State: MAHARASHTRA

Agriculture Contingency Plan for District: RATNAGIRI

1.0 District Agriculture 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 Coast Plains and Ghat 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	
		$16^0$59'31.29" N	73^0 17' 32. 33" E	46 m.	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Dr. S.A. Chavan, 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	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)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	3364.2	83	2nd week of June	2nd week of October
	NE Monsoon(October-December)	--	--	--	
	Post monsoon shower (October-December)	181.1	10	-	--
	Winter (January- March)	2.6	--	--	--
	Summer (April-May)	43.4	7	--	--
	Annual	3591.3	100	-	-

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	303	6	21	28	138	49	198	31	42

Source – District Socio-economic Review -2010 (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	
	Gross cropped area	338.0	

Source – District Socio-economic Review -2010 (Directorate of Economic & Statistics, Govt. of Maharashtra)

1.6	**Irrigation**	Area (‘000’ ha)		
	Net irrigated area	9.4		
	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	5.6	59.6
	Bore wells	170	3.6	38.3
	Lift irrigation schemes	453		
	Micro-irrigation			
	Other sources (please specify)	--		
	Total Irrigated Area		9.4	
	Pump sets	11587		
	No. of Tractors	31*		

Source – District Socio-economic Review -2010 (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%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture etc. (2009-10)

1.7	Major Field crops cultivated	Area ('000' ha)					
		Kharif		Rabi		Summer	Total
		Irrigated	Rainfed	Irrigated	Rainfed		
	Rice	--	77.2	0.1	--	--	77.3
	Finger millet	--	16.9	--	--	--	16.9
	Prosomillet	--	6.5	--	--	--	6.5
	Pulses- (Lablab bean, pigeon pea, cowpea, black gram, horse gram, etc.)	--	2.1	6.7	--	--	8.8
	Groundnut	--	2.2	0.1	--	--	2.3
	Horticultural crops – Fruits 2009-10	**Total Area ('000' ha)**					
	Mango	63.5					
	Cashew	88.0					
	Sapota	0.1					
	Other	1.4					
	Horticulture crops – Vegetables						
	Okra, Brinjal, Chilly, Cucurbits, Leafy vegetables etc.	1.5 (2000-01)					
	Plantation crops						
	Coconut	5.2					
	Aracanut	3.4					
	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	0
	Goat	11.2	26.2	37.5
	Sheep	0.003	0.002	5
	Others (Horse, Camel, Pig, Yak etc.)	-	-	-
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds**	
	Commercial	-	279046	
	Backyard	-	1026034	

Source : Maharashtra Animal and Fisheries Science University, Nagpur

1.10	**Fisheries** (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
		67615	2581	196	2304	35	28
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		-		40		-	
	B. Culture						
		Water Spread Area ('000' ha)		**Yield (t/ha)**		**Production (tons)**	
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	0.125		0.7		87.5	
	ii) **Fresh water** (Data Source: Fisheries Department)	0.876		0.2		175.2	

1.11 Production and Productivity of major crops

1.11	Name of crop	Kharif		Rabi-Summer		Summer		Total		Crop residue as fodder (‘000 tons)
		Production (‘00’ MT)	Productivity (kg/ha)	Production (‘00’ MT)	Productivity (kg/ha)	Production (‘00’ MT)	Productivity (kg/ha)	Production (‘00’ MT)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Rice	1979	2550	3	2500	--	--	1984	2550	
	Finger millet	210	1193	2	1000	--	--	212	763	
	Prosomillet	37	578	-	-	--	--	37	578	
	Pulses (Lablab bean, pigeon pea, cowpea, black gram, horse gram, etc.)	12	600	25	439	--	--	37	481	
	Groundnut, niger and mustard	8	348	5 (Groundnut) 2 (others)	1000 2000	--	--	15	517	

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

Major Horticultural crops (Crops to be identified based on total acreage)										
	Mango							1890	3 t/ha	
	Cashew							991.76	1127 kg/ha	
	Coconuts							33509 lakh nuts	90 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 2nd week of June	1st fortnight of June	to 2nd week of June to 3 rd week of June	2nd fortnight of July	1st fortnight of June
	Kharif-Irrigated	-	-	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	2nd week of Nov. to 2nd week of December	-	2nd week of December to 2nd week of January	2nd week of December to 2nd 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.	✓	-	--

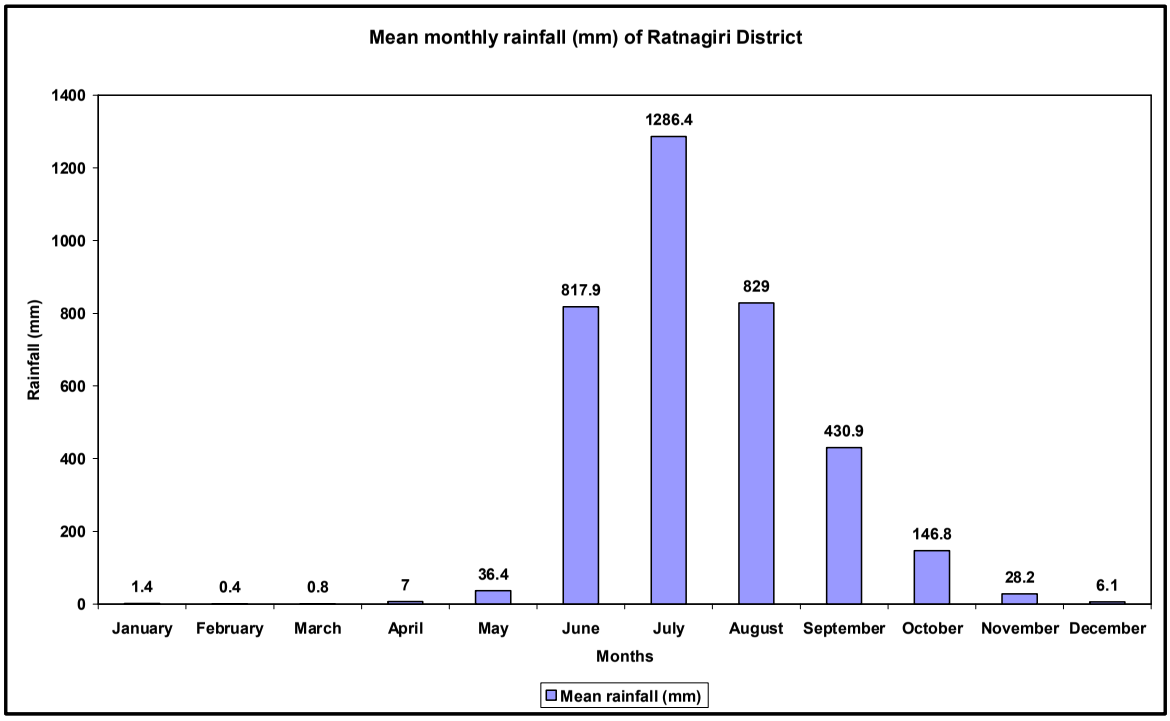
	Others (specify)	--	--	--

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

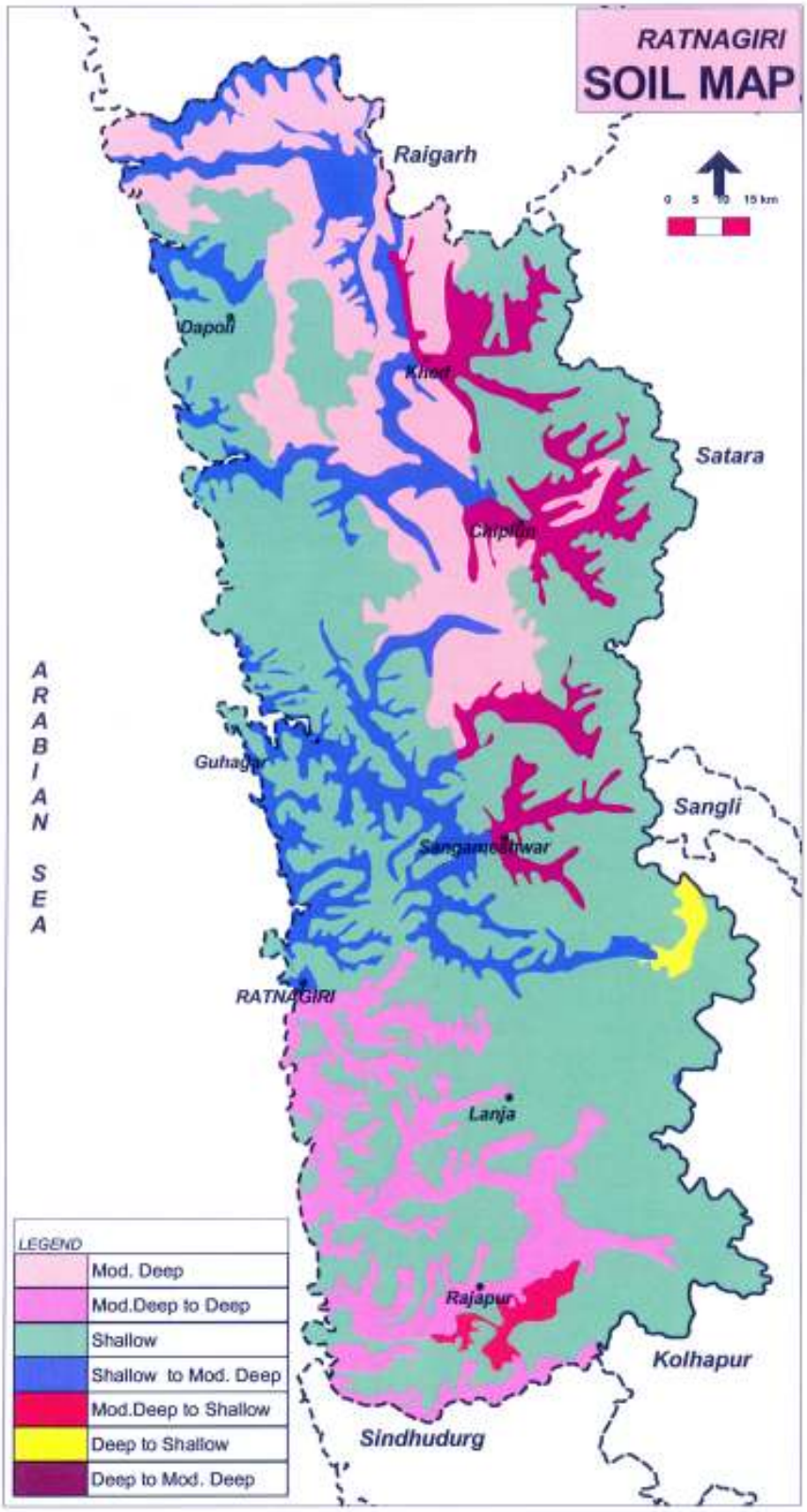
Annexure -1

Location map of Ratnagiri district

Annexure - 2


Mean monthly rainfall (mm) of Ratnagiri District
Rainfall (mm)
1400
1200
1000
800
600
400
200
0
1.4
0.4
0.8
7
36.4
817.9
1286.4
829
430.9
146.8
28.2
6.1
January
February
March
April
May
June
July
August
September
October
November
December
Months
Mean rainfall (mm)

Annexure –III



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

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	Prefer early matured variety (Ratnagiri – 73, Ratnagiri –24, Ratnagiri- 1)	--	Linkage with 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	Prefer early matured variety (Ratnagiri 1, Karjat- 3, Ratnagiri 24, Ratnagiri –5, Karjat-7.)	--	
	Low land deep soils	Rice	No change	---	
	Hill slope shallow soils	Finger millet	No change	---	
		Prosomillet	No change		

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** **1 st week of July**	**Upland** **medium deep to shallow soils**	Rice	Prefer very early matured varieties (Ratnagiri –73, Karjat -184)	Sowing of sprouted seeds	Linkage with Maharashtra State Seed Corporation
		Finger millet	Cowpea (Var. Konkan Sadabahar), Black gram (TPU- 4) Oil Seed like niger (Var. IGP 76)	-	
		Prosomillet		-	
		Groundnut	Prefer short duration variety (SB- XI, TG -26)	-	
		Niger	No change	--	
		Black gram	No change	--	
	Mid-land **medium deep soils**	Rice	Early matured variety (Ratnagiri –73, Karjat –184, Ratnagiri -24)	--	Linkage with Maharashtra State Seed Corporation
	Low land **deep soils**	Rice	Mid-late duration variety (Ratnagiri 4, Palghar- 1 Palghar-2, Karjat- 5)	-	
	Hill slope **shallow soils**	Finger millet	Pulses like cowpea (Var. Konkan Sadabahar), black gram (TPU- 4) Oil Seed likenNiger (Var. IGP 76)	--	
		Prosomillet			

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** **3rd week of July**	**Upland** **medium deep to shallow soils**	**Not applicable** Note :- ** Generally such type of situation has not occurred during past years			
	Mid-land **medium deep soils**				
	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[c] including variety**	**Agronomic measures**	**Remarks on Implementation**
**** Delay by 8 weeks** **2 nd week of August**	**Upland** **medium deep to shallow soils**	**Not applicable** Note :- ** Generally such type of situation has not occurred during past years			
	Mid-land **medium deep soils**				
	Low land **deep soils**				
	Hill slope **shallow soils**				

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measues**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell at the time of transplanting	**Upland** **medium deep to shallow soils**	Rice	Increase number of seedling per hill (5 to 6) Increase 25% nitrogen dose For shortage of seedling prepare seedling by mat nursery using short duration variety.	Protective irrigation for nursery Adopt closer spacing (15 x15 cm)	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
		Finger millet Prosomillet	Increase 25% nitrogen dose Adopt closer spacing (15 x15 cm)	Protective irrigation after transplanting	Use water from the outside sources like farm ponds, nalas, streams, rivers, etc.
		Groundnut	No change	---	
		Niger		---	
		Black gram		---	
	Mid-land **medium deep soils**	Rice	Increase number of seedling per hill (5 to 6) Increase 25% nitrogen dose	Protective irrigation	Use water from the outside sources like farm ponds, nalas, streams, rivers for puddling operation
	Low land **deep soils**	Rice			
	Hill slope	Finger millet	• Increase 25% nitrogen dose	-	

	shallow soils	Prosomillet	• 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	**Upland** **medium deep to shallow soils**	Rice	Adopt weed management practices	Protective irrigation Apply split dose of Nitrogen after restart of rains	
		Finger millet			
		Prosomillet			
		Groundnut	Mulching with tree lopping or glyricidia leaves. Adopt weed management practices with dry land weeder	Protective irrigation	
		Niger	-		
		Black gram	-		
	Mid-land **medium deep soils**	Rice	Adopt weed management practices Protective irrigation	Maintain the existing water level in the field. Apply split dose of Nitrogen after restart of rains	
	Low land **deep soils**	Rice			
	Hill slope	Finger millet		Apply split dose	

	shallow soils	Prosomillet	Adopt weed management practices Give protective irrigation if possible	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	-	
		Finger millet			
		Prosomillet			
		Groundnut	Mulching with tree lopping or glyricidia leaves Protective irrigation		
		Niger	-		
		Black gram	-		
	Mid-land **medium deep soils**	Rice	Protective irrigation	Maintain the existing water level in the field.	
	Low land **deep soils**	Rice			
	Hill slope **shallow soils**	Finger millet	-		
		Prosomillet			

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 medium deep to shallow soils**	Rice	Harvest crop at physiological maturity	Cowpea, groundnut, water melon, leafy vegetables, raising of seedlings for chilli, brinjal, cabbage, knol knol	
		Finger millet			
		Prosomillet			
		Groundnut			
		Niger			
		Black gram			
	Mid-land medium deep soils	Rice	Protective irrigation Harvest crop at physiological maturity	Horse gram, cowpea, water melons cucurbitaceous crops Leafy vegetables, Raising of seedling for chilli, brinjal, cabbage, knol kol	
	Low land deep soils	Rice		Sow field bean, horse gram, cowpea, mustard green gram on residual moisture.	
	Hill slope shallow soils	Finger millet	Harvest crop at physiological maturity	----	
		Prosomillet			

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 season)	Prefer early duration variety (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	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**
		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.	Maharashtra State Seed Corporation
		Pulses (Cowpea, Horsegram, Green gram)	No change	If other source of irrigation is available sow the crop as per schedule.	
		Vegetables	Prefer short duration vegetable and leafy vegetables	If other source of irrigation is available sow the crop as per schedule.	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	**Mid and low land Medium deep to deep soils**	Rice (Rabi season)	Prefer duration variety in low land situation (Ratnagiri 73, Ratnagiri -1) Grow short duration pulses, groundnut, vegetables in midland situation	Use SRI Technique of rice cultivation	
		Groundnut	Prefer short duration variety (Phule Pragati,)		
		Pulses (Cowpea, Horsegram, Green gram)	No change	-	
		Vegetables	Leaf Vegetables, Cucumbers	--	
		Water melon	Short duration pulses	--	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of monsoon in catchment	**Mid and low land Medium deep to deep soils**	Rice (Rabi season)	Field bean, horse gram black gram, cowpea, mustard on residual moisture under low land situation	Minimum tillage and sowing of seed by dibbling.	
		Groundnut	If farm pond water is available go for short duration pulses and leafy vegetables	-	
		Pulses (Cowpea, Horsegram, Green gram)			
		Vegetables			
		Water melon			

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	
		Groundnut	If farm pond water is available go for short duration pulses and leafy vegetables	Minimum tillage	
		Pulses (Cowpea, Horsegram, Green gram)			
		Vegetables			
		Water melon			

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	----	----	Drain out water and harvest the crop before lodging	Immediate threshing and drying in shed
Finger millet	----	----	Harvest the crop before lodging	-do-
Groundnut	----	----	Drain out water and harvest the crop immediately	Separate the pods immediately and dry in shade.
Niger	----	----	-	-
Black gram	----	----	Harvest the crop at physiological maturity	Immediate threshing and dry in shed
Horticulture				
Cucurbits	Drain out excess water	Drain out excess water	Drain out excess water	-----
Mango	If heavy rainfall is occurs during 15th July to 15th Aug. postpone paclabutrazol application till congenial condition arrives to induce early flowering (Dose of Paclabutrazol @ of 0.75 g/ a.i. per meter average canopy diameter)	-	-	-
Cashew	--	-	-	-
Banana	Drain out excess water	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
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 water	Drain out excess water	-----
Mango	Prune the broken branches and apply carbaryl (50WP) mixed with Bordeaux paste on cut surface and trunk.	----	Collect and utilize fallen fruit immediately for suitable processing	----
Cashew		----	----	----
Banana	Drain out excess water Do staking	Flowers of broken plant may be used as vegetable	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 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	-	-
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 I trap to control fruit fly	----

Mango	Take 2 sprays at 15 days interval of Phosalone 0.05% and carbaryl 0.2 % for control of mango hopper, shoot borer . Spraying with 1% Bordeaux mixture or 0.1% carbendazim or 0.1% thiophenate methyl to control anthracnose,	Spraying with 0.2% W.P. sulphur dust or 0.05% hexaconazol or 0.1% Tridemorph to control powdery mildew	Install Rakshak I trap to control fruit fly	Dipping fruits in 0.05% carbendazim for 10 min. after harvest to control post harvest rot
Cashew	Spay with carbaryl 0.2 % after the rains 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 puddled field	Drain out excess water	Drain out excess water	Immediate harvesting, immediate 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 puddled field	• Drain out excess water • Apply dose of nitrogen after submergence is over	Drain out excess water	Immediate harvesting, immediate 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
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 Pnvel -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, Irrigate the affected area with fresh water and drain out
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	• Strengthening of creek bund and sea wall to prevent sea water intrusion • Drain out sea water,	• Strengthening of creek bund and sea wall to prevent sea water intrusion • Drain out sea	• Strengthening of creek bund and sea wall to prevent sea water intrusion • Drain out sea water, Irrigate the affected area

	and drain out • Mound the crop with soil	Irrigate the affected area with fresh water and drain out	water, Irrigate the affected area with fresh water and drain out	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	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	----
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 of damage 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 of damage or broken branches	• Proper pruning of damage or broken branches	• Proper pruning of damage or broken branches

			• Collect fallen tender nuts market it.	• Collect fallen nuts and store
Coconut	Support the young seedlings	----	Collect fallen tender nuts market it.	Collect fallen tender nuts market it.
Arecanut	Support the young seedlings	----	Collect fallen tender nuts market	Collect fallen tender nuts market it.

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 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 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 and hence should be reserved for	➢ 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 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 ingredients may be provided in	➢ Green fodder production in next Kharip season needs to be undertaken as a source of fodder at earliest. ➢ Mineral Supplementation should be continued. ➢ Concentrate feeding for productive animals so as to compensate the 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

	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. ➢ 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.	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 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.	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. ➢ 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	➢ Water resources as in general are inadequate and 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.	➢ 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 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 drought hit livestock. ➢ During occurrence of disease, affected animals	➢ Routine training programme as a refresher course need to be implemented in relation to health and disease management during

	➢ 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. ➢ Personnels should be trained for health and disease management through training ➢ 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 Mineral and Vitamins mixture. ➢ Application of preventive and control measures of SP & MD.	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. ➢ 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	drought with stock of life saving medicine for livestock. ➢ There will be stress on animals due to deterioration of health during drought period. ➢ Concentrates and vitamin-mineral supplements be provided to minimize the 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 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	➢ 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	➢ 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

	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. 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	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 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	to be distributed. ➢ Mineral Supplementation should be continued. ➢ Concentrate feeding for productive animals so as to compensate the 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/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.

	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 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	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.	➢ *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.

	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 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	➢ 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	➢ 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

	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	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 availability only.	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.

	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 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 be given. ➢ Awareness amongst farmers	➢ 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 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. ➢ Vaccination against HS, BQ and FMD in bovines	➢ 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-emerging diseases. ➢ Proper disposal of carcass is very important in flood affected areas from public health point of view

	regarding 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.	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.	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**	**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**
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	➢ Permanent water resources should be 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.	➢ 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 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 feed	➢ 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	➢ 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

	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.	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.	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 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 compulsor	➢ 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		
Flood	**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.	➢ 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.	➢ 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

	➢ 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.	➢ Adequate nutrition should be given to birds to keep their health in proper condition. ➢ Judicious use of available feed.	resources should be 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. ➢ 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		
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 affecting areas with stock of medicine, mineral mixture and vaccine for poultry.	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,	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.

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

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	In severe drought condition Most of the stock can be harvested immediately while Some portion of the local aquatic species should be	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.	transfer to the less affected areas so as to conserve them and reintroduce in its regional habitat.	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. *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 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 socio-economic 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 teams in flood prone areas.	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	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, *dengue* 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.	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 socio-economic 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	Timely aid to coastal populations at 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.

	fishermen to carry safety devices on their fishing crafts.	provided with adequate food & medicines in time.	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