects of stress due to drought by optimum feeding
	 Storage of feed ingredients of previous year in sufficient quantity to use in scarcity period. Identification and storage of locally 	 Crucial use of available feed avoiding excess feeding and wastage of the feed. Stored feed ingredients will be utilized 	and management of the flock.Use of mineral and vitamin supplements to reduce
	available feed ingredients as an substitute for scares ingredients.	during contingency. Birds should be evacuated and taken to shelters as soon as there is news of an	stress. > Follow up of affected
	➤ A farm disaster kit should be prepared in advance. The kit should be placed in a central location and everyone should know where it is. The contents of the kit	imminent disaster. Every flock must have some form of durable and visible identification.	livestock for adequate feed supply. Proper utilization of the resources should be carried
	must be checked regularly to ensure fresh and complete supplies. The following items should be included in the kit in addition to the items that are used	There should be arrangements for appropriate transport, suitable for birds. Stranded birds should be rescued and taken to safer places.	out. The situation should be assessed properly and decision has to be taken on which birds to be treated
	everyday: - Updated list of all farms with information about birds, their location and records of feeding,	➤ If the stranded place is considered safe for the next week or so, the birds may be left there but should be provided with feed and drinking water.	first and how. The birds that are in very poor condition with no chance of recovery should
	vaccination, tests. – Basic first aid kit. – Handling equipment & cages.	Arrangements should be made so that veterinary and Para- veterinary personnel can quickly reach all affected farms to	be culled in humane manner. The dead birds should be
	Waterier and feeders.Sanitation and disinfection	provide necessary measures.Officials and other personnel engaged in	disposed off in hygienic manner by burial or
	equipments & chemicals. - Other safety and emergency items for vehicles and trailers, e.g.,Extra tyres, winches, tools,	relief work should also gather intelligence on the extent and nature of the damage to individual farms and villages so that appropriate relief measures can be	incineration. The situation at the farm also should be assessed and the corrective measures

etc.

- ➤ Maize grain is limiting source as a feed ingredient in poultry feed.
- Store maize for poultry feed.
- Substitute feed ingredient should be tapped as replacement for maize grain which can be used for poultry feed.
- Concentrate ingredients such as Grains, brans, & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured.
- Ban on export of oilseed meals needs to be implemented.
- Feed required for broilers3.5 kg./bird for six weeks. For Layers 55 kg /layer bird for a period of 72 weeks.

implemented.

- Adequate nutrition should be given to birds to keep their health in proper condition.
- The available ingredients as poultry feed should be used with utmost care.
- Non-conventional feed ingredients can also be tapped to use as a poultry feed taking into consideration the anti-nutritional factors present in it.
- Alternate day feeding for broilers.
- > Avoid feed wastage.
- Restricted feeding for layers.
- Poor layer birds to be culled.
- ➤ Broiler rear up to 4 weeks only.
- Use of feed additives be enhanced to maximize the feed efficiency.

should be taken as soon as possible. All damages should be repaired and shed should be made functional. Disinfection of the premises and shed should be carried to prevent spread of diseases.

- The stress on poultry due to shortage of feed during drought period can be minimized by proper feeding of the birds after drought period.
- Ad lib. feeding to compensate the egg production.
- Feed additives may be used to maximize production

Suggested contingency measur			
Drought	Before the event	During the event	After the event
Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Conservation of water for drought period. Water conservations measures adopted to increase water table like recharging of bore wells. Available water resources should be tapped and reserved. Leak proof water supply systems. Available rain water harvesting technique should be adopted i.e. farm ponds etc. Water conservations measures be adopted to increase water table. Judicious use of water. Use of nipples for watering. 	 Special distribution and carrying capacity should be implemented from other available resources for poultry. Optimum use of available water as per the requirement of birds. Supply of adequate water to farms with transportation facility. Supply of water through tankers during contingency. Judicious use of water. 	 Permanent water resources should be developed even after the event with campaign for public awareness. Evaluation and fine tuning of the contingency majors. Ensure clean, cold water supply to birds. Steps should be taken to conserve water and to develop permanent water resources. Fresh and ad lib. water should be provided.

		Suggested contingency measures	
Drought	Before the event	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management of poultry through trainings and list of trained personnel should be available at each district head quarter with stock of medicine, mineral mixture and vaccine for poultry. Regular and strict vaccination of birds. Vaccination of wild birds through water whenever possible. Deworming of birds before and after drought period. Appointment of veterinarian on farms made compulsory. 	 Services of trained personnel need to be made available in affected area with sufficient supply of medicine, mineral mixture and vaccine for poultry. Immediate attention to diseased birds by veterinarians. Regular visits of veterinarians to detect diseased birds and veterinary care Vaccination of birds if necessary. If there is occurrence of disease, affected birds should be kept isolated and treated properly and promptly. Periodic disinfection and disinfestations of farm and premises. Measures to minimize risk of spreading contagious diseases. Birds should be checked for injury/ signs of disease. Antibiotic through water Anti-stress supplements Multivitamin supplements Bio-security measures to be implemented. Proper disposal of poultry carcass. 	 Routine training programmed as a refresher course need to be implemented in relation to health and disease management during drought with stock of life saving medicine and vaccine for poultry to prevent outbreak. Proper disposal system of poultry carcasses. Efforts to minimize effects of stress through optimum feeding, management and veterinary care. Assessment of losses due to mortality if any. Proper disposal of carcass. There will be stress on birds due to deterioration of health during drought period. Hence proper feeding should be done to minimize the stress on birds by supplying vitamin supplements. Birds should be tested at regular interval to confirm that they are free of contagious diseases. Proper disposal of birds died of various diseases. Vaccination. Replacement of stock.

Suggested contingency measures			
Floods	Before the event	During the event	After the event
Shortage of feed ingredients	 Poultry owners needs to be advised to be in readiness for- Alternate poultry sheds with feed stock at safe places. Displacement of stock- transport arrangements. 	 Poultry owners needs to be advised to be in readiness for- Alternate poultry sheds with feed stock at safe places. Displacement of stock- transport arrangements. 	 Shifting at original site after repair of the shades and restoration of the necessary facilities. Proper feeding should be done to minimize the

- Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers
- Measures to avoid spoilage of feed stores due to water.
- > Construction of feed stores to stores feed sufficient for at least one month.
- Farmers will be encouraged to purchase and store the feed ingredient when it is cheaply available in the market.
- Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas.

- Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers
- Measures to avoid spoilage of feed stores due to water.
- Construction of feed stores to stores feed sufficient for at least one month.
- Farmers will be encouraged to purchase and store the feed ingredient when it is cheaply available in the market.
- ➤ Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas.

- stress on birds
- Ensure good quality feed and fodder supply to birds
- Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district even after the event.

		Suggested contingency measures	
Floods	Before the event	During the event	After the event
Drinking water	 Arrangement of clean and hygienic water. Leak and contamination proof water supply system. Installations of the watering systems targeted to optimum use of available water avoiding water wastage. Source of water should be away from flood affected areas. Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of flood. Encourage the farmers for rain water harvesting. Proper utilization of Water to save water. 	 Sufficient facility for transportation with advanced proper planning should be made in the areas of each district. Water treatment to avoid entry of pathogens through drinking water. Judicious use of potable chlorinated water. Avoid contamination of wells and tube wells by flood water. Proper utilization of Water to save water. Supply of water through tankers during contingency. Water purification measures for ensuring hygienic water supply. 	 Actions to rectify the water related issues observed during flood period. Ensure potable water supply to birds. Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. Sources of potable drinking water should be tapped for its proper use. Use of disinfected water. Arrangements of hygienic water supply.
		Suggested contingency measures	
Floods	Before the event Dur	ing the event After the even	t
Health and disease	Personnel should be trained for health and disease management		ne training programmed as a refresher e need to be implemented in relation to

management	through trainings and list of trained	available in affected area
	personnel should be available at	with sufficient supply of
	each district head quarter for flood	medicine, mineral mixture
	affecting areas with stock of	and vaccine.
	medicine, mineral mixture and	During flood if it is difficult
	vaccine for poultry.	to shift and manage large
	Vaccination and deworming	number of birds, they
	schedule should be observed	should be slaughter and sent
	strictly.	to cold storage.
	Additional deworming can be	Vaccination against
	carried out before and after floods.	contagious diseases.
	Medicine store facility with	Proper disposal of birds died
	availability of adequate drugs at	of diseases particularly
	each farm and veterinary	contagious diseases.
	dispensaries.	Disinfection of sheds be
	Training of farmers to identify signs	undertaken.
	of common contagious diseases	➤ Immediate veterinary help
	particularly to avoid outbreaks.	to the farms.

Do not built poultry house on nalla

or stream or otherwise remove the

birds before monsoon from such

poultry house.

health and disease	managen	nent during	g flood w	ith
stock of medicine	and va	accine for	poultry	to
prevent outbreak.	Proper	disposal	system	of
poultry carcasses.	•		•	

- Cleaning and disinfection of poultry farms.
- Monitoring for disease outbreaks in birds through regular farm visits by veterinarian.
- Proper disposal of carcass is very important in flood affected areas from public health point of view.
- Vaccination for RD and IBD to avoid outbreaks.
- Anti-stress treatment of birds is important to prevent mortality.
- Preventive measures should be taken to reduce occurrence of diseases, particularly use of antibiotics in drinking water.
- Hygienic measures should be followed.
- Birds should be served for emerging infectious diseases.
- Restriction on movement of the birds.
- Compensation of the loss.

	Suggested contingency measures				
Cyclone	Before the event	During the event	After the event		
Shortage of feed ingredients	➤ Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas with storage facility.		the event.		

Adequate proper feeding

and management.

Suggested contingency measures
Suggested contingency measures

Cyclone	Before the event	During the event	After the event
Drinking water	Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the cyclone.	Sufficient facility for transportation with advanced proper planning should be made in the areas of each district.	Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district.
		Suggested contingency measures	
Cyclone	Before the event	During the event	After the event
Health and disease management	Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter during heat and cold waves with stock of life saving medicine, vaccine, feed and mineral mixture for poultry.	 Services of trained personnel need to be made available in affected area with facilities to overcome heat waves through water availability and cold through proper closed shelter with sufficient supply of medicine and vaccine for poultry. During heat fogging system should be ready and during cold artificial heat through electricity need to be provided. Detection & treatment of ailing birds. Vaccination against contagious diseases. Antistressor preparations or multivitamins preparations through drinking water during stress. Ad. lib. Cold water availability Supply of medicine and vaccine for poultry. Feed in cool hrs and increase the frequency of feeding with high density feeds. Mineral & Vitamin supplementation 	refresher course need to be implemented in relation to health and disease management during heat and cold waves with stock of medicine and vaccine for poultry and sufficient arrangement. Anti- stress to relieve stress. Birds should be monitored for occurrence of diseases. Vaccination to avoid outbreaks. Proper disposal of poultry carcasses.

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Information not available	Information not available	Information not available
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Need to implement cost-effective water efficiency and conservation measures in very early stage to handle the drought. Strategic plan should be made to construct bunds & conserve water in drought prone areas.	In severe drought condition Most of the stock can be harvested immediately while Some portion of the local aquatic species should be transfer to the less affected areas so as to conserve them and reintroduce in its regional habitat.	Water policies should be determined If we want to restore our inland fishery resources. Need to set up hatcheries for drought affected fish species to avoid their extinction, and the conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.
(ii) Changes in water quality	Regular monitoring of water quality	Need to harvest the stock to minimize economic losses before mass mortality due to undesired water quality.	After achieving desired water quality, conserved species once again need to be reintroduced in their original habitats.
(iii) Any other	Gene bank should be made for all indigenous local commercially & ecologically important species.	To conserve the endangered species breeding and rearing indoor facility may be created for future restoration.	The conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.

B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Water temperature may get raised and also Dissolved Oxygen level may get declined, hence efforts should made to increase the depth of pond & avoid	Water recycling with the aid of potential filtration systems can be applied if available. Provide artificial oxygenation. If water level	Construction of small reservoirs or dams should be newly developed in drought prone area. Identifying culturable air breathing

	water seepage by using bentonite clay, plastic liners etc. also artificial oxygenation systems as aerators etc. should be incorporated in aquaculture system.	is too much low, can lead to mass mortality due to environmental stress hence it will be better to harvest the stock immediately.	species / hardy species (e.g. Notopterus, Clarius, Puntius etc.) suitable to the regional aquatic environment.
(ii) Impact of salt load build up in ponds / change in water quality	Throughout the culture period salinity & other parameters should be checked for regular intervals. Fresh water storage ponds should be developed at aquaculture site.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Identifying best suitable euryhaline spp. (Pearl spot, Sea bass, Rabbit fish, mullets etc.) for the culture which can tolerate wide range of salinity.
(iii) Any other			

2) Floods			
A. Capture			
Marine	Disaster preparedness mission through Sea walls, Embankment. In future early warning systems and evacuation strategy planning for flood prone areas. Plan of Preventive measures against the epidemiological diseases, like malaria, cholera, dengue etc. among coastal communities. Educating coastal population about Disaster mitigation and provision of good transport	Aid to populations at the affected zones and shelters. Affected population should be provided with adequate food & medicines in time.	National & international financial support for research on the various aspects of the flood will be needed for future strategies. Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socioeconomic status. Control of vector-borne endemic and
	means in coastal areas prior to the Flooding event which will be helpful for rescue operations.		epidemic diseases. Mangrove plantation & conservation strategies should be adopted in estuarine region for minimizing future risk.
Inland	In future early warning systems and evacuation strategy planning for flood prone areas.	Aid to populations at the affected zones and shelters.	Diversifying course of flooding river to minimize socio-economic losses.
	Awareness of People living in rural zones, or urban margins with regards to the geography of their area as they do not take into account whether they are on a river's flood plain, an	Timely help to populations at the affected zones and shelters. Affected population should	Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socio- economic status.

unstable hillside, a dry river bed in a flooding area, etc., when they (fisheries community) build their houses.	be provided with adequate food & medicines in time.	
More emphasis should be given on the maintenance of public infrastructure, such as highways, secondary roads and bridges prior to the flooding event which will be helpful for rescue operations.		
Awareness should be created for using good materials for their construction of houses.		
Strategic planning to build up local rescue teams in flood prone areas.		

(i) Average compensation paid due to loss of human life	Not applicable				
(ii) No. of boats / nets/damaged	Not applicable	Not applicable			
(iii) No. of houses damaged	Not applicable	Not applicable			
(iv) Loss of stock	Not applicable				
(v) Changes in water quality	Not applicable	Not applicable			
(vi) Health and diseases	Preventive measures of Plan of the Health Ministry for the prevention of epidemiological diseases, like malaria, cholera, <i>dengue</i> etc. &vaccination in flood prone area.	Affected population should be provided with adequate food & medicines in time.	Control of vector-borne endemic and epidemic diseases.		

B. Aqua	aculture			
(iii)	Inundation with flood water	Early warning systems should be developed to minimize future risk. Elevating the height of peripheral dykes of the aquaculture ponds. Providing	Need to harvest the stock as early as possible to minimize economic losses	Drain out excess water, disinfecting and refilling the ponds with water andrestocking by adopting standard aquaculture protocols.

	elevated net fencing on the bunds to the avoid loss of fish during flooding.		
(ii) Water contamination and changes in water quality	Elevating the peripheral dykes of the aquaculture ponds.	Need to harvest the stock as early as possible to minimize economic losses	Drain out all the water from the pond and refill it with good quality water for future crop.
(iii) Health and diseases	Adequate vaccinisation of fish stocks prior to flooding event is recommended to minimize the risk.	In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Quarantining of culture pond before next stocking.
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.
(v) Infrastructure damage (pumps, aerators, huts etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for the pumps & aerators in flood condition.	Transport of the pumps, aerators etc. to the safer places.	Insurance and micro-finance for repaire and maintenance of the infrastructure.
(vi) Any other	-	-	-

3. Cyclone / Tsunami			
A.Capture			
Marine	Timely Communication of weather forecasting to fishermen Implementation of Tsunami detection & warning system in Indian ocean and evacuation strategy planning for Cyclone / Tsunami prone area. Disaster preparedness mission	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Organization to rebuild their socio- economic status. Control of vector-borne endemic and epidemic diseases; National & international financial
	through Sea walls, Embankment Provision of Wave breakers &dry		support for research on the various aspects of the Cyclone / Tsunami will be needed for the planning of future

	docks for fishing vessel security.		strategies.
	Encouragement and financial incentives should be given to fishermen to carry Safety Devices on their fishing crafts.		Mangrove conservation, plantation strategies should be adopted in estuarine / coastal region for minimizing future risk
	Educating coastal population about Disaster mitigation and provision of good transport means in coastal areas prior to the Cyclone / Tsunami event which will be helpful for rescue operations.		
	Preventive measures for the prevention of epidemiological diseases, like malaria, cholera, dengue etc		
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland	Timely Communication of weather forecasting to fishermen Encouragement and financial incentives should be given to fishermen to carry safetydevices on their fishing crafts.	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socioeconomic status. Rehabilitation of fishermen communities.
B. Aquaculture			
(i) Overflow / flooding of ponds	Elevating the peripheral dykes of the aquaculture ponds Early warning systems should be developed to minimize future risk.	In very initial stage prior to flooding, need to harvest the stock as early as possible to minimize economic losses . In severe condition nothing can be controlled.	Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Changes in water quality (fresh water / brackish water ratio)	Elevating the peripheral dykes of the aquaculture ponds. Regular monitoring	Fresh water from the storage ponds can be utilized for maintaining	Drain out excess water, After achieving desired water quality , restocking by

	of water quality.	salinity.	adopting standard aquaculture protocols.	
(iii) Health and diseases Adequate vaccinisation of the stocks prior to this is recommended to minimize the risk		In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Disinfecting / Quarantining of culture pond before the next stocking.	
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.	
(v) Infrastructure damage (pumps, aerators, shelters/huts etc) Elevating the peripheral dykes of the aquaculture ponds and Initial provision of good indoor storage facility for pumps & aerators.		Transport of the pumps, aerators etc. to the safer places.	Insurance and microfinance with low interest from Govt. for the repair and maintainance of the infrastucture.	
(vi) Any other				
4. Heat wave and cold wave				
A. Capture				
Marine	Information not available	Information not available	Information not available	
Inland	Not applicable	Not applicable	Not applicable	
B. Aquaculture				
(i) Changes in pond environment (water quality) Depth of the aquaculture ponds should be increased to minimize thermal stress. Plantation at the peripheral dykes of aquaculture ponds can be recommended.		Aerators should properly utilized for the good circulation of water maintaining good pond environment.	Identification of best suitable eurythermic spp. for aquaculture to tolerate wide temperature range.	
(ii) Health and Disease management	Maintaining water parameters at desired levels can reduce the stressful condition & can avoid disease.	Aerators should properly utilized for the good circulation of water maintaining optimum water quality.	Early warning systems should be developed to minimize future risk. Identification of hardy species for aquaculture practices.	
(iii) Any other				

THANE And PALGHAR

State: MAHARASHTRA Agriculture Contingency Plan for District: THANE and PALGHAR

1.0 Di	strict Agriculture profile				THE UNIT THE GITT				
1.1	Agro-Climatic/Ecological Zone								
	Agro Ecological Sub Region (ICAR)		Western Ghats And Coastal Plain, Hot Humid-Perhumid Eco-Region (19.1) Western Ghats And Coastal Plain, Hot Humid-Perhumid Eco-Region (19.3)						
	Agro-Climatic Zone (Planning Commission)	West Coast	Plains And Ghat Reg	gion (XII)					
	Agro Climatic Zone (NARP)	North Konk	North Konkan Coastal Zone (MH-2)						
	List all the districts or part thereof falling under the NARP Zone	Thane, Palg	Thane, Palghar and Raigad						
	Geographic coordinates of district	Latitude			Longitude		Altitude		
	headquarters	19°10'54.21	" N 18°42'20.20" N		72°57'38.59 "E 72 °57'73.4	-8" E	20 M		
	Name and address of the concerned ZRS/ZARS/RARS/RRS/RRTTS		Dr. L. S. Chavan, Associate Director of Research, Regional Agricultural Research Station, Karjat- 410 201, Dist. Raigad						
	Mention the KVK located in the district	Krishi Vigyan Kendra, Kosbad hills, Tal- Dhanu, Dist. Thane (M.S.)- 401 703							
	Name and address of the nearest Agromet Field Unit for agro- advisories in the zone	Technical Officer, Integrated Agro Advisory Services, Department of Agronomy, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli - 415 712, Dist. Ratnagiri (M.S.)							
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	(spe	Normal Onset cify week and month)		al Cessation eek and month)		
	SW monsoon (June-Sep):	2502.1	76		1 st week of June	2 nd week of October			
	NE Monsoon(Oct-Dec):	_	-		-		-		
	Post rainy showers (Oct-Dec):	88.1	5		-		-		
	Winter (Jan- March)	1.5	0		-		-		
	Summer (Apr-May)	10.9	0		-		-		
	Annual	2602.5	81						

1.3	Land use	Geographical	Cultivable	Forest	Land under	Permanent	Cultivable	Land under	Barren and	Current	Other
	pattern of the	area	area	area	non-	pastures	wasteland	Misc. tree	uncultivable	fallows	fallows
	district (latest				agricultural			crops and	land		
	statistics)				use			groves			
	Area ('000' ha)	908	454	351.21	58.59	16.46	18	36	59	18	18

Source – District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.4	Major Soils (Medium black soils)	Area ('000'ha)	Percent (%) of total
	Shallow Red soils	708.4	75.8
	Medium Red deep soils	221.9	23.7
	Deep soils	3.6	0.3

Source :- NBSS & LUP, Nagpur

1.5	Agricultural land use	Area ('000'ha)	Cropping intensity %
İ	Net sown area	356	
	Area sown more than once	36	110.1
	Gross cropped area	392	

Source :District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.6	Irrigation	Area ('000'ha)	Area ('000'ha)						
	Net irrigated area	10.28	10.28						
	Gross irrigated area	21.3	21.3						
	Rainfed area	336.8							
	Sources of Irrigation	Number	Number Area ('000' ha) Percentage of total irrigated area						
	Canals		15.0	78.1					
	Tanks	-	-	-					
	Open wells	2887	2.0	10.4					
	Bore wells	287							
	Lift irrigation schemes	87	2.2	11.5					
	Micro-irrigation		2.2	11.5					
	Other sources (please specify)								
	Total Irrigated Area		19.2	100.0					
	Pump sets	8203							
	No. of Tractors	2465							

Source :District Socio-economic Review -2014-15 (Directorate of Economic & Statistics, Govt. of Maharashtra)

Groundwater availability and use* (Data source: State/Central Ground water	No. of blocks/ Tahsils	(%) area	Quality of water (specify the problem such as high levels of			
Department /Board)			arsenic, fluoride, saline etc)			
Over exploited	-	-	-			
Critical	-	-	-			
Semi- critical	-	-	-			
Safe	-	-	-			
Wastewater availability and use	-	-	-			
Ground water quality						
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%						

1.7 Area under major field crops & horticulture etc.

1.7 Major Field crops cultivated		Area ('000' ha)						
	Kh	arif	Rabi		Summer	Total		
	Irrigated	Rainfed	Irrigated	Rainfed				
Rice	5.1	145.5	3	-	-	139		
Finger millets	-	15.96	-	-	-	16		
Prosomillet	-	11.3	-	-	-	11.0		
Pulses (Cowpea, blackgram, pigeon pea, chick pea, etc.)	-	11.85	9.7	-	-	21.7		
Groundnut	-	1.9	0.1	-	-	3.7		
Other oilseeds	-		0.6	-	-			
Horticultural crops – Fruits		Total Area ('000'ha)						
Mango		15.81						
Cashew		4.3						
Sapota		10.8						
Other fruit crops		2.6						
Flowers				0.4*				

Horticulture crops – Vegetables	
Okra, Brinja, Chilli and Leafy	7.2*
vegetables etc.	

Plantation crops	
Coconut	2.5
Fodder crops	-

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

*District Krishi Utpadan Aarakhda, Joint Director of Agriculture, Konkan Division, Thane

1.8	Livestock	Male	Female	Total
	Non descriptive Cattle (local low yielding)	288721	192005	725395
	Crossbred cattle	4093	8887	11247
	Non descriptive Buffaloes (local low yielding)	2164	7059	162764
	Graded Buffaloes	0	0	11155
	Goat	57853	173380	192760
	Sheep	78	58	2127
	Others (Camel, Pig, Yak etc.)			1001
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total N	No. of birds
	Commercial	Dara are not available	13	25134
	Backyard	-		

Source: Maharashtra Animal and Fisheries Science University, Nagpur

1.10	Fisheries (Data source: Chief Planning Officer)									
	A. Capture									
	i) Marine (Data Source: Fisheries	No. of fishermen	Во	ats	1	Nets	Storage facilities (Ice			
	Department)		Mechanized	Non- mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	plants etc.) Number of processing unit			
		101042	2155	1185	113160	16325	142			
	ii) Inland (Data Source: Fisheries	No. Farmer owned ponds		No. of Reservoirs		No. o	f village tanks			
	Department)	63		3	35		237			

B. Cultur	e	
Water Spread Area ('000'ha)	Yield (t/ha)	Production (MT)

i) Brackish water (Data Source: MPEDA/	1.1	1.0	1147.0
Fisheries Department)			
ii) Fresh water (Data Source: Fisheries	5.6	0.5	3197.7
Department)			

1.11 Production and Productivity of major crops (Average of last 5 years)

1.11	Name of	Kha	arif	Rabi-	Summer	Sum	mer	То	otal	Crop residue as
	crop	Produc tion ('000'T)	Produc tivity (kg/ha)	Produc tion	Produc tivity (kg/ha)	Produc tion (000'T)	Produc tivity	Produc tion	Produc tivity	fodder ('000 tons)
				(000'T)			(kg/ha)	(000'T)	(kg/ha)	
Majo	r Field crops (C	rops to be identifie	ed based on total	acreage)					·	·
	Rice	352.1	2612	6.0	2400	-	-	303.3	2160	-
	Finger millets	9.3	812	0.4	1000	-	-			-
	Other cereals and millets	5.7	650			-	-	20.2	726.6	-
	Pulses	8.0	3420	5.3	570	-	-	12.3	630.8	-
	Groundnut	0.2	850	0.4	2000	-	-		444	-
	Other oil seed	1.0	357	0.2	333			1.6		-

Source :- Krishi Utpadan Karyakramachi Rupresha, Kharif and Rabi Hangam - 2010-11, Vibhagiy Sabha, Konkan Mahsul Vibhag. Dept. of Agriculture, Govt. of Maharashtra

Major	Major Horticultural crops (Crops to be identified based on total acreage)								
	Mango	94.0	1.60 MT/ha						
	Cashew	4.0	0.50 MT/ha						
	Coconuts	178 Lakh nuts	8000 nuts/ha						
	Sapota	830.0	10.00 MT/ha						
	Vegetables	846.0	12.00 MT/ha						

Source :- District Krishi Utpadan Aarakhda, Joint Director of Agriculture, Konkan Division, Thane

1.12	Sowing window for 5 major field crops	n.	T1 111 /	D 201		g
	(start and end of normal	Rice	Finger millets	Prosomillet	Groundnut	Sesame
	sowing period)					
	Kharif- Rainfed	10 th June to 10 th July	2 nd fortnight of June	2 nd fortnight of	-	2 nd fortnight of July
				June		
	Kharif-Irrigated					
	Rabi- Rainfed					
	Rabi-Irrigated	2 nd fortnight of December	-		2 nd fortnight of	2 nd fortnight of
					December	November

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		✓	
	Flood		✓	
	Cyclone		✓	
	Hail storm			√
	Heat wave		✓	
	Cold wave			✓
	Frost			✓
	Sea water intrusion	✓		
	Pests and disease outbreak (specify) 1. Rice :- : Stem borer, Bacterial blight, Blast 2. Finger millet :- Bacterial blight, Blast 3. Groundnut :- Early and late leaf spot	√		
	4. Mango:- Mealy bug, thrips, fruit fly, Anthracnose, Powdery mildew.			
	5 Cashew: - Tea mosquito bug, thrips, aphids			
	6 Areca nut :- Koleroga and Ganoderma rot.			
	7 Sapota : Seed borer, Bud borer, Fruit drop			
	8 Coconut :- Rhinoceros beetle, eriophyid mite, black headed caterpillar			
	9 Okra: Fruit & shoot borer, white fly, Yellow vein mosaic			
	10Cucurbits :- Red pumpkin beetle, fruit fly, thrips , Powdery & Downy mildew.			
	11 Brinjal :- Fruit & shoot borer, Bacterial wilt			

	Others (specify)		-	-	-
1.14	Include Digital maps of the district for Location map of district within State as Annexure I		Ĭ	Enclosed: Yes	
		Mean annual rainfall as Annexure 2		Enclosed: Yes	
		Soil map as Annexure 3		Enclosed: Yes (Gi	ive legend)

Annexure 1: Location Map of Thane and Palghar



Annexure - 2

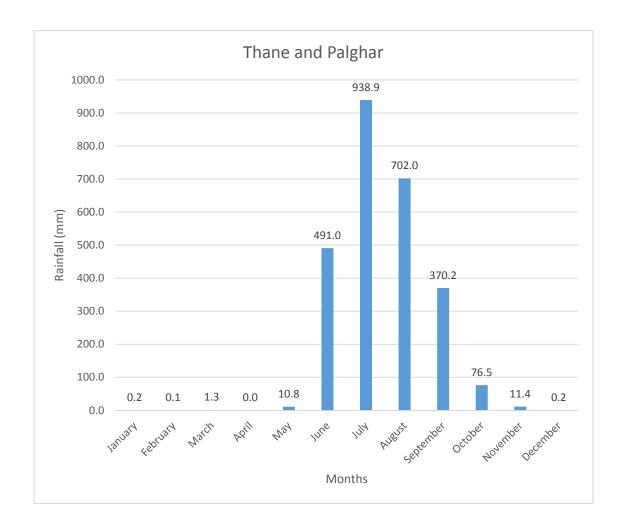
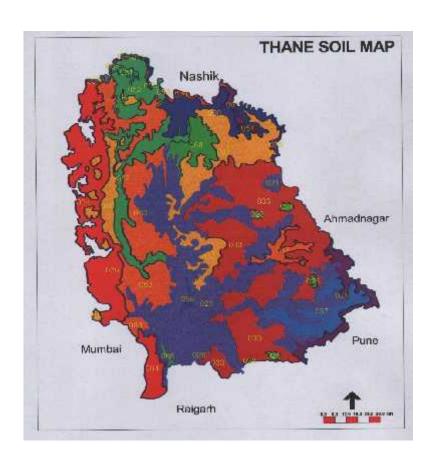


Fig: Mean monthly rainfall (mm) of Thane and Palghar District.

Annexure -3



Soil map Thane and Palghar District (Source :- NBSS & LUP, Nagpur)

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Sugges	ted Contingency measur	es
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping systemincluding variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (3 rd week of June)	Upland medium deep to shallow soils	Rice	In case of failure of germination use very early duration variety (Karjat-184, Ratnagiri – 73)	 Prepare the seedlings by mat nursery / Dapog method. If raising of seedling in nursery is not possible, then use direct seeding method (dry or sprouted seeds) 	Procure the seed from Maharashtra State Seed Corporation.
		Finger millet Vegetable crops (Chilli, okra, bitter gourd, snake gourd) Sesamum	No change		
	Mid-land medium deep soils	Rice	In case of failure of germination use early duration variety (Karjat- 3, Karjat-4, Karjat-7, Ratnagiri-1, Ratnagiri-5, Ratnagiri-24, Ratnagiri-711)	 Prepare the seedlings by mat nursery / Dapog method. If raising of seedling in nursery is not possible, 	Procure the seed from Maharashtra State Seed Corporation.

Low land deep soils	Rice	In case of failure of germination use mid late duration variety (Karjat-5, Karjat-9, Palghar-1, Palghar-2, Ratnagiri-4)	then use direct seeding method (dry or sprouted seeds)	
Hill slopeshallow soils	Finger millet	No change	-	

Condition			Sugge	sted Contingency measure	es s
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping systemIncluding variety	Agronomic measures	Remarks on Implementation
**Delay by 4 weeks (1 st week of July)	Upland farming medium deep to shallow soils	Rice	Use very early duration variety (Karjat-184, Ratnagiri – 73)	Raise the crop by direct seeding method (dry or sprouted seeds)	Source of Seed : Maharashtra State Seed corporation
		Finger millet	Short duration variety (H.R. 374)		
		Sesamum	No Change	-	
		Vegetable crops (Chilli, okra, bitter gourd, snake gourd)	-		
	Mid-land farming medium deep soils	Rice	Use early duration variety (Karjat-184, Karjat-3, Karjat-4, Karjat-7,	Raise the crop by direct seeding method (dry or sprouted seeds)	
			Ratnagiri – 73)		
	Low land farming	Rice	Mid-late duration variety		
	deep soils		(Palghar- 1, Palghar- 2, Karjat- 5 etc)		
	Soils on hill slope shallow soils	Finger millet	Cowpea (Variety- Konkan Sadabahar)., Black gram (Variety- TPU -4)		

^{**} Generally such type of situation has not occurred during past years

Condition		Suggested Contingency measures					
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation		
**Delay by 6 weeks (3 rd Week of July)	Upland medium deep to shallow soils Mid-land medium deep soils	Not applicable Note:- ** Generally such type of situation has not occurred during past years					
	Low land deep soils Hill slope shallow soils						

Condition		Suggested Contingency measures				
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation	
**Delay by 8 weeks (1 st Week of August)	Upland medium deep to shallow soils Mid-land medium deep soils Low land deep soils Hill slope shallow soils	Not applicable Note :- ** Generally s	uch type of situation has not occu	urred during past years		

Condition		Suggested Contingency measures				
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation	
Normal onset followed by 15-20 days dry spell at the time of transplanting	Upland medium deep to shallow soils	Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm). Increase 25% recommended dose of fertilizer. For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method. Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery. 	 Protective irrigation for nursery Protective irrigation after transplanting 	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation	
		Finger millet	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) 	Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas,	
		Vegetables	-	Protective irrigation/ mulching with Glyricidia green leaves/ weed management	streams, rivers, etc.	
	Mid-land medium deep soils Low land deep soils	Rice	 Increase number of seedling per hill (5 to 6) or adopt closer spacing (15 x15 cm). Increase 25% recommended dose of fertilizer. For shortage of seedling prepare seedling by mat nursery using short duration variety. Use thomba method. Dusting with methyl parathion 2% dust @ 25 kg/ha to control armyworm in nursery. 	Protective irrigation for nursery Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation	

Hill slope shallow soils	Finger millet	 Increase 25% recommended dose of fertilizer Adopt closer spacing (15 x15 cm) 	Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas, streams, rivers, etc.
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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	Upland medium deep to shallow soils	Rice	 Postpone the split dose of Nitrogen application till receipts of rain/protective irrigation Protective irrigation. Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Apply split dose of Nitrogen after restart of rains Spray % potassium 	Use water from the outside sources like farm ponds, nalas, streams, rivers for protective irrigation

	Finger millet	Protective irrigation	 Adopt weed management practices. Apply split dose of Nitrogen after restart of rains Spray % potassium 	
	Vegetable	Apply split dose of Nitrogen after restart of rains	 Protective irrigation Mulching with leaf lopping 	
Mid-land medium deep soils	Rice	Postpone the split dose of Nitrogen application till receipts	• Adopt weed management practices.	Use water from the outside sources like farm ponds, nalas,
Low land deep soils	Rice	of rain/protective irrigation • Protective irrigation	• Maintain the existing water level in the field.	streams, rivers for protective irrigation
		• Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval.	 Apply split dose of Nitrogen after restart of rains Spray % potassium 	
		Take three sprays of Tricyclazole 1g/lit of water for control of rice blast		
Hill slope shallow soils	Finger millet	Give protective irrigation if possible.	 Adopt weed management practices. Apply split dose of Nitrogen after restart of rains 	

Condition			Sugge	sted Contingency measur	res
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	Upland medium deep to shallow soils	Rice	 Protective irrigation Take three spray Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast. 	 Adopt weed management practices. Maintain the existing water level in the field. Spray % potassium 	Use water from the outside sources like farm ponds, nalas, streams, rivers for protective irrigation
		Finger millet	Protective irrigation.	 Adopt weed management practices. Spray % potassium 	
		Vegetables	Protective irrigation	 Adopt weed management practices. Spray % potassium Mulching with leaf lopping 	
	Mid-land medium deep soils	Rice	Protective irrigation.Take three spray	• Adopt weed management	

Low land deep soils	Rice	Copper oxy chloride 2.5 g/lit water + Streptocycline sulphate 0.5 g/lit of water to control Bacterial leaf blight at 15 days interval. Take three sprays of Tricyclazole 1g/lit of water for control of rice blast.	practices. • Maintain the existing water level in the field. • Spray % potassium	
Hill slope shallow soils	Finger millet	Give protective irrigation if possible.	Adopt weed management practices	

Condition			Suggested Contingency measures			
Terminal drought	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi crop planning	Remarks on Implementation	
(Early withdrawal of monsoon)	Upland farming medium deep to shallow soils	Rice Finger millet Vegetables	Harvest crops at physiological maturity Protective irrigation	, , , , , , , , , , , , , , , , , , , ,	Source of Seed : Maharashtra State seed corporation and other seed agency	
	Mid-land farming medium deep soils	Rice	Protective irrigation	Wal (Lablab bean), Blackgram,	Source of Seed : Maharashtra State	

Low land farming deep soils	Rice	Harvest crop at physiological maturity	Bengalgram, Cowpea, Mustard Sunflower, Groundnut, Sesamum Vegetables like Okra, Brinjal, Knol khol, Chilli, Capsicum, Tomato, Leafy vegetables, Melons and Cucurbitaceous crops, Seasonal flowers in irrigated area	seed corporation an other seed agency	d
Soils on hill slope shallow soils	Finger millet	Harvest crop at physiological maturity	-		

2.1.2 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	Mid and low land Medium deep to deep soils	Rice (Rabi – hot weather season)	 Use early duration variety (Karjat-3, Karjat 7, Karjat-184, Ratnagiri 73, Ratnagiri -1) or Grow short duration pulses viz. cowpea (Var. Konkan Sadabahar), under control irrigation and tail end area. Grow oil seed like groundnut (Konkan Gaurav, SB XI, Phule pragati). 	 Dapog/mat technique of nursery raising. Young seedling transplanting. SRI Technique. 	Source of Seed Maharashtra State Seed corporation and other seed agency	

Condition	Suggested Contingency measures				res
	Major Farming situation	Normal Crop/cropping	Change in crop/cropping	Agronomic	Remarks on
		system	system	measures	Implementation
		Groundnut	Prefer short duration variety (Phule pragati) or grow short duration pulses viz. Cowpea (Var. Konkan Sadabahar),	If other source of irrigation is available sow the crop as per schedule.	
		Pulses (Wal, Cowpea, Greengram)	No change	Use micro irrigation (drip or	
		Vegetables (Cucurbitaceous and Solanaceous crops, Okra etc.)	No change	micro sprinkler) • Prepare the seedlings in	
		Water melon	Use short duration varieties	portrays of vegetables (cucurbitaceous crops, brinjal, chilli, water melon) to avoid delay in transplanting.	
Condition				ted Contingency measu	
	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	Mid and low land Medium deep to deep soils	Rice (Rabi season)	 Prefer early duration variety in low land situation (Karjat-3, Karjat-184, Ratnagiri 73, Ratnagiri -1) Grow short duration pulses (cow pea (Var. Konkan Sadabahar), Lab lab bean (Konkan wal no. 1). lab lab bean, horse gram), groundnut (Phule Pragati), vegetables in midland situation 	Use SRI Technique for rice cultivation. Adopt Weed management practices Use micro irrigation (drip or micro sprinkler)	Procure the seed from Maharashtra State Seed Corporation

Major Farming situation	Normal Crop/cropping system Groundnut	Change in crop/cropping system Prefer short duration variety (Phule Pragati,)	Agronomic measures • Adopt Weed management practices with dry weeder	Remarks on Implementation • Procure the seed from Maharashtra State Seed
	Groundnut	variety	management practices with dry	from Maharashtra
			Use micro irrigation (drip or micro sprinkler) Adopt Mulcinhg	Corporation
	Sesame	No change	 Adopt Weed management practices with dry weeder. Adopt Mulcinhg 	
	Pulses (Wal, cowpea, horsegram, greengram, Bengal gram)	No change	Adopt Weed management practices with dry	
	Vegetables (Capsicum, cucurbitaceous and solanaceous crops, okra etc.)	No change	weeder • Use micro irrigation (drip or micro sprinkler)	
		Pulses (Wal, cowpea, horsegram, greengram, Bengal gram) Vegetables (Capsicum, cucurbitaceous and solanaceous crops, okra	Pulses (Wal, cowpea, horsegram, greengram, Bengal gram) Vegetables (Capsicum, cucurbitaceous and solanaceous crops, okra etc.)	Pulses (Wal, cowpea, horsegram, greengram, Bengal gram) Vegetables (Capsicum, cucurbitaceous and solanaceous crops, okra etc.) No change management practices with dry weeder management practices with dry weeder • Use micro irrigation (drip or micro sprinkler)

Condition			Suggested Contingency measures				
	Major Farming	Normal Crop/cropping system	Change in crop/cropping	Agronomic	Remarks on		
	situation		system	measures	Implementation		
Non release of water in canals under delayed onset of monsoon in	Mid and low land Medium deep to deep soils	Rice (Rabi season)	Grow Lab lab bean, horse gram, black gram, bengal gram cowpea, mustard on residual moisture under low land situation.	 Minimum tillage and sowing of seed by dibbling. Adopt Weed management 	Procure the seed from Maharashtra State Seed Corporation		
catchment		Groundnut Sesame	No change	practicesUse micro			

Condition			Suggested Contingency measures				
	Major Farming Normal Crop/cropping system		Change in crop/cropping	Agronomic	Remarks on		
	situation		system	measures	Implementation		
		Pulses (Cowpea, Horsegram,		irrigation (drip or			
		Greengram, Bengalgram, Pea		micro sprinkler)			
		etc.)		Adopt mulching			
		Vegetables (Cucurbitaceous and	No change	Adopt Weed			
		Solanaceous crop, Okra etc.)		management			
		Water melon		practices			
				• Use micro			
				irrigation (drip or			
				micro sprinkler)			
				Adopt mulching			

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	Mid and low land Medium deep to deep soils	Rice (Rabi season) Groundnut Pulses (Cowpea, Horsegram, Greengram)	Wal (lablab bean) - Var. Konkan Wal No. 1, Horse gram - Var. Dapoli - 1, Bengal gram,on residual moisture under low land situation Short duration pulses like Bengal Gram, Wal (lablab bean), horse gram, black gram, greengram cowpea (Konkan Sadabahar) on residual moisture. If farm pond water is available grow leafy vegetables. No change	 Minimum tillage and sowing of seed by dibbling, Relay cropping Minimum tillage and sowing of seed by dibbling, relay cropping Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler). Adopt mulching 	Procure the seed from Maharashtra State Seed Corporation

Condition			Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation	
		Vegetables (Cucurbitaceous and Solanaceous crop, Okra etc.) Water melon	Short duration pulses like Bengal Gram, Wal (lablab bean), horse gram, black gram, greengram cowpea (Konkan Sadabahar) on residual moisture. If farm pond water is available grow leafy vegetables.	 Minimum tillage and sowing of seed by dibbling, relay cropping Adopt Weed management practices. Use micro irrigation (drip or micro sprinkler). Adopt mulching 		

Condition			Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation	
Insufficient Mid and low land groundwater Medium deep to deep soils		Rice (Rabi season)		Not applicable		
recharge due to low rainfall	Mediam deep to deep soms	Groundnut				
		Sesame				
		Pulses (Cowpea, Horsegram, Greengram)				
		Vegetables (Cucurbitaceous and Solanaceous crop, Okra etc.)				
		Watermelon				
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	
Rice	Spray Cartap Hydrocloride 50SP @ 1.2 g/lit for the management of case worm Close water in the field and Drag rope over crop to dislodge the cases after that open the water at one end of the field to collect the cases which can be destroyed afterwards Drain out excess water and spray Propiconazol @ 1ml /lit of water to control sheath blight		Drain out excess water and harvest the crop before lodging	Immediate threshing and drying in shed	
Fingermillets			Harvest the crop before lodging	Immediate threshing and drying in shed	
Groundnut	Drain out excess water	Drain out excess water 2.Spray mancozeb @ 2.5 g/lit of water to control Tikka and rust disease	Drain out excess water and harvest the crop immediately	Separate the pods immediately and dry in shade.	

Horticulture				
Cucurbitaceous crop	Drain out excess water	Drain out excess water	Drain out excess water	-
Solanaceous crop	Drain out excess water	Drain out excess water	Drain out excess water	
Mango	Wait for congenial condition for application of Paclabutrazol @ of 0.75 g/ a.i. per meter average canopy	-	-	-

	diameter			
Banana	 Drain out excess water Propping with bamboo Spray Hexaconazol @ 1ml/lit of water for control of Sigatoka Leaf spot and blight At pre flowering stage 	Drain out excess water.Propping with bamboo	 Drain out excess water Propping with bamboo	
Sapota	Drain out excess water	Drain out excess water	Drain out excess water	Drain out excess water
Seasonal flower	Drain out excess water	Drain out excess water	Drain out excess water and harvest at proper stage	
Heavy rainfall with high speed winds in a short span				
Rice			Drain out water and harvest the crop at maturity immediately if lodging take place	Immediate threshing and drying in shed
Fingermillets			Harvest the crop at maturity before its lodging.	Harvest the crop before lodging
Groundnut	Drain out excess water	Drain out excess water	Harvest the crop immediately	Separate the pod immediately and dry in shade
Horticulture				
Cucurbitaceous crop	Drain out excess water Repair the pendol	Drain out excess water Repair the pendol	Drain out excess water	Harvest at proper stage
Solanaceous crop	Drain out excess water Do staking	Drain out excess water Do staking	Drain out excess water	Harvest at proper stage
Mango	Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk.	Prune the broken branches and swabbing with Chloropyriphos © 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste	Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. Collect and utilize fallen	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux

		on cut surface and trunk. • Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose.	fruit immediately for suitable processing.	paste on cut surface and trunk.
Cashew	Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk.	 Prune the broken branches and swabbing with Chloropyriphos @ 5ml/lit water to avoid stem borer infestation and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water. Also apply Bordeaux paste on cut surface and trunk. 	-	-
Banana	Drain out excess waterPropping with bamboo	 Drain out excess water Propping with bamboo Flowers of broken plant may be used as vegetable 	Drain out excess waterPropping with bambooFruit of broken plants may be used as vegetable.	-
Sapota	 Prune the broken branches and Apply Chloropyriphos @ 5ml/lit water and Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water . Also apply Bordeaux paste on cut surface and trunk. 	-	-	-
Seasonal flowers	Drain out excess water	Drain out excess water	Drain out excess water	
	Do staking to prevent lodging	Do staking	Do staking	-
Outbreak of pests and diseases due to unseasonal rains				
Rice	Spraying of Carbendazim	Spraying of Carbendazim	-	-

	0.1% or Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease	0.1% or Copper oxy chloride 0.25% or tricyclazole 0.1% to control blast disease		
Fingermillets	-	-	-	-
Groundnut	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	• Spraying with carbendazim 0.1% or Propiconazole 0.1% or Tridemorph 0.1% to control early and late leaf spot	-	-
Horticulture				
Cucurbitaceous crop	-		 Install Rakshak trap 4 per ha (Cue lure) to control fruit fly Spray with Copper Oxy Chloride @ 2.5 g/lit of water to control Downey mildew 	-
Solanaceous crop		-	-	
Mango	Take spray of Lambda Cyhalothrin 5 EC @ 0.6 ml/lit of water and second spray of Imidachloprid 17.8 EC @ 0.3 ml/lit of water for control of mango hopper, shoot borer. Spray Carbendazim + Mancozeb based composite fungicide @ 2 g/lit of water for anthracnose	• Spraying with 0.2% W.P. sulphur dust or 0.05% hexaconazol to control powdery mildew.	Install Rakshak trap 4 per ha (Methyl eugenol) to control fruit fly	Dipping fruits in hot water at 52°C for 10 min. after harvest to control post harvest rot.
Cashew	First spray with Profenophos 40EC 1ml/ lit of water, second spray with Lamda cyhalothrin	-	-	-

Sanata	0.6 ml/ lit of water and third spray with prophenophos 1ml /lit of water @ interval of one month. Sprays starting from leaf flush to control tea mosquito bug.	For control of Sanota cond		Collect and destroy the
Sapota	Three sprays of Emamectin benzoate 5 SG 0.45 g/lit. or Deltamethrin 2.8 EC @ 1 ml/lit or Lambda cyhalothrin 5 EC @ 1 ml/lit or profenofos 40 EC @ 1 ml/lit for control of sapota bud borer. The first spray should be given at the fifty per cent flowering i.e. March and subsequent two sprays should be given at an interval of one month. For control of sapota seed borer.	For control of Sapota seed borer spraying of Profenophos 40 EC @ 1ml/lit. by the end of monsoon, Therafter Deltamethrin 2.8 EC 1 ml/lit. one month after first spray, Lambda-cyhalothrin 5 EC 1 ml/lit. one month after second spray and Deltamethrin 2.8 EC/lit one month after third spray Spraying of Metalaxyl + Mancozeb containing complex fungicide @ 0.2% to control fruit drop	-	Collect and destroy the fallen and infected fruits

2.3 Floods

Condition	Suggested contingency measure				
Transient water logging/ partial inundation	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest	
Rice	If washed out resowing of nursery by using mat nursery/sowing of sprouted seed on puddled field	Drain out excess water	Drain out excess water	 Drain out excess water. Immediate harvesting, threshing and drying in shed 	
Fingermillets	Not applicable since these crop	s are grown on well drained soils	S.		
Groundnut					

Sesame				
Horticulture (Vegetables)				
Cucurbitaceous crop	Resowing /Replanting of	Drain out excess water	Drain out excess water	
Solanaceous crop	seedlings			
Flower crops				

Continuous submergence for more than 2 days				
Rice	If washed out resowing of nursery by using mat nursery/ sowing of sprouted seed on puddled field	 Drain out excess water Apply second dose (40%) of nitrogen after submergence is over 	Drain out excess water	 Drain out excess water. Immediate harvesting, threshing and dry in shed
Fingermillets	Nor applicable since these crops	are grown on well drained soils.		
Groundnut				
Sesame				
Horticulture (Vegetables)				
Cucurbitaceous crop				
Solanecious crop				
Flower crops				

Sea water intrusion			
Rice	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out, If wash out resowing of nursery with salt tolerant varieties like Panvel -1 and 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water. Irrigate the affected area with fresh water and drain out 	creek bund and sea wall to prevent sea water intrusion • Drain out sea water.

	Panvel -2			
Fingermillets	Nor applicable since these crops are grown on well drained soils.			
Groundnut				
Black gram				
Horticulture (Vegetables)				
Cucurbitaceous crop				
Solanecious crop				
Flower crops				
Coconut	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out Mound the crop with soil 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	 Strengthening of creek bund and sea wall to prevent sea water intrusion Drain out sea water, Irrigate the affected area with fresh water and drain out 	

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								
Mango	• Cover with shed net /Protective irrigation	Water spray / 1% Potassium nitrate spray	Collect and destroy dropped fruits	Collect dropped fruits				
	 Water spray 							
Cashew	• Cover with shed net /Protective irrigation	Protective irrigation	Protective irrigation					
	Water spray							
Coconut	• Cover with shed net.	Frequent irrigation	 Frequent irrigation 	 Frequent 				
	Water spray			irrigation				
Arecanut	Cover with shed net.	Frequent irrigation	Frequent irrigation	Frequent irrigation				

	Water spray			
Cucurbitaceous crop	Water spray	Water spray	Water spray	-
Solanaceous crop				-
Flower crops				-

Mango	-	-	Collect and destroy the fallen fruit to avoid the further built- up of pest and disease inoculums	Collect the fallen fruit to avoid the further built-up of pest and disease inoculums
Cyclone				
Mango	Support the young seedlings/grafts	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing 	 Proper pruning of damage or broken branches Collect dropped fruits and use it for suitable processing
Cashew	Support the young seedlings/grafts	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect fallen nuts market it. 	 Proper pruning of damage or broken branches Collect fallen nuts and store
Coconut	Support the young seedlings	Immediate disposal of damaged trunck	Collect fallen tender nuts, market it.	Collect fallen tender nuts market it.
Sapota	Support the young seedlings	Proper pruning and disposal of damaged or broken branches	 Proper pruning of damage or broken branches Collect fallen fruits, market it 	 Proper pruning of damage or broken branches Collect fallen fruits, market it.
Arecanut	Support the young seedlings	Immediate disposal of damaged trunck	• Collect fallen tender nuts and market it	Collect fallen tender nuts market it.
Frost	Not applicable	,		
Cold wave				

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.7.3 Livestock

		Suggested contingency measures	
Drought	Before the event	During the event	After the event
Feed and fodder availability	Conservation of green fodder as silage dry fodder as hay in flush season for utilization in lean period	Judicious use of feed resources processed as per type of livestock possessed by the livestock owners.	For Green fodder production in next Kharip season needs to be undertaken as a source of
	Dry fodder available should be processed i.e. Urea treatment of crop residues to enhance their nutritive value. For this inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to the livestock owners.	 Distribution of fodder, UMMB blocks, other feed resources stored in the affected area to the livestock owners as per the number and type of livestock possessed. Mineral supplementation – Mineral mixture be provided for the 	fodder at earliest. Mineral Supplementation should be continued. Concentrate feeding for productive animals so as to compensate the body condition and production.
	Judicial use of available feed resources by the livestock owners.	livestock@50 g/day/Anim. Disposal/Transfer of the animals in	The animals must be brought into cyclic stage for
	Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be collected and stored.	the area having feed resources availability. > Concentrate feeding for productive animals to support minimum	reproduction. Young crossbred livestock needs to be attended properly so as to harness the
	Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured for productive	 production & life saving of the important animals. Other non productive animals are to be fed at subsistence level. Use of food grains for biodisel and 	 high productivity. Adlib. feeding may be practiced with balancing the nutrients required. The unproductive/surplus
	animals. > Urea molasses mineral blocks (UMMB) may be reserved with NDDB, Anand,	distillaries should be stopped and the grains be spared for productive animals.	livestock needs to be culled/disposed. Livestock suitable with the
	 concentrate. Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed 	ingredients may be provided in order to harvest maximum nutrients for productive animals particularly high productive crossbred cows.	farming system practiced only should be maintained. Mechanization in agriculture needs to be encouraged.
	resource for ruminants. Tree leaves are easily available. Leaves of	Top feeds should be used during scarcity period only.	Feed processing needs to be encouraged in order to

- neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A and hence should be reserved for feeding during drought.
- Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.
- ➤ Mineral mixture should be procured and stored for supply.
- ➤ Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.
- ➤ Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banks to be established at each Taluka in the drought area.
- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- > State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- > Cattle camp sites needs to be identified.
- NGOs/Gorakshan Sanstha etc. needs to be identified.
- Anticipated number of livestock & feed resources to be provided needs to be assessed.
- Livestock registration should be compulsory with identification by tagging
- Preparedness of veterinary services to drought prone areas.

- Oil seed cakes are good source of proteins and hence should be used for productive animals only.
- Feed supplements/ Additives needs to be used widely for productive animals.
- Establishment of Cattle camps at identified sites.
- NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for maintenance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- Adaptation of proper distribution policy as per requirement with transport facility.
- Regular rest periods for working animals particularly bulls during hot period of the day.
- Capture and care of stray animals.
- The unproductive/surplus livestock needs to be culled/disposed.
- Sale of feed and fodder from the affected area to non affected area should be banned.
- > Distribute fodder at reasonable rate.
- Monitoring feed and fodder prices.

- minimize the wastage of feed resources.
- > In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.
- Readiness for feed and fodder bank as and when required for each districts with transport facility.
- Review of shortfalls in planning and refining action plan the before and during event.

	 Encourage farmers to cultivate fodde crops. Identification of the site for fodder depot. Facility to store fodder by creating centralized silage making facility with provision for transport. Forage production and storage of fodde in irrigated areas. Assessment of risk and vulnerability. Formation of village Disaster Management Committee. Establishment of drought monitoring system or early warning system. 		
		Suggested contingency measures	
Drought	Before the event ^s	During the event	After the event
Drinking water	 Water resources as in general ar inadequate and hence the resource should be trapped and increased. Available rain water harvesting technique should be adopted i.e. farm ponds etc. Water conservations measures be adopted to increase water table like recharging of bore wells. Available water resources should be tapped and reserved. Water harvesting measures like farm ponds alternative water sources, Nal bunding/check dams etc. needs to be undertaken. Judicious use of water in agriculture i.e. through drip/sprinkler irrigation. Wastage of water needs to be curbed. Rain water harvesting measures needs to 	 Special distribution and carrying capacity should be implemented from other available resources. Water should be used as per the requirement of animals (@10-15 lit/ 100 kg body weight). Drinking water should not be used for washing animals. Clean and chlorinated water be provided to prevent water borne diseases. Special distribution and carrying capacity should be supplemented from other available resources. Water for irrigation should be stopped. Judicious use of water for livestock. Supply of water through tankers 	Permanent water resources should be developed with campaign for public awareness. Steps should be taken to conserve water. Ensure fresh clean and cold water supply to livestock.
	 be implemented at village level. Proper utilization of Water to save water. Equal water distribution plan may b implemented. Cloud seeding desalination, recycl sewage water, transvasment river projectetc. 	shall be used for drinking water. Proper utilization of Water to save water.	

			Suggest	ed contingency measures		
Drought		Before the event		During the event		After the event
Health and disease management	>	Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter with stock of life saving medicine for livestock.	>	Services of trained personnel need to be made available in affected area with sufficient supply of life saving medicine of livestock. A team of veterinary experts be deployed for health management of	>	Routine training programme as a refresher course need to be implemented in relation to health and disease management during drought with stock of life saving
	>	Vaccination of animals for various diseases according to season. Deworming and spraying be done to get rid of endoparasites and ectoparasites to keep the health of animals in good	>	drought hit livestock. During occurrence of disease, affected animals should be kept isolated and treated properly and promptly.	>	medicine for livestock. There will be stress on animals due to deterioration of health during drought period.
	>	condition. Personnels should be trained for health and disease management through training		Vaccination against contagious diseases like HS, FMD, Theileriosis be carried out.	>	Concentrates and vitamin- mineral supplements be provided to minimize the
	>	List of trained personnel should be available at each district head quarter. Feedadditives/Tonics/ Vitamin supplements should be stocked.	>	Mineral mixture be provided to take care of deficiency disorders. Tick control measures be undertaken to prevent tick borne diseases in	>	stress on animals. The animals should be observed for signs of contagious diseases or
	A	Vaccines, Insecticides, disinfectants and dewormers needs to be stocked. Records/PM/ Carcass disposal	A A	animals under stress. Deworming should be carried out. Feed additives/Tonics/Vitamin	>	deficiency disorders. Vaccination spraying and deworming programme
	>	arrangements needs to be ensured. Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and	>	supplements should be provided. Post Mortem /record keeping/carcass disposal arrangements be effected. Restriction on movement of the	>	needs to be undertaken. Record of affected livestock to be submitted for compensation of the loss.
	> >	managemental shortfalls. Create temporary shade shelters to prevent heat stress on the animals. (animal camps) Supply of Mineral and Vitamins mixture.	>	animals to prevent the spread of diseases. Periodic disinfection and disinfestations of premises where animals are kept.	>	Farm disinfection and disinfestations. Assessment of losses due to mortality if any.
	>	Application of preventive and control measures of SP & MD.	> >	Permission of only healthy and vaccinated animals in cattle market. By proper treatment with supervision and exercise over starvation. Special transport facility of mobile van for veterinary team be deployed.		
			Suggest	ed contingency measures		

Flood	Before the event	During the event	After the event
Feed and fodder	➤ Identification of flood prone zones and flood forecasting.	 Quick evacuation of livestock from flood plane areas before area become 	For Fooder production in next
availability	 Installation of early warning systems. Steps to prevent spoilage of food and 	flooded Prevent outflow of manure pit in river	Kharip season needs to be undertaken as a source of fodder at
	water supply due to flood water. Dedicated helpline to emergency contact and communication at taluka level.	Proper feed, vaccine, drugs, disinfecrants and feed supplement	earliest. Fodder seed of improved fodder crop
	Avoid construction of farm buildings in flood risk areas.	distribution policy adopted with transport facility.	varieties needs to be distributed.
	➤ Local ponds and canals regularly inspected and cleared off from	 Prevent spoilage of food and water supply Judicious use of feed resources 	Mineral Supplementation should
	 obstruction Adequate stock of Tetanus toxoid. Change cropping pattern according to 	➤ Judicious use of feed resources processed as per type of livestock possessed by the livestock owners.	be continued. Concentrate feeding for productive animals so
	flood risk periods. > Storage of available fodder at safe place	Distribution of fodder, UMMB blocks, other feed resources stored in	as to compensate the body condition and
	before rainy season.Training of local personnel for disaster management.	the affected area to the livestock owners as per the number and type of livestock possessed.	production. The animals must be brought into cyclic
	Dry fodder available should be processed i.e. Urea treatment of crop residues to enhance their nutritive value. For this	 Mineral supplementation – Mineral mixture be provided for the livestock@50 g/day/Anim. 	stage for reproduction. > Young crossbred livestock needs to be
	inputs such as training of livestock owners, material like urea, polythene sheet etc may be provided free of cost to	Disposal/Transfer of the animals in the area having feed resources availability.	attended properly so as to harness the high productivity.
	the livestock owners. > Judicial use of available feed resources by the livestock owners.	Concentrate feeding for productive animals to support minimum production & life saving of the	Adlib. feeding may be practiced with balancing the nutrients
	Non conventional feed resources such as Neem seed Cake/ Sal seed Meal/ Mango seed Kernels/ Babul pods etc should be	important animals.Other non productive animals are to be fed at subsistence level.	required. The unproductive/surplus
	collected and stored. Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes,low grade grains, Govt Godowns wastes,	➤ Use of food grains for biodisel and distillaries should be stopped and the grains be spared for productive animals.	livestock needs to be culled/disposed. Livestock suitable with the farming system
	grains unfit for human consumption etc. should be procured for productive	 Bypass protein concentrate ingredints may be provided in order to harvest 	practiced only should be maintained.
	animals. ➤ Urea molasses mineral blocks (UMMB)	maximum nutrients for productive animals particularly high productive	Mechanization in agriculture needs to be

- may be reserved with NDDB, Anand, Gujarat for emergency supply as concentrate.
- Sugarcane bagasse, cane tops and molasses form important byproducts. Sugarcane bagasse- is an important feed resource for ruminants.
- Tree leaves are easily available. Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder. Tree leaves are good source of protein, calcium, Vitamin A&hence should be reserved for feeding during drought.
- Cactus is primarily found in deserts hence it is easily available during scarcity also. As such it is not used for feeding animals but during scarcity it can be used.
- Mineral mixture should be procured and stored for supply.
- Fodder Banks: Grasses & tree leaves: Grasses from periphery of forest area wastelands & farmlands & Dry fallen forest tree leaves may be harvested & stored as hay in bales.
- ➤ Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banksto be established at each Taluka in the drought area
- ➤ Govt. should provide support to farmers for making stacks, bailing & storage.
- > State Animal feed resources Grid needs to be established so as to provide feed resources during scarcity period.
- Cattle camp sites needs to be identified.
- NGOs/Gorakshan Sanstha etc. needs to

- crossbred cows.
- Top feeds should be used during scarcity period only.
- Oil seed cakes are good source of proteins and hence should be used for productive animals only.
- Feed supplements/ Additives needs to be used widely for productive animals.
- > Establishment of Cattle camps at identified sites.
- NGOs/Gorakshan Sanstha etc. identified to be involved for participation/implementation.
- Feed resources @ 7 kg.dry fodder/day/adult animal for maintainance 2.0 kg. concentrate mixture/day/adult animal for supporting minimum milk production.
- > The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district.

- encouraged.
- Feed processing needs to be encouraged in order to minimize the wastage of feed resources.
- In-situ storage and feeding of processed animal feed resources by the livestock owners needs to be encouraged.
- Fodder resources should be exploited with sufficient transport facilities from other areas of the district even after the event.

	be identified. Anticipated number of livestock & feed resources to be provided needs to be assessed. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the city where feeds & fodder (silage) can be stored for emergency use.		
		Suggested contingency measures	
Flood	Before the event	During the event	After the event
Drinking water	 Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the flood. Rain water harvesting should be done in all districts. Every district should be made self-sufficient. Every district gas plenty of rain water which should be harvested so that these areas should become self-sufficient & if required they should be able to provide water to other dry areas too. The rain water should not be wasted in sea. Shelters & temporary camps should be set up at a height in city area as well as in suburbs after choosing the right location for each area. Same provisions should be done in other Konkan districts. Bore well facilities should be exploited in districts for supply of clean water. Contamination of local water resources due to flood water should be prevented Potable drinking water source should 	 Sufficient facility for transportation with advanced proper planning should be made in the areas of each district. During flood condition there will be polluted water, whatever potable drinking water source is available should be used with almost care. Disinfection of drinking water i.e. chlorination of water should be carried out Stop use of drinking water for animals from contaminated water resources. Disinfection of the water for consumption of the animals should be carried out to prevent water-borne diseases. Aerosol spray of the disinfectant for preventing spread of airborne infections should be carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities. Judicious use of water for livestock. Water tankers provision Private water resources such as wells shall be used for drinking water 	 Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district. Clean disinfected water from bore well or rain harvested water may be supplied to the animals as water-borne infections are common after floods. Sources of potable drinking water should be tapped for its proper use. Permanent water resources should be developed with campaign for public awareness. Water storage facility created away from the flooded area.

	be there to supply water to animals. > Every society should implement rain harvesting system, so that water can be stored for use whole year long. Water problem likely to be faced in future. Water harvesting measures like farm ponds alternative water sources, Nala bunding/check dams etc. needs to be undertaken. > Judicious use of water in agriculture i.e. through drip/sprinkler irrigation. > Wastage of water needs to be curbed. > Rain water harvesting measures needs to be implemented even at village level with establishment of water Storage and Purification facility	availability only.	
		Suggested contingency measures	
Flood	Before the event	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for flood affected areas with stock of life saving medicine for livestock. Vaccination of animals for various diseases according to season. Deworming and spraying be done to get rid of endoparasites and ectoparasites to keep the health of animals in good condition. Stock of life saving medicine be made. Disaster management team of veterinarians be constituted at district/taluka/panchayat level. Training to veterinarians in health and disease management during flood disaster 	 Services of trained personnel need to be made available in affected area with sufficient supply of life saving medicine of livestock. Shifting of the animals at suitable place for temporary shelter. Disaster management team of veterinarians be deployed. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. Various referral centres in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be made available at Tahsil level besides 	 Routine training programme as a refresher course need to be implemented in relation to health and disease management during flood with stock of life saving medicine for livestock. After flood condition there are chances of occurrence of specific diseases. Preventive measures should be taken to reduce occurrence of diseases. Vaccination and deworming programme needs to be undertaken. Animals should closely be observed for new/re-
	be given.Awareness amongst farmers regarding	district level so that more number of farmers may approach for diagnosis	emerging diseases.Proper disposal of carcass is

- health care practices during flood disaster be undertaken.
- Feedadditives/Tonics/ Vitamin supplements should be stocked.
- Vaccines /Dewormers needs to be stocked.
- Records/PM/ Carcass disposal arrangements needs to be ensured.
- ➤ In flood prone area pucca cattle shed should be constructed.
- > Preparation of walls and hips to keep flood water away from village.
- > Supply of Mineral and Vitamins mixture.
- Application of preventive and control measures of SP & MD.

- & treatment.
- Adequate nutrition including vitamin-mineral supplements should be given to animals to keep their health in proper condition.
- During occurrence of contagious diseases, affected animals should be kept isolated and treated properly. Isolation and treatment of ailing animals viz. hypothermia, wound, diarrhoea and pneumonia be undertaken.
- Vaccination against HS, BQ and FMD in bovines and PPR and enterotoxaemia in small ruminants should be undertaken.
- Deworming and spraying of apparently healthy animals be carried out.
- Use of antivenum in snake bite cases.
- Feed additives/Tonics/Vitamin supplements should be provided. Vaccination and deworming programme needs to be undertaken.
- Post Mortem /record keeping/carcass disposal arrangements be effected.
- Disinfect the premises with bleaching powder and lime.
- > Turn off electrical power.
- Training of farmers for maintaining optimum health of animals, balance ration and recognize early signs of disease and managemental shortfalls during floods.
- During severe regular flood, shifting of village away from river or changing the path of river away from village.

- very important in flood affected areas from public health point of view Methods of disposing of dead animals include burning, burying and composting
- Disinfection of animal sheds with 2% formaldehyde / 4% caustic soda.
- Provide proper shelter to protect animals from cold and rain.
- Record of affected livestock to be submitted for compensation of the loss.
- In regular flood prone areas defenses such as levees, bunds, reservoirs and weivs should be used for future preventions.

		Suggested contingency measures	
Cyclone	Before the event ^s	During the event	After the event
Feed and fodder availability	 There should be availability of fodder depot one each for every district. Information at every district head quarter regarding availability of fodder resources from other areas for exploitation should be made available. A storehouse can be prepared at a highest point in the district where feeds & fodder (silage) can be stored for emergency use. The store house should have proper walls on all sides with one entrance to avoid effect of cyclone. Feed & fodder should be stored as emergency stock in Govt. warehouses which can be distributed to areas that need them. 	 Adaptation of proper distribution policy as per requirement with transport facility. The stored feeds & fodder can be used to feed the animals & if it is short then Fodder resources should be exploited with sufficient transport facilities from other areas of the district. 	Readiness for feed and fodder bank as and when required for each districts with transport facility should be created.
		Suggested contingency measures	
Cyclone	Before the event	During the event	After the event
Cyclone Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Rain water harvesting should be done in all districts. Every district should be made self-sufficient. Each district has plenty of rain water which should be harvested so that these areas are self-sufficient & if required they should be able to provide water to other dry areas too. The rain water should not be wasted in sea. Walls of the well should be constructed much above the ground level to avoid contamination. 	 ▶ Special distribution and carrying capacity should be implemented from other available resources. ▶ Rain harvested water & bore well water should be disinfected & provided to the animals. ▶ Special distribution and carrying capacity should be implemented from other available resources. ▶ Disinfection of the water for consumption of the animals should be carried out to prevent water-borne diseases. Aerosol spray of the disinfectant for preventing spread of airborne infections should be carried out. Shelters & temporary camps for displaced animals should be set up with proper sanitation facilities 	After the event Permanent water resources should be developed even after the event with campaign for public awareness.

		Suggested contingency measures	
Cyclone	Before the event ^s	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for cyclone affecting areas with stock of life saving medicine for livestock. Vaccination against common infections like FMD, swine fever, black quarter, anthrax, haemorrhagic septicaemia, etc. should be given to animals. Stock of medicines should be kept available for use during cyclone. The walls and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Supply of Mineral and Vitamins mixture. Application of preventive and control measures of SP & MD. 	 Keep watch on weather and listen to radio or TV and make others alert by warning. Shift the animals at safer place or in well secured cattle sheds. The wall and roofs of the cow sheds should be well secured. Loose poles & tree branches should be removed, which may become harmful during extreme wind. Services of trained personnel need to be made available in cyclone affected area with sufficient supply of life saving medicine of livestock. Makeshift Veterinary medical facilities should be created at the site nearer to disaster place. Various referral centers in the disease diagnostics should be roped in for detection of infections which cannot be diagnosed at field level. Various diagnostic facility with modern techniques should be made available at Tahesil level besides district level so that more number of farmers may approach for diagnosis & treatment. 	 Routine training programme as a refresher course need to be implemented in relation to health and disease management during cyclone with stock of life saving medicine for livestock. Do not free the animals unless all clear or officially advised it is safe.

2.5.2 Poultry

	Suggested contingency measures		
Drought	Before the event	During the event	After the event

Shortage of feed ingredients

- There should be availability of feed, feed ingredients and mineral mixtures with sufficient storage capacity for every district.
- Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers
- > Storage of feed ingredients of previous year in sufficient quantity to use in scarcity period.
- ➤ Identification and storage of locally available feed ingredients as an substitute for scares ingredients.
- A farm disaster kit should be prepared in advance. The kit should be placed in a central location and everyone should know where it is. The contents of the kit must be checked regularly to ensure fresh and complete supplies. The following items should be included in the kit in addition to the items that are used everyday:
 - Updated list of all farms with information about birds, their location and records of feeding, vaccination, tests.
 - Basic first aid kit.
 - Handling equipment & cages.
 - Waterier and feeders.
 - Sanitation and disinfection equipments & chemicals.
 - Other safety and emergency items for vehicles and trailers, e.g., Extra tyres, winches, tools, etc.
- Maize grain is limiting source as a

- Adaptation of proper distribution policy as per requirement with transport facility.
- > Supply of feed ingredients through government channel to the end users at reduced price.
- Make sure that birds receive adequate quantity and essential nutrients through feed to minimize stress and to prevent occurrence of disease outbreaks.
- > Crucial use of available feed avoiding excess feeding and wastage of the feed.
- > Stored feed ingredients will be utilized during contingency.
- ➤ Birds should be evacuated and taken to shelters as soon as there is news of an imminent disaster. Every flock must have some form of durable and visible identification.
- ➤ There should be arrangements for appropriate transport, suitable for birds. Stranded birds should be rescued and taken to safer places.
- ➤ If the stranded place is considered safe for the next week or so, the birds may be left there but should be provided with feed and drinking water.
- Arrangements should be made so that veterinary and Para- veterinary personnel can quickly reach all affected farms to provide necessary measures.
- Officials and other personnel engaged in relief work should also gather intelligence on the extent and nature of the damage to individual farms and villages so that appropriate relief measures can be implemented.
- Adequate nutrition should be given to birds to keep their health in proper condition.
- The available ingredients as poultry feed should be used with utmost care.

- Readiness for feed, feed ingredients and mineral mixtures as and when required for each districts with transport facility.
- Strategies to minimize the effects of stress due to drought by optimum feeding and management of the flock.
- ➤ Use of mineral and vitamin supplements to reduce stress.
- Follow up of affected livestock for adequate feed supply.
- Proper utilization of the resources should be carried out. The situation should be assessed properly and decision has to be taken on which birds to be treated first and how.
- The birds that are in very poor condition with no chance of recovery should be culled in humane manner.
- The dead birds should be disposed off in hygienic manner by burial or incineration.
- The situation at the farm also should be assessed and the corrective measures should be taken as soon as possible. All damages should be repaired and shed should be made functional. Disinfection of the premises and shed should be carried to prevent spread of diseases.
- The stress on poultry due to shortage of feed during drought period can be minimized by

feed ingredient in poultry feed.
Store maize for poultry feed

- Store maize for poultry feed.
- Substitute feed ingredient should be tapped as replacement for maize grain which can be used for poultry feed.
- Concentrate ingredients such as Grains, brans, & oilseed cakes, low grade grains, Govt. Godowns wastes, grains unfit for human consumption etc. should be procured.
- Ban on export of oilseed meals needs to be implemented.
- Feed required for broilers3.5 kg./bird for six weeks. For Layers 55 kg /layer bird for a period of 72 weeks.

- Non-conventional feed ingredients can also be tapped to use as a poultry feed taking into consideration the anti-nutritional factors present in it.
- Alternate day feeding for broilers.
- Avoid feed wastage.
- Restricted feeding for layers.
- Poor layer birds to be culled.
- Broiler rear up to 4 weeks only.
- Use of feed additives be enhanced to maximize the feed efficiency.

- proper feeding of the birds after drought period.
- Ad lib. feeding to compensate the egg production.
- Feed additives may be used to maximize production

		Suggested contingency measures	
Drought	Before the event	During the event	After the event
Drinking water	 Water resources as in general are inadequate and hence the resources should be trapped and increased. Conservation of water for drought period. Water conservations measures adopted to increase water table like recharging of bore wells. Available water resources should be tapped and reserved. Leak proof water supply systems. Available rain water harvesting technique should be adopted i.e. farm ponds etc. Water conservations measures be adopted to increase water table. Judicious use of water. Use of nipples as waterers. 	 Special distribution and carrying capacity should be implemented from other available resources for poultry. Optimum use of available water as per the requirement of birds. Supply of adequate water to farms with transportation facility. Supply of water through tankers during contingency. Judicious use of water. Use of nipples as waterers. 	 Permanent water resources should be developed even after the event with campaign for public awareness. Evaluation and fine tuning of the contingency majors. Ensure clean, cold water supply to birds. Steps should be taken to conserve water and to develop permanent water resources. Fresh and ad lib. water should be provided.

		Suggested contingency measures	
Drought	Before the event ^s	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management of poultry through trainings and list of trained personnel should be available at each district head quarter with stock of medicine, mineral mixture and vaccine for poultry. Regular and strict vaccination of birds. Vaccination of wild birds through water whenever possible. Deworming of birds before and after drought period. Appointment of veterinarian on farms made compulsory. 	 Services of trained personnel need to be made available in affected area with sufficient supply of medicine, mineral mixture and vaccine for poultry. Immediate attention to diseased birds by veterinarians. Regular visits of veterinarians to detect diseased birds and veterinary care Vaccination of birds if necessary. If there is occurrence of disease, affected birds should be kept isolated and treated properly and promptly. Periodic disinfection and disinfestations of farm and premises. Measures to minimize risk of spreading contagious diseases. Birds should be checked for injury/ signs of disease. Antibiotic through water Anti-stress supplements Multivitamin supplements Bio-security measures to be implemented. Proper disposal of poultry carcass. 	 Routine training programmed as a refresher course need to be implemented in relation to health and disease management during drought with stock of life saving medicine and vaccine for poultry to prevent outbreak. Proper disposal system of poultry carcasses. Efforts to minimize effects of stress through optimum feeding, management and veterinary care. Assessment of losses due to mortality if any. Proper disposal of carcass. There will be stress on birds due to deterioration of health during drought period. Hence proper feeding should be done to minimize the stress on birds by supplying vitamin supplements. Birds should be tested at regular interval to confirm that they are free of contagious diseases. Proper disposal of birds died of various diseases. Vaccination. Replacement of stock.

Suggested contingency measures			
Floods	Before the event	During the event	After the event

Shortage of feed ingredients	 Poultry owners needs to be advised to be in readiness for- Alternate poultry sheds with feed stock at safe places. Displacement of stock- transport arrangements. Registration of poultry farms made compulsory to make it easier to be prepared and provide quick help to the farmers Measures to avoid spoilage of feed stores due to water. Construction of feed stores to stores feed sufficient for at least one month. Farmers will be encouraged to purchase and store the feed ingredient when it is cheaply available in the market. Information at every district head quarter regarding availability of feed 	 Shifting of birds at Alternate poultry sheds with feed stock at safe places. Stress reducing measures to be adopted. Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district. Adequate nutrition should be given to birds to keep their health in proper condition. Judicious use of available feed. 	 Shifting at original site after repair of the shades and restoration of the necessary facilities. Proper feeding should be done to minimize the stress on birds Ensure good quality feed and fodder supply to birds Feed and feed ingredients resources should be exploited with sufficient transport facilities from other areas of the district even after the event.
	and feed ingredients and mineral mixture resources from other areas.		
		Suggested contingency measures	
Floods	Before the event ^s	During the event	After the event
Drinking	➤ Arrangement of clean and hygienic	> Sufficient facility for transportation with	Actions to rectify the water
water	water.	advanced proper planning should be made	related issues observed during
	Leak and contamination proof water	in the areas of each district.	flood period.
	supply system. Installations of the watering systems	Water treatment to avoid entry of pathogens through drinking water.	Ensure potable water supply to birds.
	targeted to optimum use of available	Judicious use of potable chlorinated water.	Sufficient infrastructure facility
	water avoiding water wastage.	Avoid contamination of wells and tube	for transportation with
	Source of water should be away from	wells by flood water.	advanced proper planning
	flood affected areas.	> Proper utilization of Water to save water.	should be made in the areas of each district.
	Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of flood.	 Supply of water through tankers during contingency. Water purification measures for ensuring hygienic water supply. 	 Sources of potable drinking water should be tapped for its proper use.
	➤ Encourage the farmers for rain water		Use of disinfected water.
	harvesting. Proper utilization of Water to save		Arrangements of hygienic water supply.

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water.	

	Suggested contingency measures		
Floods	Before the event	During the event	After the event
Health and disease management	 Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter for flood affecting areas with stock of medicine, mineral mixture and vaccine for poultry. Vaccination and deworming schedule should be observed strictly. Additional deworming can be carried out before and after floods. Medicine store facility with availability of adequate drugs at each farm and veterinary dispensaries. Training of farmers to identify signs of common contagious diseases particularly to avoid outbreaks. Do not built poultry house on nalla or stream or otherwise remove the birds before monsoon from such poultry house. 	 Services of trained personnel need to be made available in affected area with sufficient supply of medicine, mineral mixture and vaccine. During flood if it is difficult to shift and manage large number of birds, they should be slaughter and sent to cold storage. Vaccination against contagious diseases. Proper disposal of birds died of diseases particularly contagious diseases. Disinfection of sheds be undertaken. Immediate veterinary help to the farms. Adequate proper feeding and management. 	 Routine training programmed as a refresher course need to be implemented in relation to health and disease management during flood with stock of medicine and vaccine for poultry to prevent outbreak. Proper disposal system of poultry carcasses. Cleaning and disinfection of poultry farms. Monitoring for disease outbreaks in birds through regular farm visits by veterinarian. Proper disposal of carcass is very important in flood affected areas from public health point of view. Vaccination for RD and IBD to avoid outbreaks. Anti-stress treatment of birds is important to prevent mortality. Preventive measures should be taken to reduce occurrence of diseases, particularly use of antibiotics in drinking water. Hygienic measures should be followed. Birds should be served for emerging infectious diseases. Restriction on movement of the birds. Compensation of the loss.

	Suggested contingency measures				
Cyclone	Before the event	During the event	After the event		
Shortage of feed ingredients	➤ Information at every district head quarter regarding availability of feed and feed ingredients and mineral mixture resources from other areas with storage facility.	➤ Feed and feed ingredients resources should be exploited with sufficient transport and storage facilities from other areas of the district.	➤ Feed and feed ingredients resources should be exploited with sufficient transport and storage facilities from other areas of the district even after the event.		

		Suggested contingency measures	
Cyclone	Before the event	During the event	After the event
Drinking water	Sufficient storage capacity should be made available particularly during rainy season in view of the forecasting of the cyclone.	Sufficient facility for transportation with advanced proper planning should be made in the areas of each district.	Sufficient infrastructure facility for transportation with advanced proper planning should be made in the areas of each district.
		Suggested contingency measures	
Cyclone	Before the event	During the event	After the event
Health and disease management	Personnel should be trained for health and disease management through trainings and list of trained personnel should be available at each district head quarter during heat and cold waves with stock of life saving medicine, vaccine, feed and mineral mixture for poultry.	 Services of trained personnel need to be made available in affected area with facilities to overcome heat waves through water availability and cold through proper closed shelter with sufficient supply of medicine and vaccine for poultry. During heat fogging system should be ready and during cold artificial heat through electricity need to be provided. Detection & treatment of ailing birds. Vaccination against contagious diseases. Antistressor preparations or multivitamins preparations through drinking water during stress. Ad. lib. Cold water availability Supply of medicine and vaccine for 	 Routine training programme as a refresher course need to be implemented in relation to health and disease management during heat and cold waves with stock of medicine and vaccine for poultry and sufficient arrangement. Anti- stress to relieve stress. Birds should be monitored for occurrence of diseases. Vaccination to avoid outbreaks. Proper disposal of poultry carcasses.

>	Feed in cool hrs and increase the frequency	
	of feeding with high density feeds.	
>	Mineral & Vitamin supplementation	

2.5.3 Fisheries/ Aquaculture

		Suggested contingency measures	
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Not applicable	Not applicable	Not applicable
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Need to implement cost-effective water efficiency and conservation measures in very early stage to handle the drought. Strategic plan should be made to construct bunds & conserve water in drought prone areas.	In severe drought condition Most of the stock can be harvested immediately while Some portion of the local aquatic species should be transfer to the less affected areas so as to conserve them and reintroduce in its regional habitat.	Water policies should be determined If we want to restore our inland fishery resources. Need to set up hatcheries for drought affected fish species to avoid their extinction, and the conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.
(ii) Changes in water quality	Regular monitoring of water quality	Need to harvest the stock to minimize economic losses before mass mortality due to undesired water quality.	After achieving desired water quality, conserved species once again need to be reintroduced in their original habitats.
(iii) Any other	Gene bank should be made for all indigenous local commercially & ecologically important species.	To conserve the endangered species breeding and rearing indoor facility may be created for future restoration	The conserved species once again need to be reintroduced in their original habitats after achieving desired aquatic environment.

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B. Aquaculture	
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(i) Shallow water in ponds due to insufficient rains/inflow	Water temperature may get raised and also Dissolved Oxygen level may get declined, hence efforts should made to increase the depth of pond & avoid water seepage by using bentonite clay, plastic liners etc. Also artificial oxygenation systems as aerators etc. should be incorporated in aquaculture system.	Water recycling with the aid of potential filtration systems can be applied if available. Provide artificial oxygenation. If water level is too much low, can lead to mass mortality due to environmental stress hence it will be better to harvest the stock immediately.	Construction of small reservoirs or dams should be newly developed in drought prone area. Identifying culturable air breathing species / hardy species (e.g. <i>Notopterus</i> , <i>Clarius</i> , <i>Puntius</i> etc.) suitable to the regional aquatic environment.
(ii) Impact of salt load build up in ponds / change in water quality	Throughout the culture period salinity & other parameters should be checked for regular intervals. Fresh water storage ponds should be developed at aquaculture site.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Identifying best suitable euryhaline spp. (Pearl spot, Sea bass, Rabbit fish, mullets etc.) for the culture which can tolerate wide range of salinity.

2) Floods		
A. Capture		

Marine	Disaster preparedness mission through Sea walls, Embankment. In future early warning systems and evacuation strategy planning for flood prone areas. Plan of Preventive measures against the epidemiological diseases, like malaria, cholera, <i>dengue</i> etc. Among coastal communities. Educating coastal population about Disaster mitigation and provision of good transport means in coastal areas prior to the Flooding event which will be helpful for rescue operations.	Aid to populations at the affected zones and shelters. Affected population should be provided with adequate food & medicines in time.	National & international financial support for research on the various aspects of the flood will be needed for future strategies. Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socioeconomic status. Control of vector-borne endemic and epidemic diseases. Mangrove plantation & conservation strategies should be adopted in estuarine region for minimizing future risk.
Inland	In future early warning systems and evacuation strategy planning for flood prone areas. Awareness of People living in rural zones, or urban margins with regards to the geography of their area as they do not take into account whether they are on a river's flood plain, an unstable hillside, a dry river bed in a flooding area, etc., when they (fisheries community) build their houses. More emphasis should be given on the maintenance of public infrastructure, such as highways, secondary roads and bridges prior to the flooding event which will be helpful for rescue operations. Awareness should be created for using good materials for their construction of houses. Strategic planning to build up local	Aid to populations at the affected zones and shelters. Timely help to populations at the affected zones and shelters. Affected population should be provided with adequate food & medicines in time.	Diversifying course of flooding river to minimize socio-economic losses. Microfinance to the affected population by Governmental & Non Governmental Organization to reconstruct their socio-economic status.

	rescue teams in flood prone areas.		
(i) Average compensation paid due to loss of human life	Not applicable		
(ii) No. of boats / nets/damaged	Not applicable		
(iii) No. of houses damaged	Not applicable		
(iv) Loss of stock	Not applicable		
(v) Changes in water quality	Not applicable		_
(vi) Health and diseases	Preventive measures of Plan of the Health Ministry for the prevention of epidemiological diseases, like malaria, cholera, <i>dengue</i> etc. & vaccinisation in flood prone area.	Affected population should be provided with adequate food & medicines in time.	Control of vector-borne endemic and epidemic diseases.

B. Aquaculture				
(iv)	Inundation with flood water	Early warning systems should be developed to minimize future risk. Elevating the height of peripheral dykes of the aquaculture ponds. Providing elevated net fencing on the bunds to the avoid loss of fish during flooding.	possible to minimize economic losses	Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Water of in water qu	contamination and changes nality	Elevating the peripheral dykes of the aquaculture ponds.	Need to harvest the stock as early as possible to minimize economic losses	Drain out all the water from the pond and refill it with good quality water for future crop.

(iii) Health and diseases	Adequate vaccinisation of fish stocks prior to flooding event is recommended to minimize the risk.	In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Quarantining of culture pond before next stocking.
(iv) Loss of stock and inputs (feed, chemicals etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for inputs.	Early harvest of the stock and transport of inputs to the safer places.	Use new stock.
(v) Infrastructure damage (pumps, aerators, huts etc)	Elevating the peripheral dykes of the aquaculture ponds and good indoor storage facility for the pumps & aerators in flood condition.	Transport of the pumps, aerators etc. to the safer places.	Insurance and micro-finance for repaire and maintenance of the infrastructure.

3. Cyclone / Tsunami			
A.Capture			
Marine	Timely Communication of weather forecasting to fishermen Implementation of Tsunami detection & warning system in Indian ocean and evacuation strategy planning for	the affected zones and provision of shelters. Affected population should be	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socio-economic status. Control of vector-borne endemic and
	Cyclone / Tsunami prone area. Disaster preparedness mission through Sea walls, Embankment medicines in time.		epidemic diseases;
			National & international financial support for research on the various
	Provision of Wave breakers &dry docks for fishing vessel security.		aspects of the Cyclone / Tsunami will be needed for the planning of future strategies.
	Encouragement and financial incentives should be given to fishermen to carry Safety Devices on their fishing crafts.		Mangrove conservation, plantation strategies should be adopted in estuarine / coastal region for minimizing future risk
	Educating coastal population about		
	Disaster mitigation and provision of good transport means in coastal areas		

	prior to the Cyclone / Tsunami event which will be helpful for rescue operations.		
	Preventive measures for the prevention of epidemiological diseases, like malaria, cholera, dengue etc		
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland	Timely Communication of weather forecasting to fishermen Encouragement and financial incentives should be given to fishermen to carry safetydevices on their fishing crafts.	Timely aid to coastal populations at the affected zones and provision of shelters. Affected population should be provided with adequate food & medicines in time.	Microfinance to the affected population by Governmental & Non Governmental Organization to rebuild their socio-economic status. Rehabilitation of fishermen communities.
B. Aquaculture			
(i) Overflow / flooding of ponds	Elevating the peripheral dykes of the aquaculture ponds Early warning systems should be developed to minimize future risk.	In very initial stage prior to flooding, need to harvest the stock as early as possible to minimize economic losses. In severe condition nothing can be controlled.	Drain out excess water, disinfecting and refilling the ponds with water and restocking by adopting standard aquaculture protocols.
(ii) Changes in water quality (fresh water / brackish water ratio)	Elevating the peripheral dykes of the aquaculture ponds. Regular monitoring of water quality.	Fresh water from the storage ponds can be utilized for maintaining salinity.	Drain out excess water, After achieving desired water quality, restocking by adopting standard aquaculture protocols.
(iii) Health and diseases	Adequate vaccinisation of the stocks prior to this is recommended to minimize the risk	In situ observations & analysis of health status of cultivable species and stress inducing factors and recommendation of treatments to specific diseases.	Disinfecting / Quarantining of culture pond before the next stocking.
(iv) Loss of stock and inputs (feed,	Elevating the peripheral dykes of the	Early harvest of the stock and	Use new stock.

chemicals etc)	aquaculture ponds and good indoor storage facility for inputs.	transport of inputs to the safer places.	
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Elevating the peripheral dykes of the aquaculture ponds and Initial provision of good indoor storage facility for pumps & aerators.	Transport of the pumps, aerators etc. to the safer places.	Insurance and microfinance with low interest from Govt. for the repair and maintainance of the infrastucture.
(vi) Any other			
4. Heat wave and cold wave			
A. Capture			
Marine	Not applicable		
Inland	Not applicable		
B. Aquaculture			
(i) Changes in pond environment (water quality)	Depth of the aquaculture ponds should be increased to minimize thermal stress. Plantation at the peripheral dykes of aquaculture ponds can be recommended.	Aerators should properly utilized for the good circulation of water maintaining good pond environment.	Identification of best suitable eurythermic spp. for aquaculture to tolerate wide temperature range.
(ii) Health and Disease management	Maintaining water parameters at desired levels can reduce the stressful condition & can avoid disease.	Aerators should properly utilized for the good circulation of water maintaining optimum water quality.	Early warning systems should be developed to minimize future risk. Identification of hardy species for aquaculture practices.
(iii) Any other			